Master of Science in Biomedical Communications
Viewbook 2023

"Creativity is allowing yourself to make mistakes..."

MScBMC Viewbook 2023

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Showcasing work by the graduating class of 2023 from the Master of Science in Biomedical Communications at the University of Toronto

Edited by Amy Assabgui Dogan, Aimy Wang, Tracy Xiang, and Ke Er (Amy) Zhang

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Foreword

With the publication of the 5th annual Viewbook, we celebrate the achievements of the BMC Graduating Class of 2023.

The 2T3 Viewbook is a testament to the ingenuity and creativity of this spirited cohort. This was a year of many firsts for our program. We saw our first collaboration with Ingenium, a crown corporation that oversees three national museums (the Canada Agriculture and Food Museum, Canada Aviation and Space Museum and the Canada Science and Technology Museum). Another first came in the form of a VR project, undertaken in collaboration with the Institute of Medical Science. This year also provided us with additional exemplars of collaboration in the form of two team Masters' Research Projects.

While, a result of the pandemic, this cohort experienced its share of challenges, the class of 2T3 navigated this ever-shifting terrain with resolve, producing the beautiful work displayed throughout this volume. The talent demonstrated by this group is abundantly evident in the pages that follow.

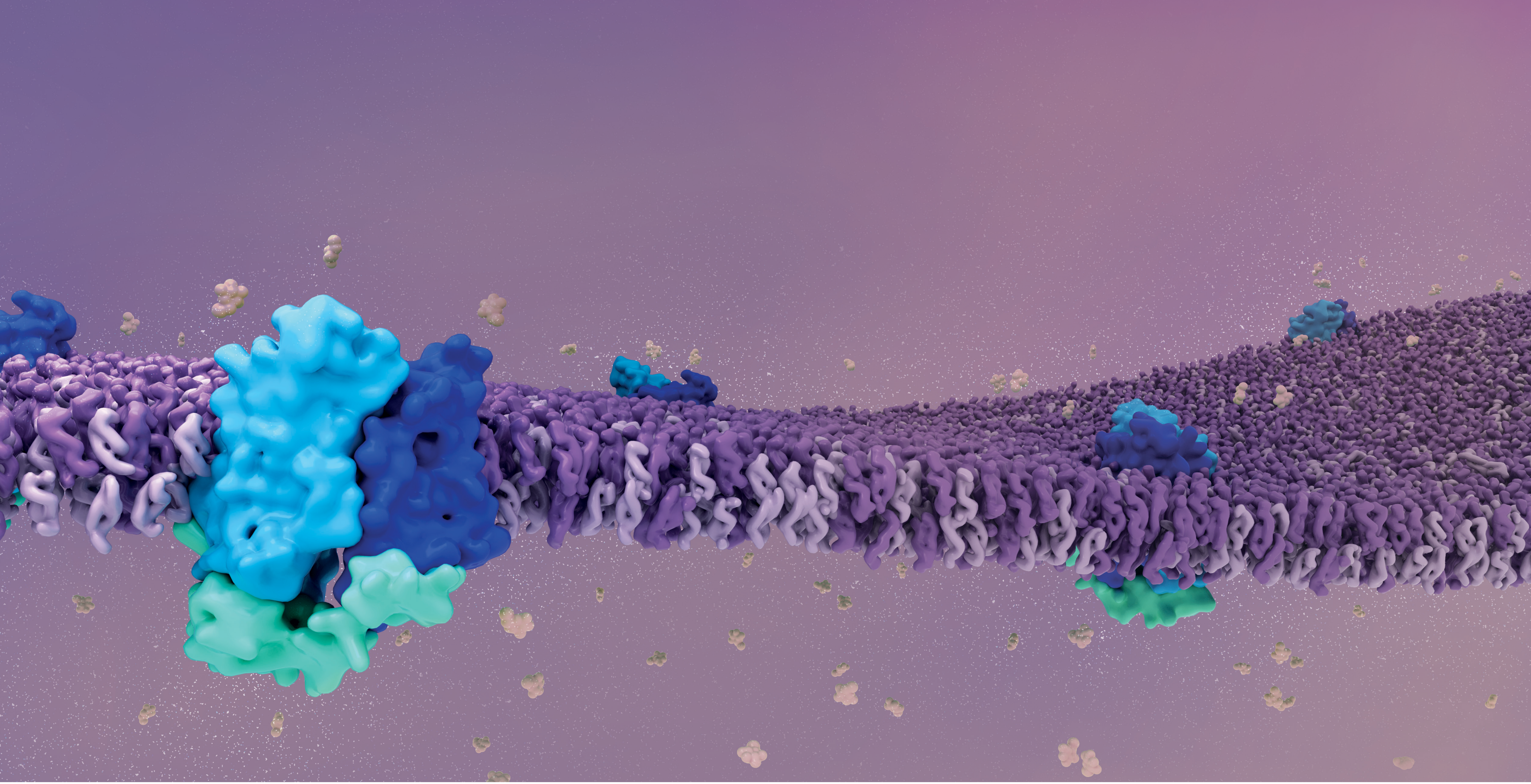
Over the course of the COVID-19 pandemic we've learned a great deal about the importance of community. As you embark on your professional careers, you will be joining a thriving community of BMC alumni.

We are, as ever, very thankful for the energetic and generous community that is the BMCAA. In particular, we would like to express our gratitude to the BMCAA Viewbook team, led by Amy Assabgui Dogan (2T2), and including Ke Er (Amy) Zhang (2T2), Aimy Wang (2T2), and Tracy Xiang (1T9), for their continued hard work in designing and producing this wonderful volume.

A heartfelt congratulations to the many creative minds that comprise the class of 2T3.

— Jodie Jenkinson and Michael Corrin, September 2023

Legend



Elmira Amini

As a healthcare professional, I used visual narratives to communicate with patients about their ongoing conditions, and witnessed the power of this communication tool. During my time at BMC, I focused on visual communication of health information to public audiences in ways that improved understanding and behavioural intentions. Through my passion and skill, I hope to create designs that help individuals stay informed, and to be active participants in their own health.

Molecular Visualization

GLUT1 is a membrane protein responsible for the facilitated diffusion of glucose across a membrane. This molecular visualization introduces different subunits of this transporter through the cell membrane and the role of inactivating mutations in compromised transport of glucose, leading to GLUT1 deficiency syndrome.

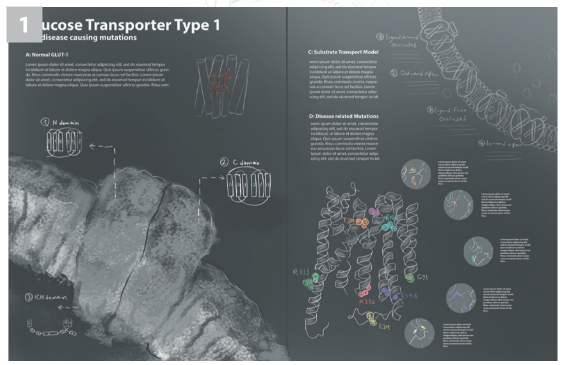
1. Sketch. I went through several rough sketches to inform the layout. I took into consideration the reading order, and flow of the information across the spread.

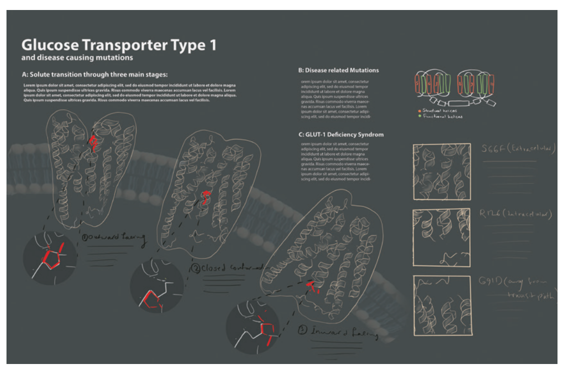
2. Production process. I used Protein Data Bank (PDB) assets directly in the first draft to inform the structure of GLUT1.

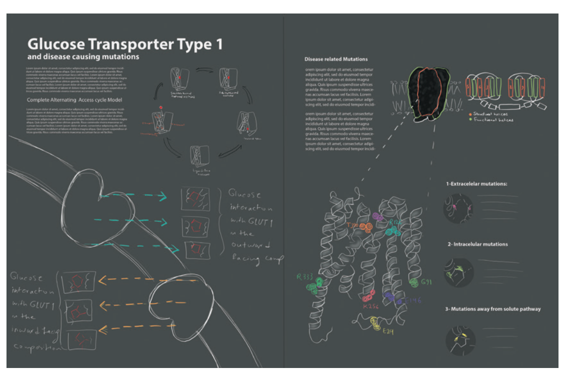
3. Final illustration. I updated the draft with the accurate orientation of the transporter in relation to the membrane and superimposed a 3D representation of the transport channel in its glucose-bound state.

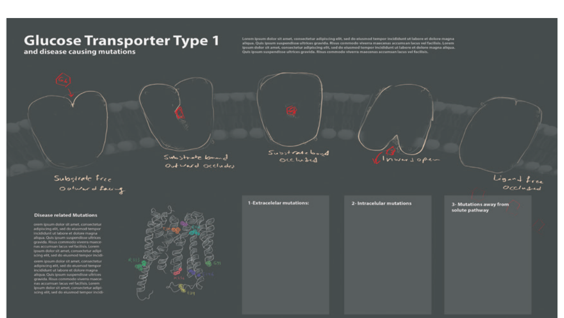
4. Production process. Different visual representations of topology structure for transmembrane helices rendered in Maya.

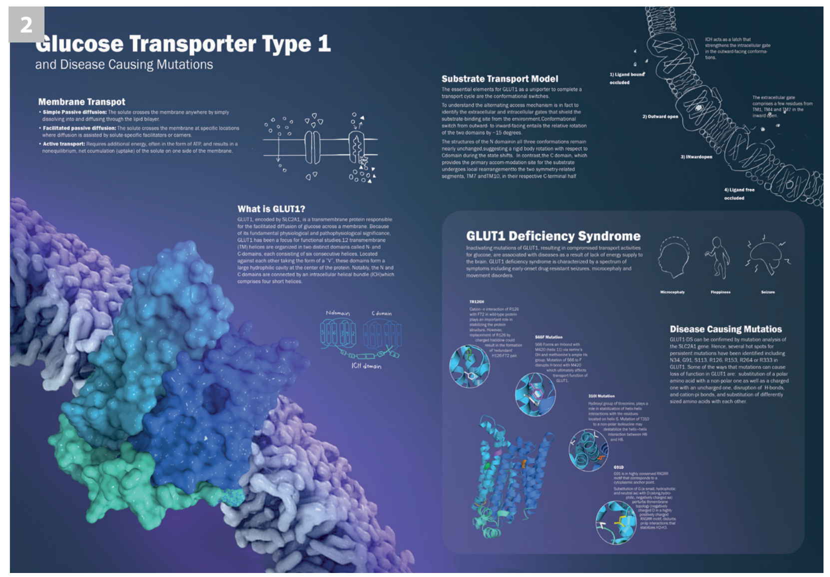
Previous spread. A shot of the cell membrane used in my molecular visualization spread.

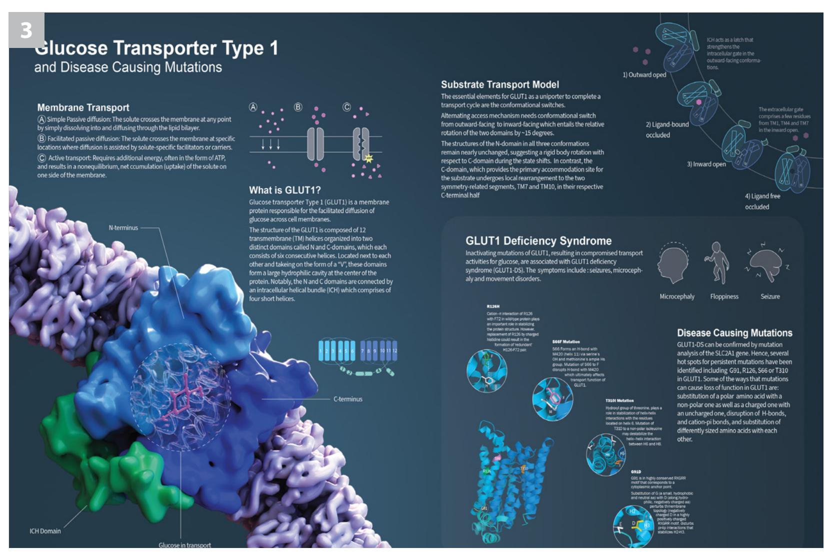


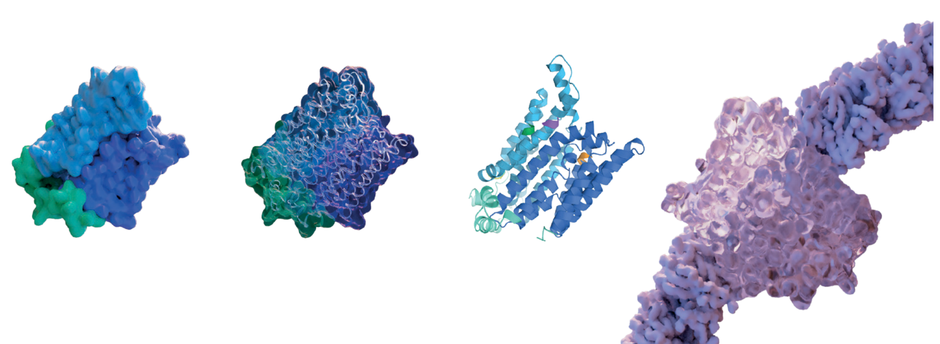


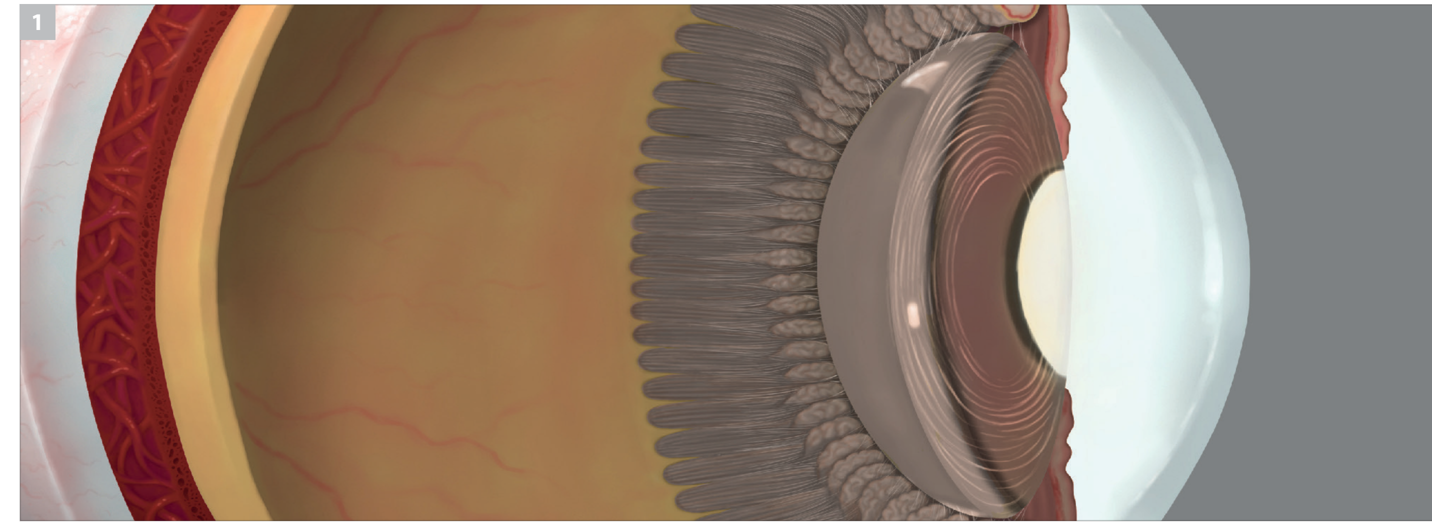


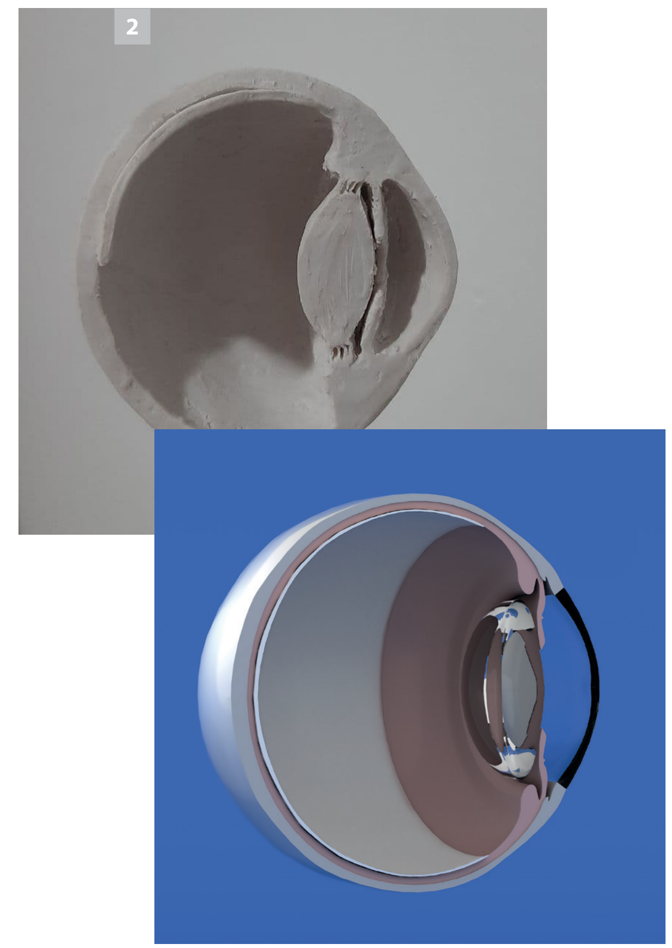


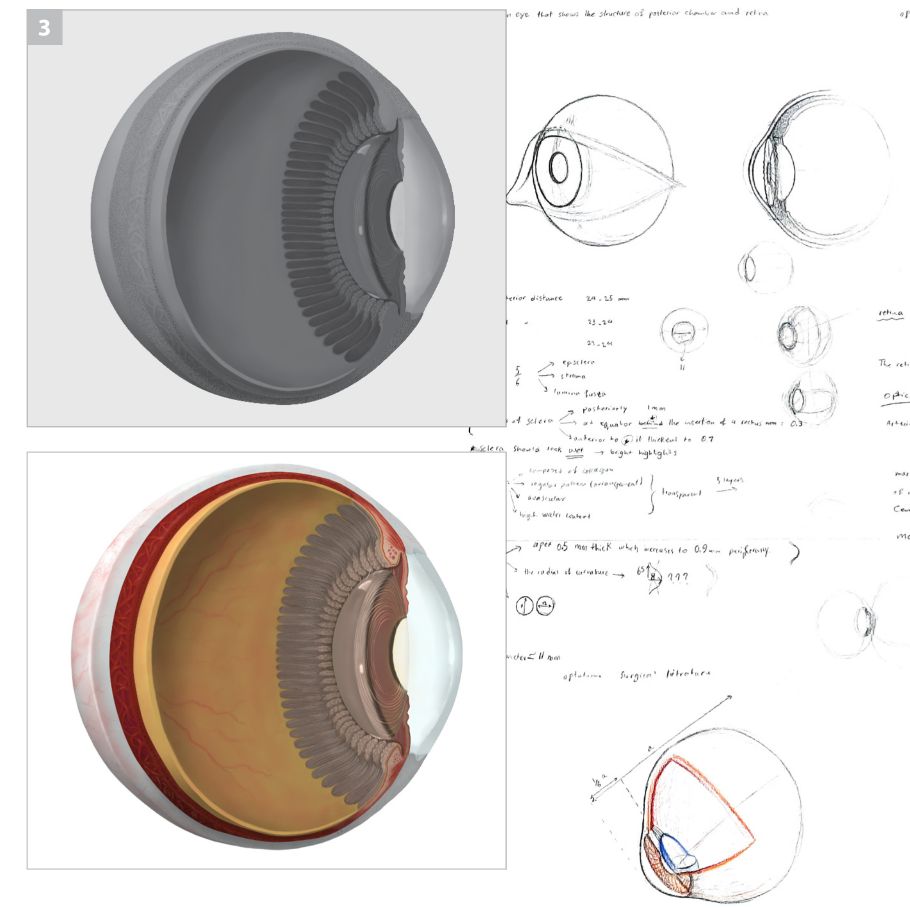












Anatomical Illustration

This illustration visualizes the posterior chamber of the human eye. The goal of this project was to create a structurally accurate and realistically illuminated human organ from a non-standard viewpoint we cannot directly observe.

1. Final illustration. A close-up of the final render focusing on how lighting suggests form, volume, and texture of the lens and posterior chamber of the eye.

2. Production process. I made a simple physical maquette out of modelling clay to choose a view that allowed for the better communication of the posterior chamber and ciliary body. Later, I built a rough 3D model based on measurements indicated in anatomical texts.

3. Production process. After planning the intended cut and viewpoint of the eye, I created a rendering using a greyscale palette and then colourized it in Photoshop.

Editorial Illustration

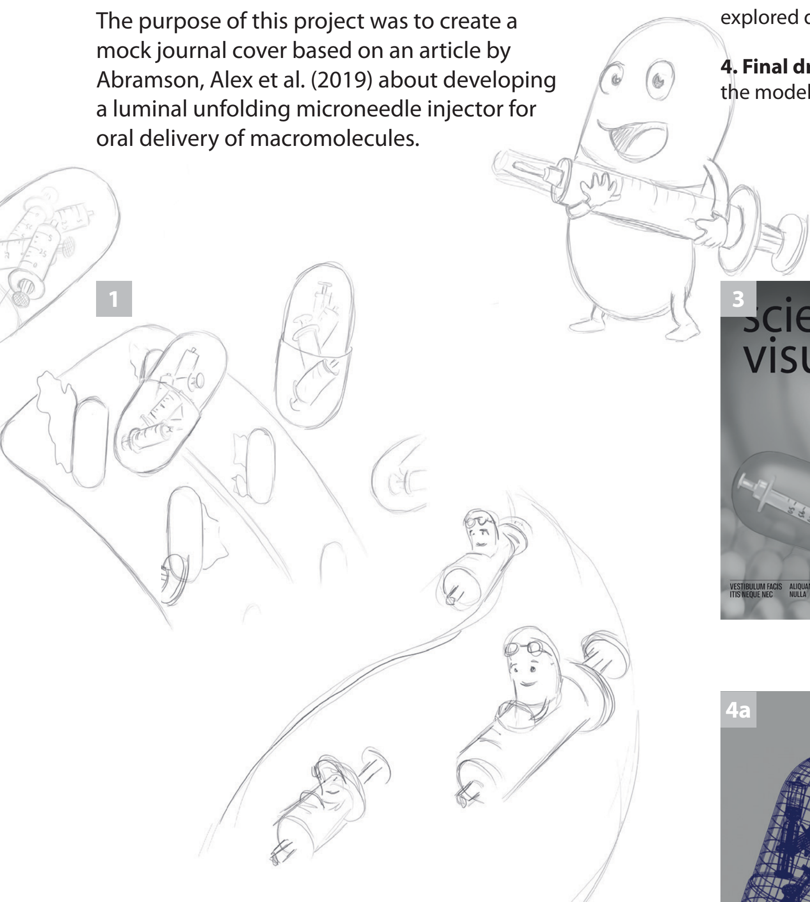
The purpose of this project was to create a mock journal cover based on an article by Abramson, Alex et al. (2019) about developing a luminal unfolding microneedle injector for oral delivery of macromolecules.

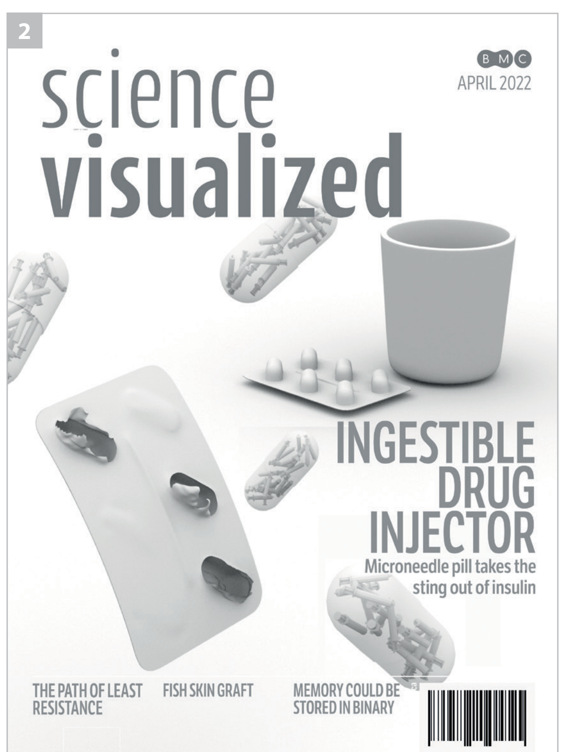
1. Sketch. I typically do some rapid visualizations to bring my ideas into the physical world.

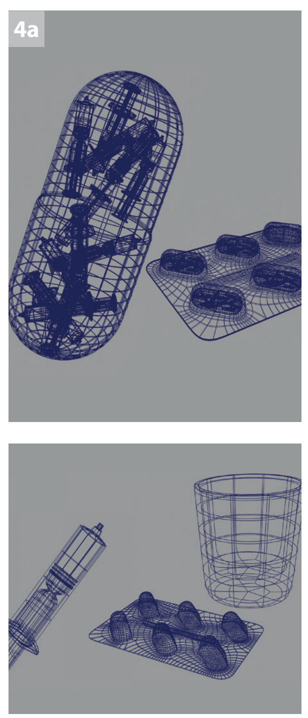
2. 3D modelling. Playblast preview of the 3D models.

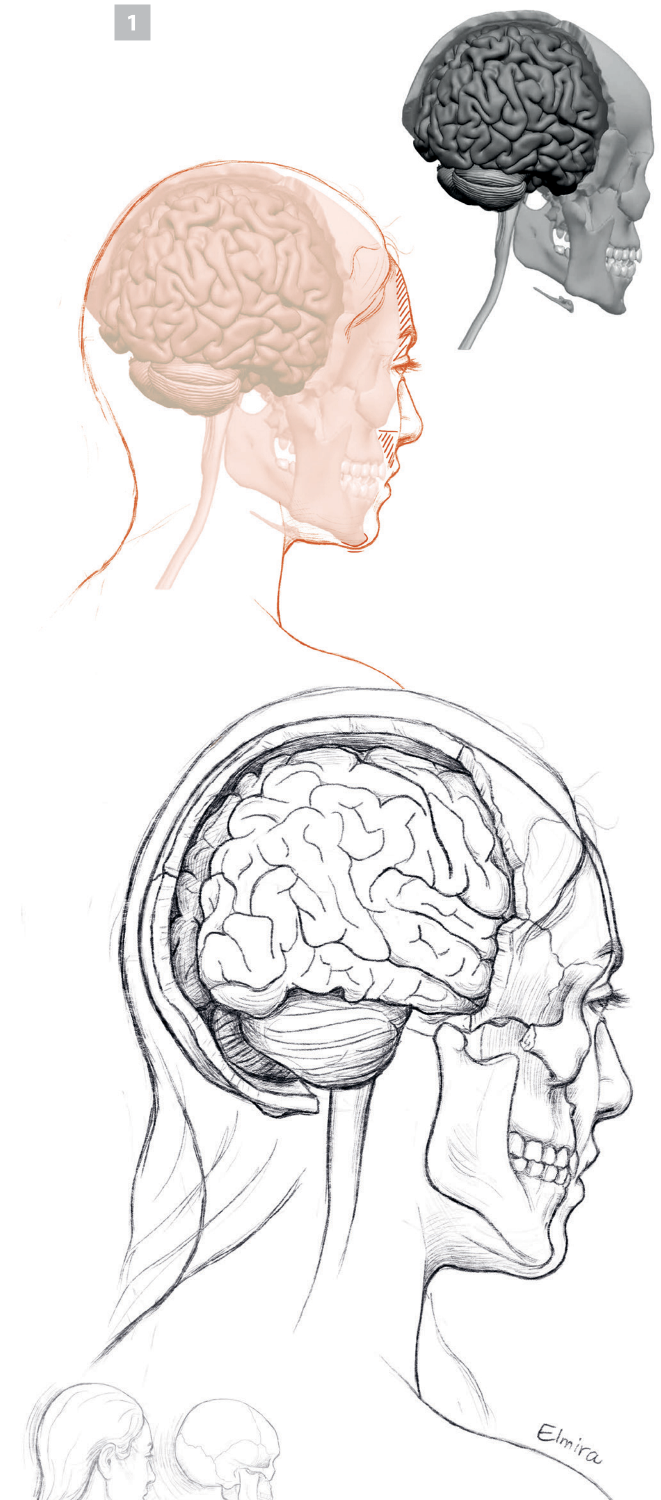
3. Sketch. After deciding on the objects that would summarize the research concept, I explored different compositions to find one that had the most potential.

4. Final draft. A look at the final cover and the 3D assets within it. **4a.** Wireframe preview of the models and final journal cover images. **4b.** Final cover. **4c.** A close-up of final illustration.



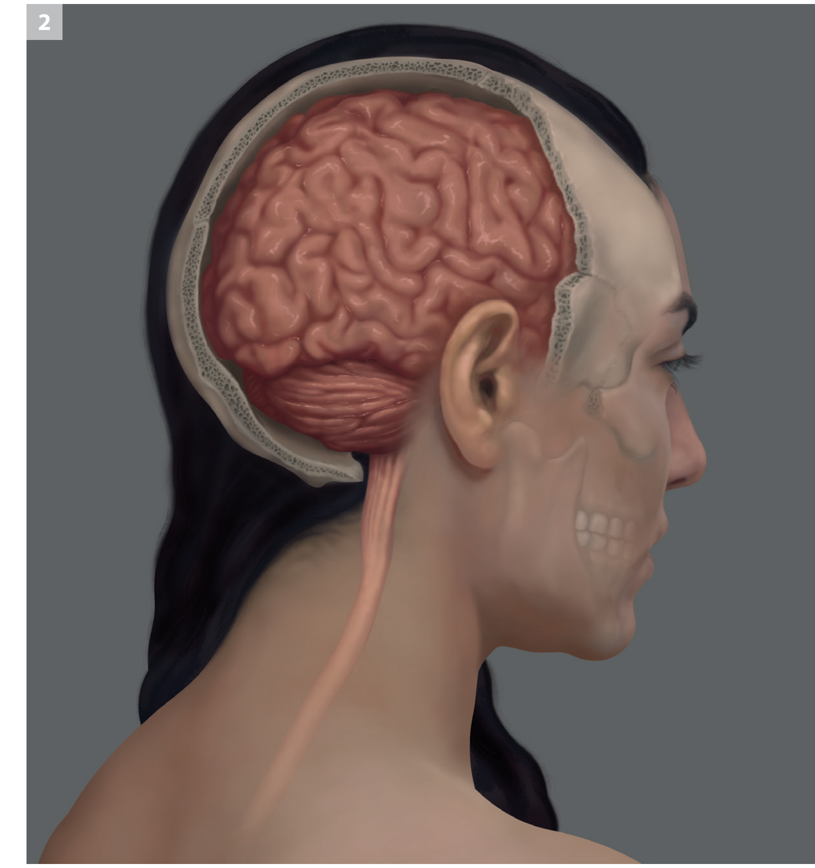


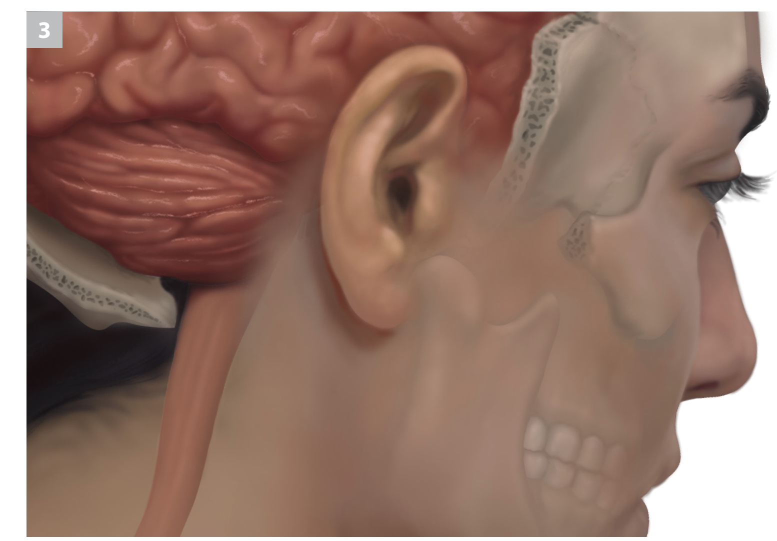




Neuroanatomical Illustration

This neuroanatomy self-portrait intends to show the accurate orientation of the brain in relation to the cranium, cervical spine, and exterior features of the head from a unique viewpoint.





1. Sketch. Although I used 3D models of the human cranium and brain as reference, I had to modify the shape of the skull and proportions of the bones so that it matched the surface anatomy of my head and face.

2. Production process. I began by blocking in the preliminary layers using the base colors relative to each area, which allowed me to paint darker colors on top, and then lighter colors on top of that. Then, I fine-tuned my work gradually by adding lights and refining details.

3. Final illustration. A close-up of the final render, showing the selective use of transparency to show bones underneath the face.

Save Our Antibiotics Together: One World, One Health

This 2D animation discusses antibiotic resistance and the interconnected nature of health across the biosphere. It explains how the use of antibiotics in farm animals can change the antibiotic resistance status in human medicine. The animation aims to raise awareness about antibiotic resistance, while encouraging people to take action against this threat.

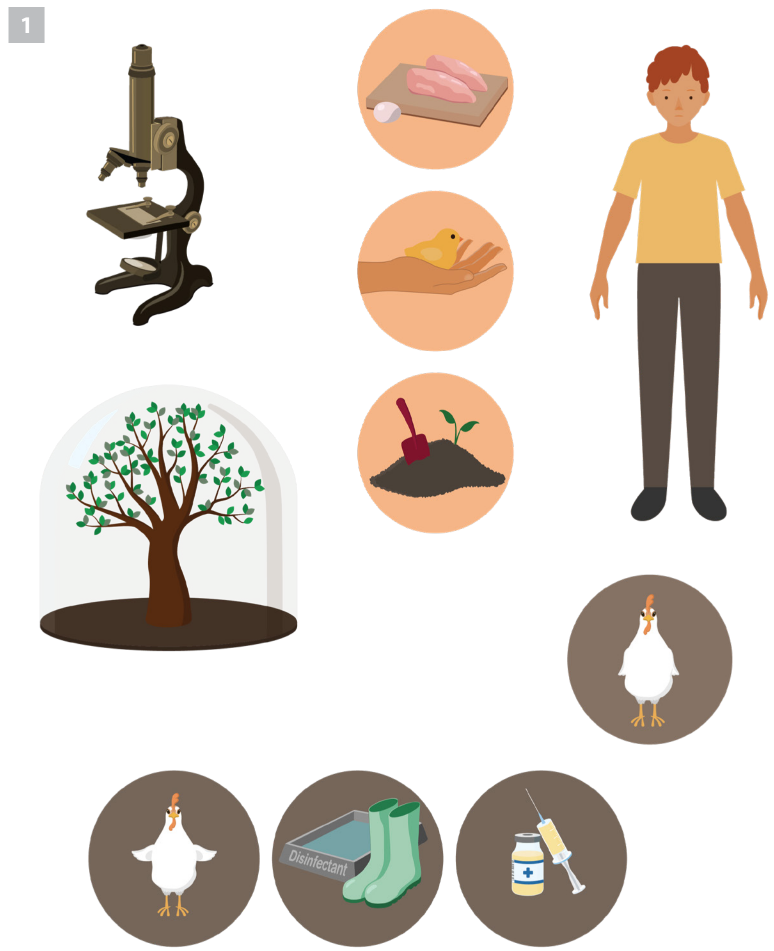
1. Production process. I created the vector assets either in Illustrator or natively in After Effects.

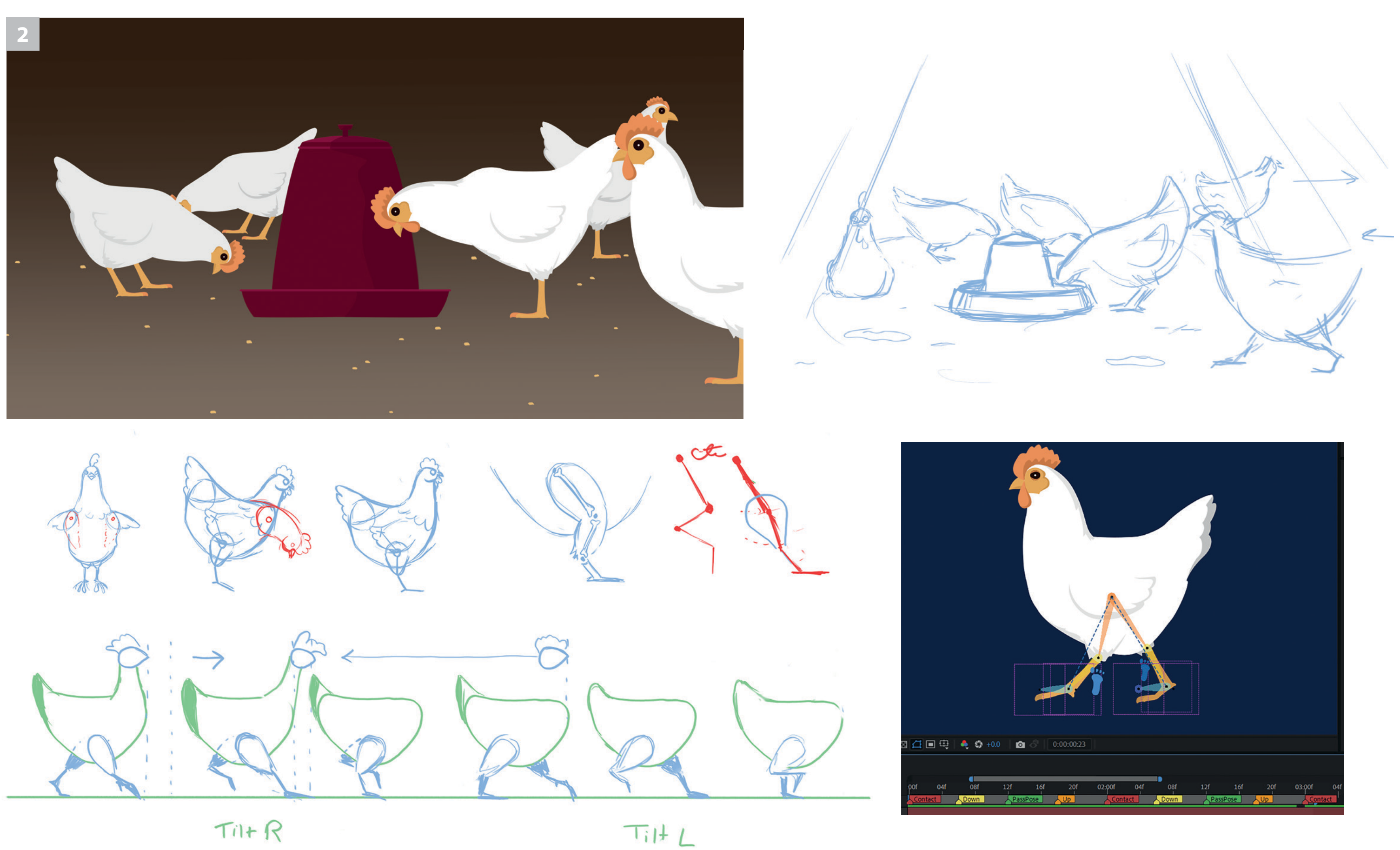
2. Production process. The process of animating chickens in a poultry farm including an image of the final frame, initial sketch, walk cycle planning, and rigging.

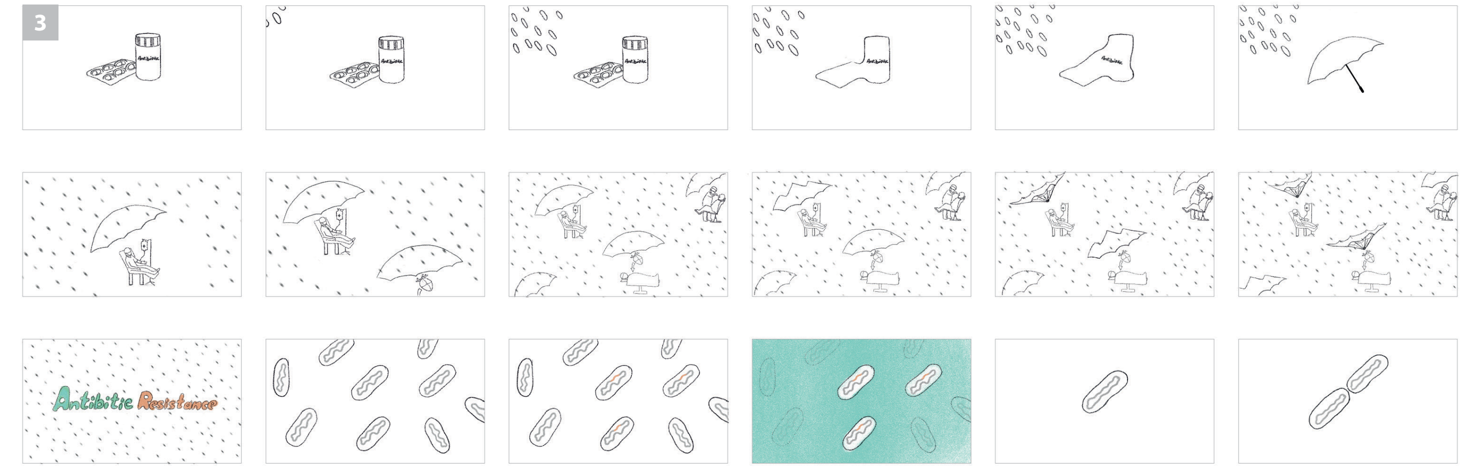
3. Storyboard. Select images of the initial storyboard.

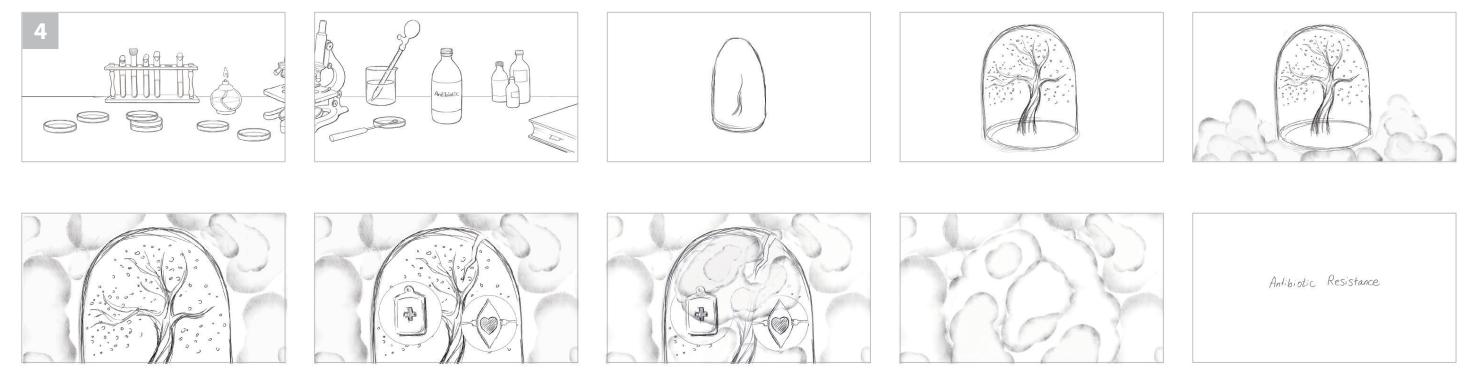
4. Storyboard. After developing the first version of my animatic, I decided to make some changes in the storytelling to make it more intuitively meaningful for general audiences. Thus, I redid many frames from scratch.

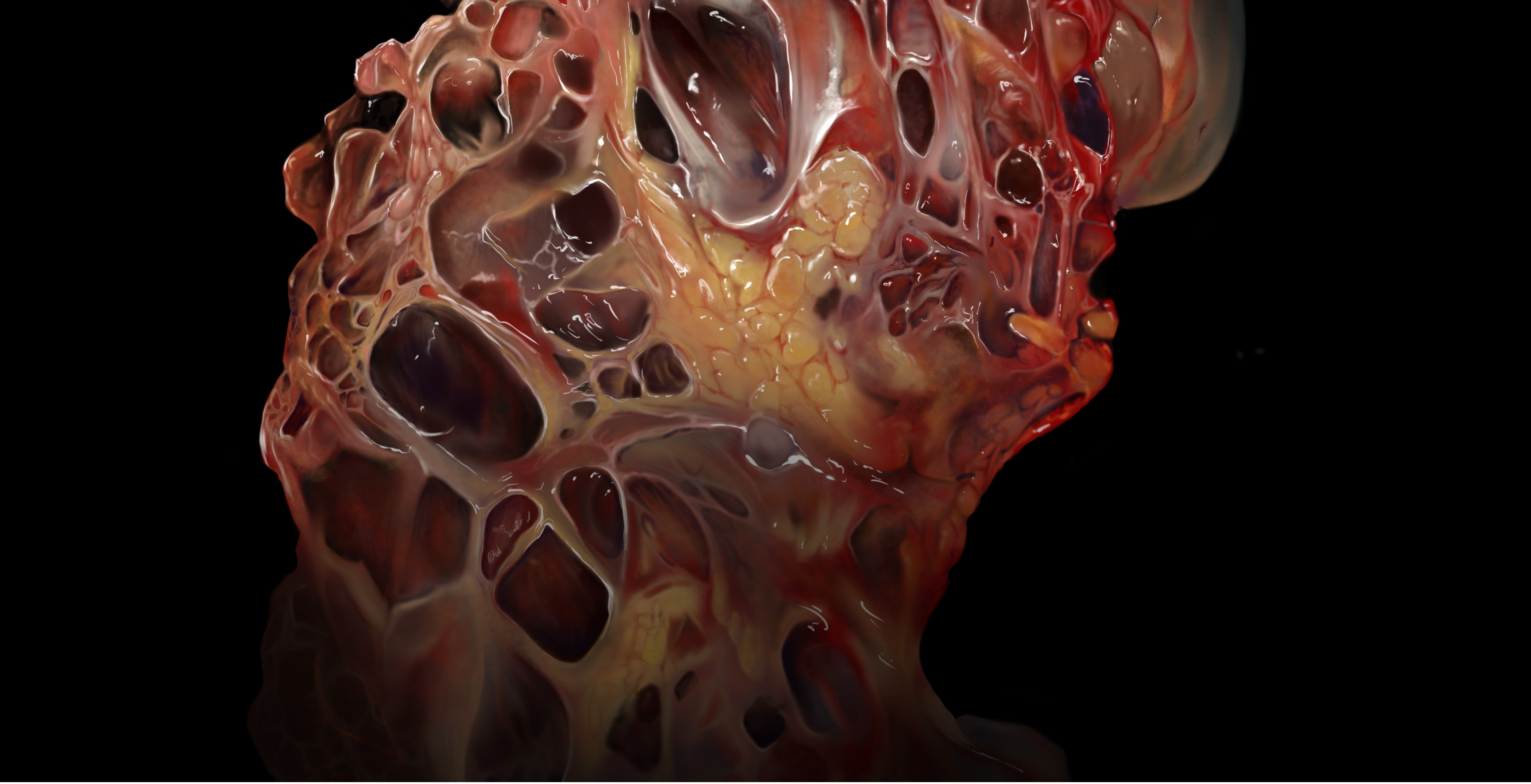
5. Production process. Some style frames and test render images. Before the animating stage, I created a custom colour palette for the animation. Then, I rendered some frames using those colors and put a greyscale filter on them to test images for luminance contrast.











Tal Bavli Ziv

An illustrator above all, I carry my traditional training through every step of the process when creating medical illustrations. Challenges, from visualizing abstract concepts to simplifying complexity, consistently inspire and elevate my work. After years of working toward this goal, I am thrilled I can finally, proudly, call myself a medical illustrator.

Information Visualization

A tri-fold spread showcasing the unique communication skills of prairie dogs, particularly their intricate, rich language skills, and other human-like social behaviors.

1. Sketch. Initial loose sketches and thumbnails.

2. Study. A value study created once the composition was chosen.

3. Production process. Layout tests, attempting to find the best way to clearly present all the relevant information.

4. Production process. Stages of development, each round of feedback resulting in changes and improvements.

5. Final illustration. Full-colour final illustration.

Previous spread. A tissue study of a polycystic kidney created digitally in Procreate.

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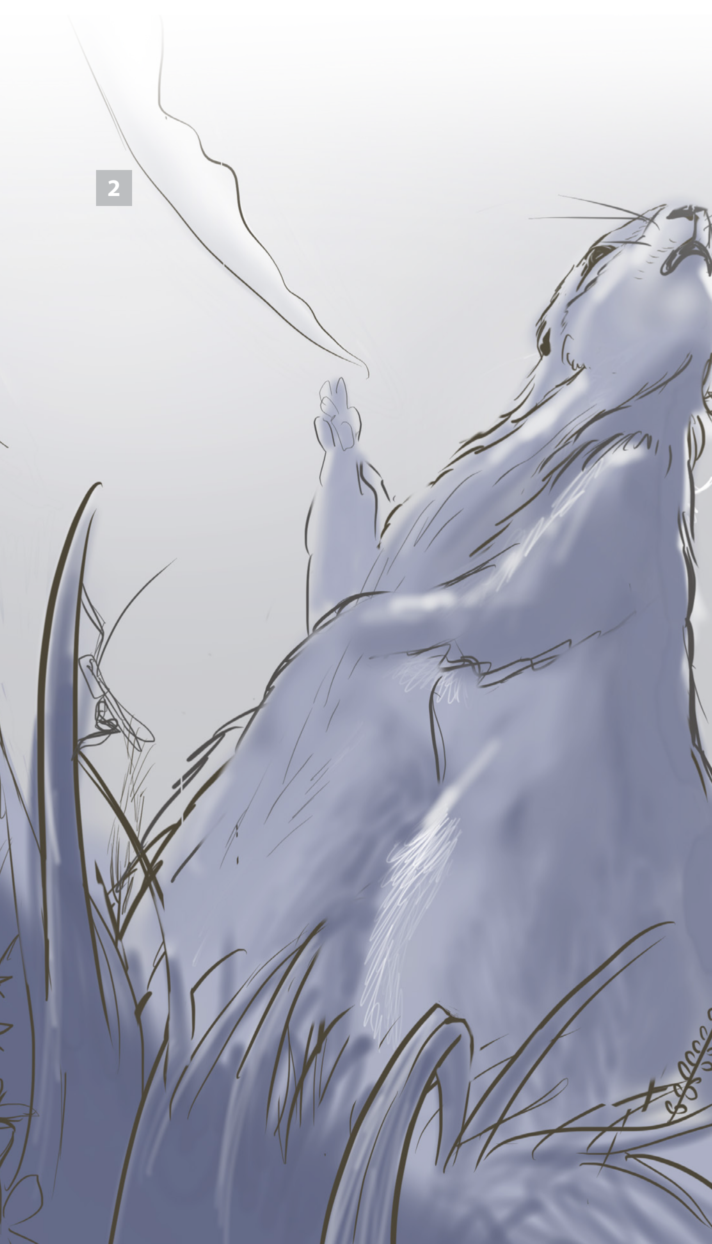

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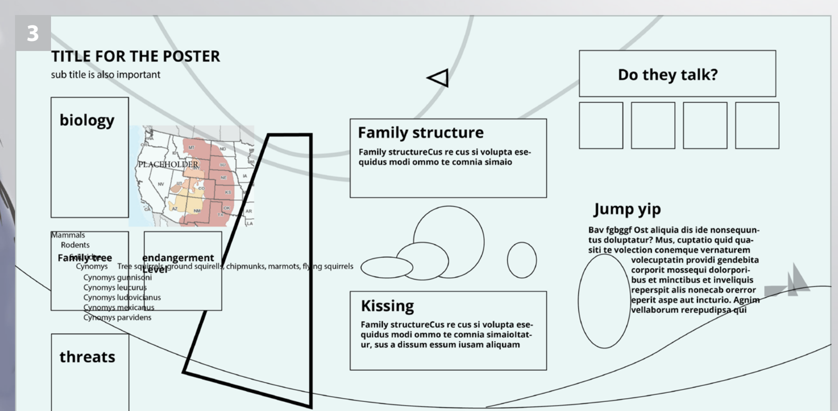

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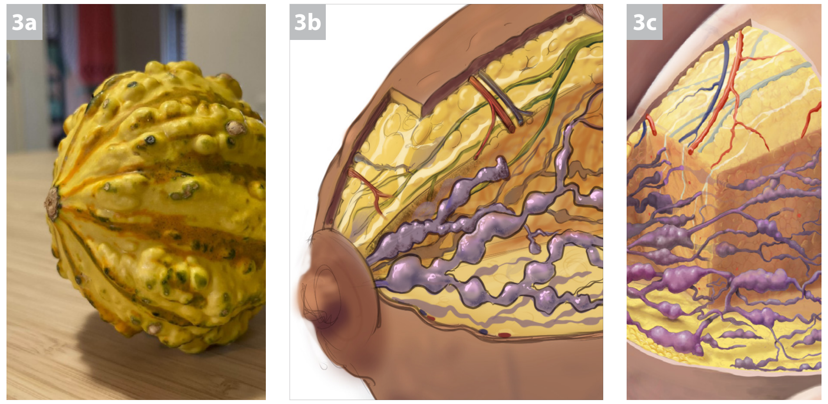
Anatomical Illustration

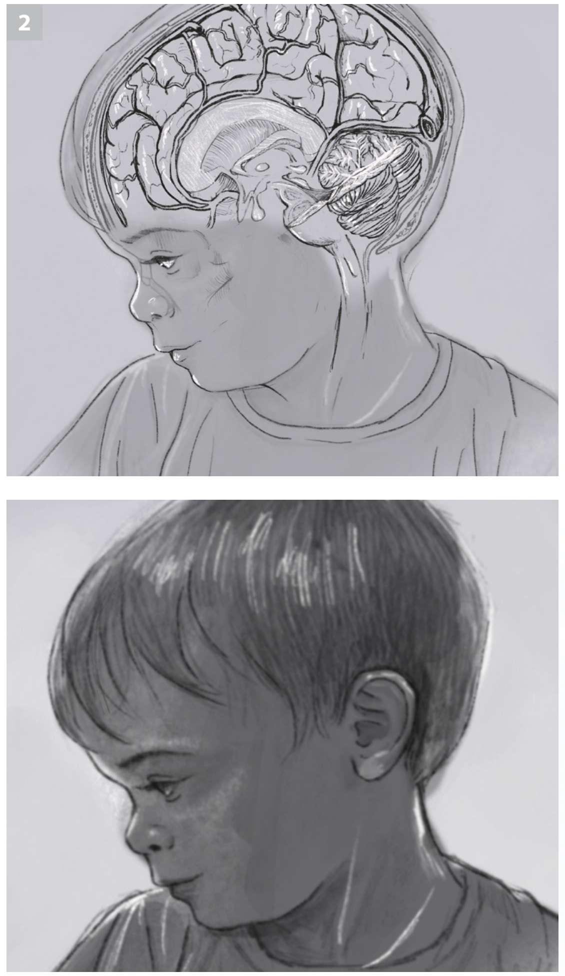
The goal of this image is to highlight not only the incredible anatomical structures that enable breast-feeding, but also the dissonance between the seemingly peaceful moment, and the effort the female body undertakes as engorgement is triggered.

1. Sketch. Sketches in different stages of development. I eventually settled on closing the infant's eyes to try to obscure their racial features, and allow the image to be a bit more inclusive through its ambiguity.

2. Final illustration. Final illustration made in Procreate.

3. Production process. 3a. I used a decorative gourd as a maquette for the milk ducts. **3b.** I attempted different cut windows, but I eventually abandoned them and kept the original view. **3c.** Sketches to final image were made in Procreate.





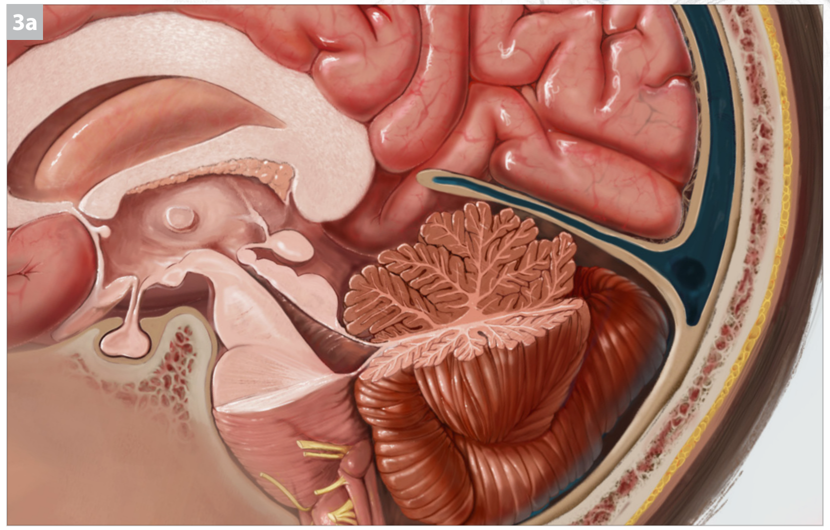
Neuroanatomical Illustration

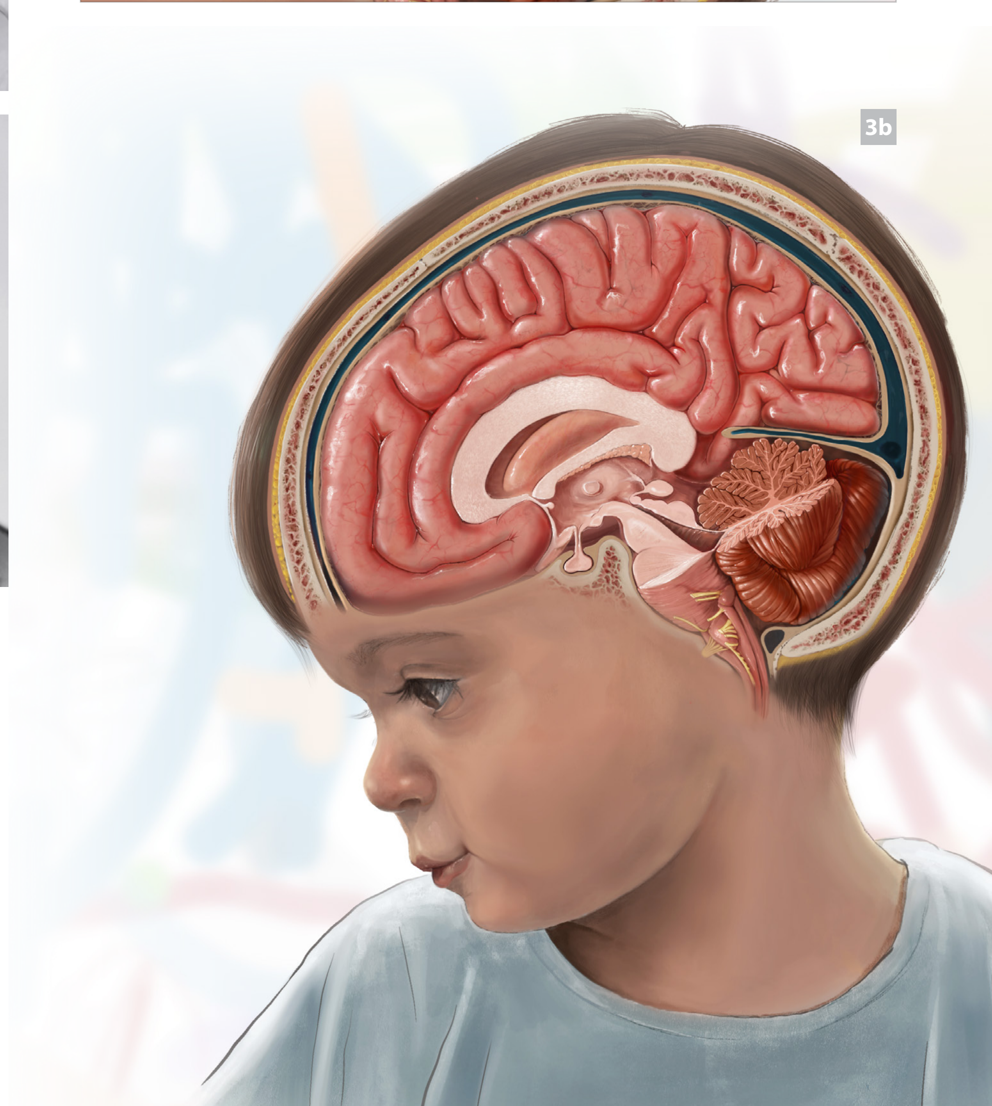
My neuroanatomy portrait focused on a pediatric brain, and I tried to include it in the major differences between and adult brain and the still developing child brain. The easiest difference to notice is the shape and width of the corpus callosum.

1. Production process. 1a. A reference photo of the 3-year-old model for this illustration. **1b.** The image used as the background in this illustration was actually made by the model himself in a moment left unattended with my iPad. I decided to include it to emphasize even more the pediatric aspect of this piece.

2. Sketch. Sketches and process stages.

3. Final Illustration. 3a. A close-up of the final piece, focusing on the selective use of transparency to show the brain within the cranium. **3b.** A close-up of the final render of the brain.





Anatomical Illustration

A collection of gross anatomy illustrations highlighting the texture of different tissues. These were all created in Procreate.

1. Final illustration. Anatomy of the posterior triangle of the neck, drawn from observation at the Grant's Museum.

2. Final illustration. Part of a surgical illustration series.

3. Final illustration. Cavernous sinus close-up. This illustratu-ion is meant to help understand the complex structure of the cavernous sinus and the important nerves and arteries that pass through it.

4. Study. Texture study of brain tissue.

5. Study. Texture study of cardiac tissue.

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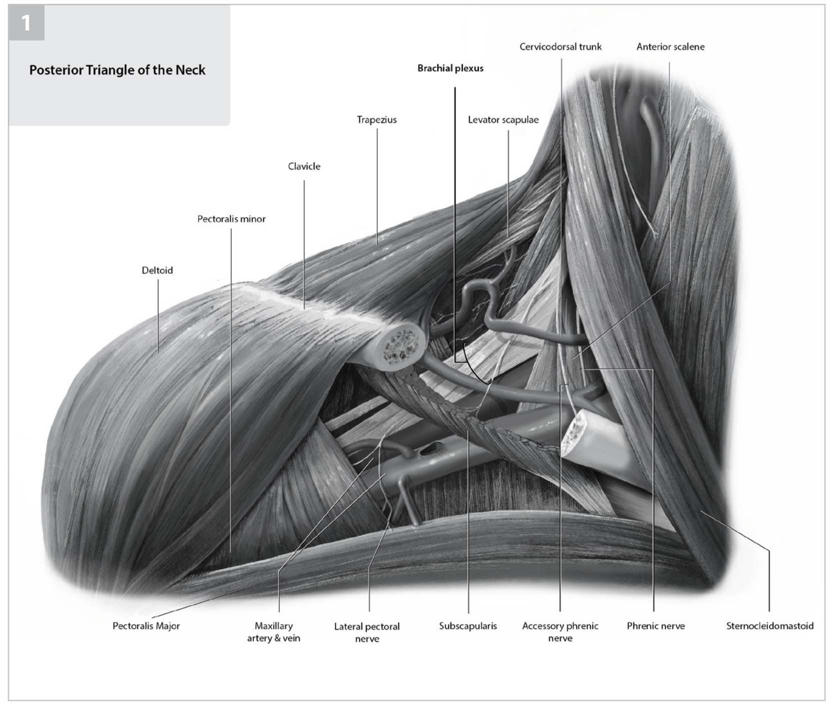

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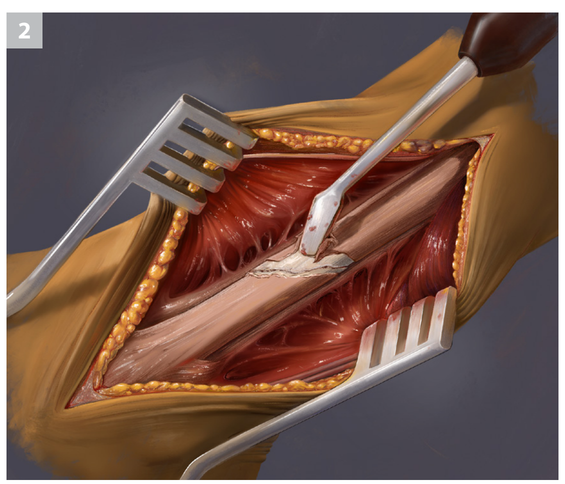

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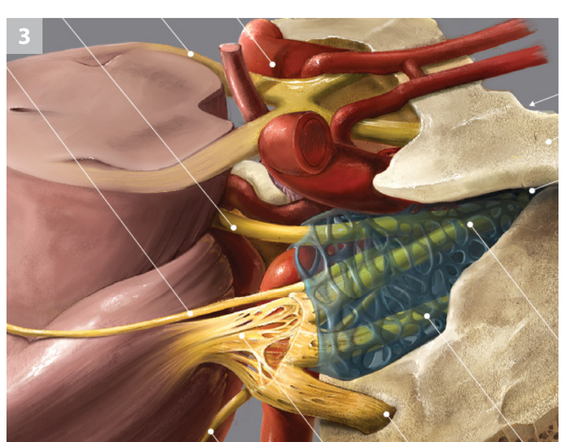

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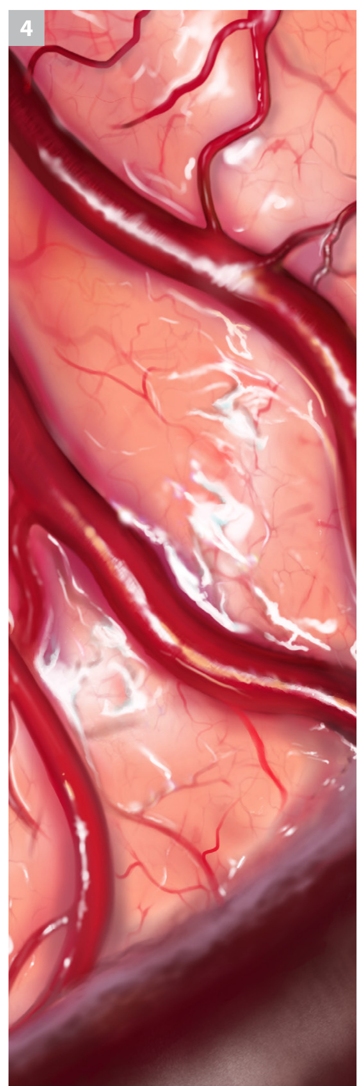

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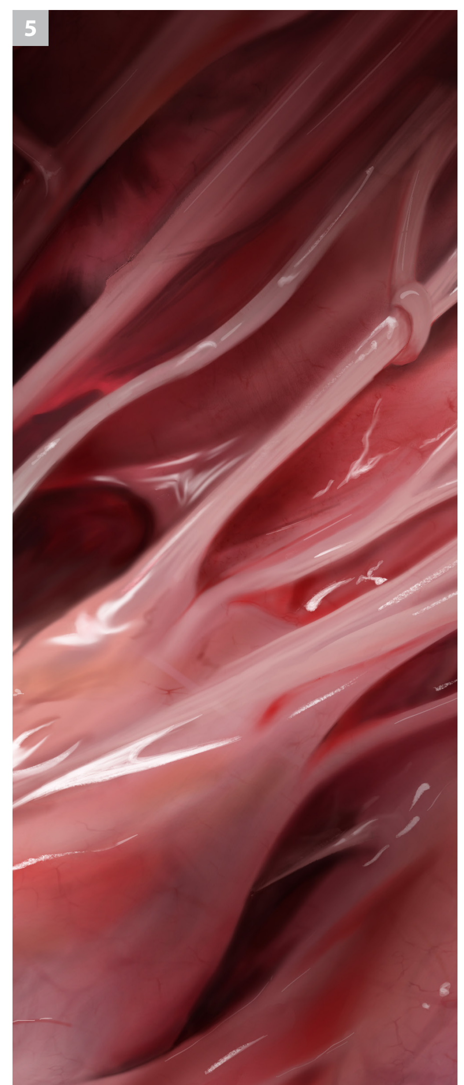

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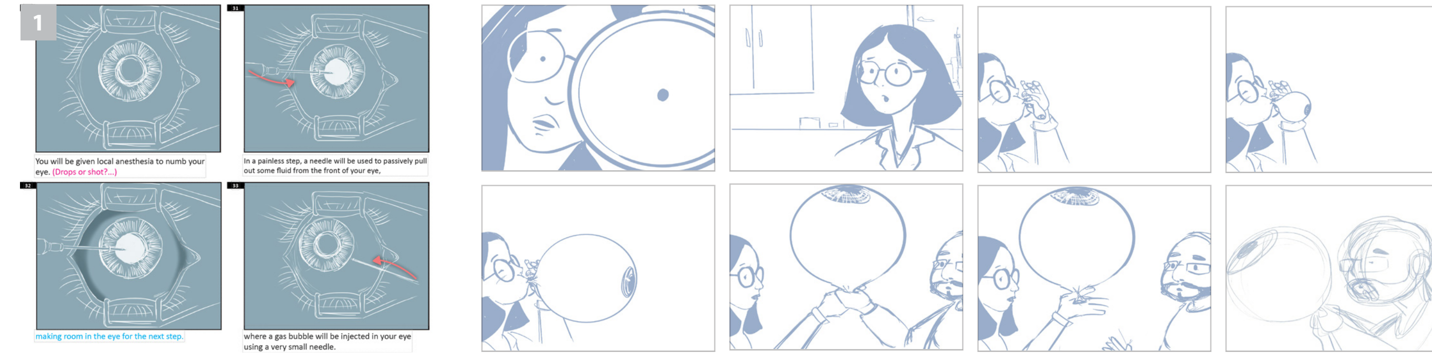

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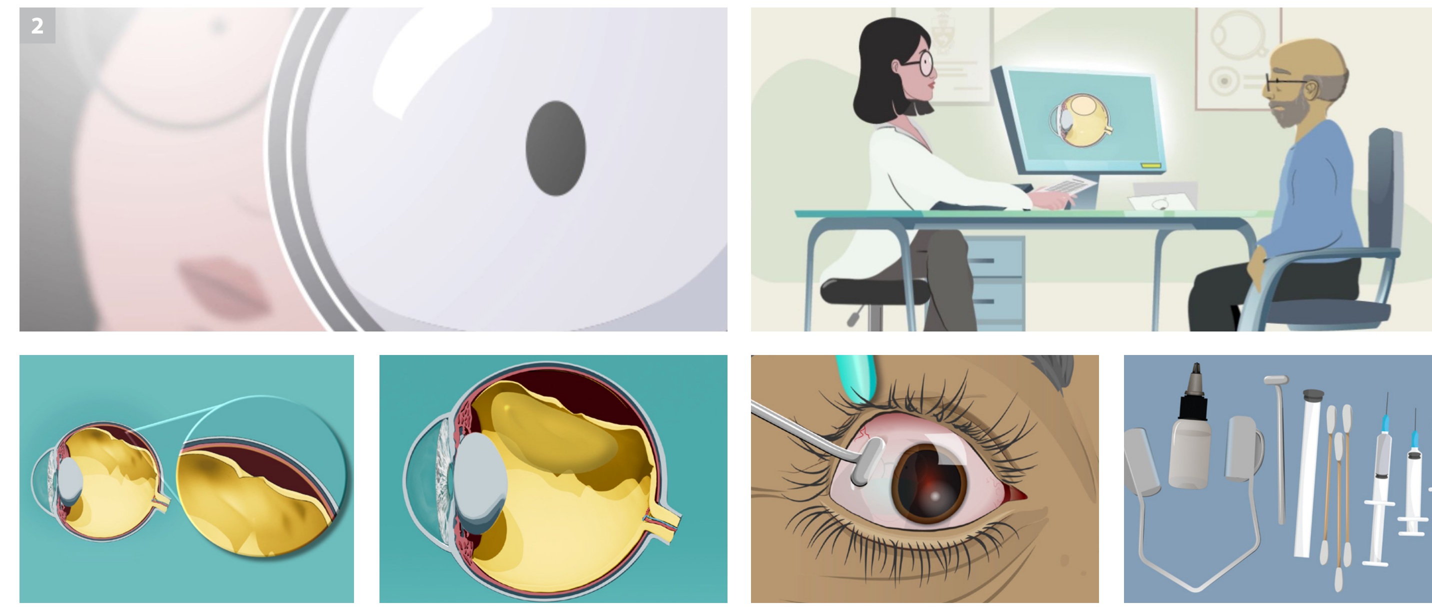

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Patient Education for Pneumatic Retinopexy

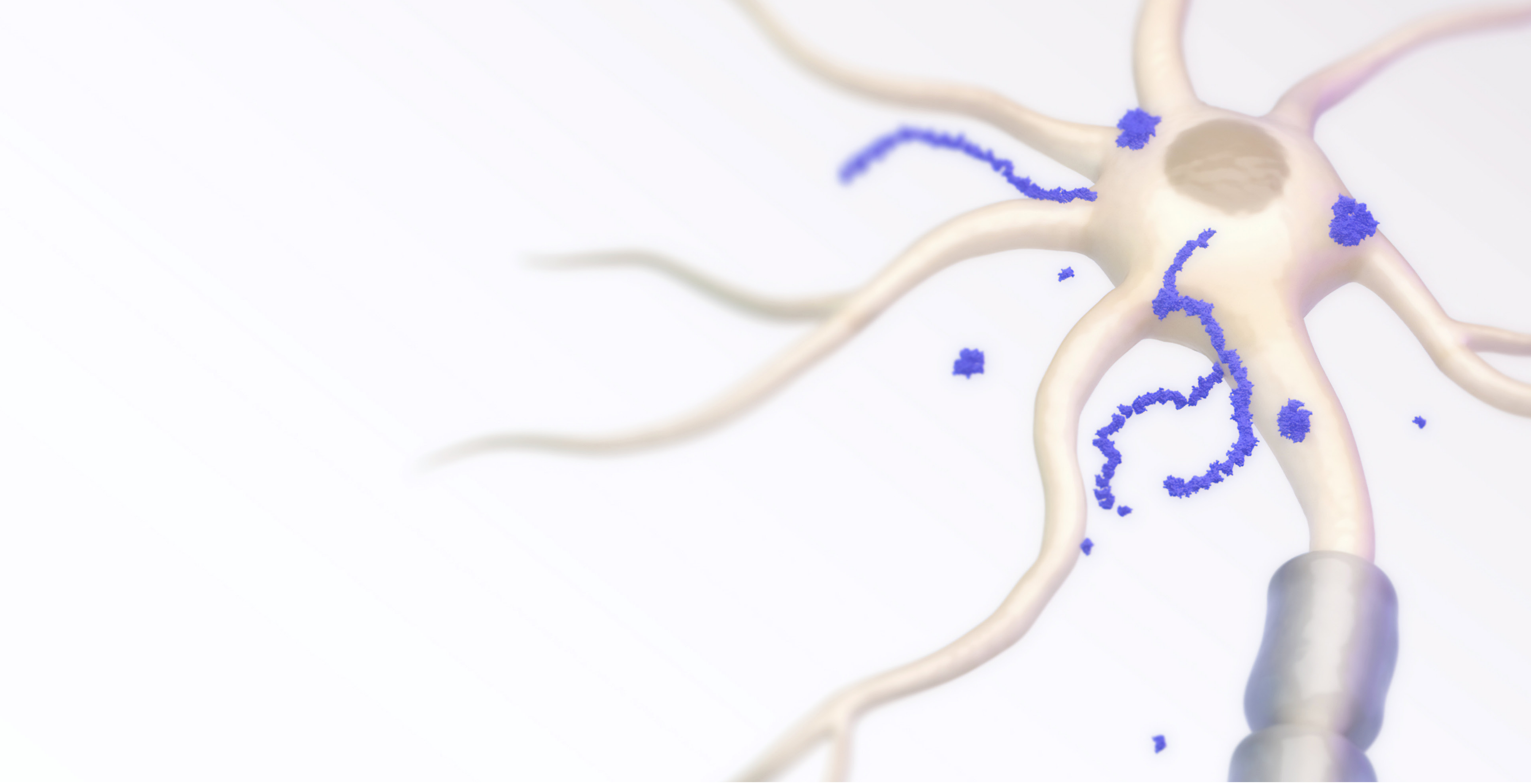
An animated video for patients about to undergo Pneumatic Retinopexy to treat a detached retina. The video takes the patient through the anatomy and pathology of their condition, the procedure itself, and most importantly, their part in the process, following postoperative instructions strictly.

1. Sketch. Initial sketches for the first version of the storyboard.

2. Final animation. Series of stills from the final animation showing the different stages of surgery and relevant anatomy.

3. Study. Character and movement study of different patients.

4. Final animation. Still from the final animation showing patient-doctor interaction.



Linda Ding

As visual communicators, we often face the task of representing experiences beyond our own. My BMC journey has led me to embrace this challenge through meaningful collaborations with peers, faculty, experts, and underrepresented voices in healthcare. These experiences shape my approach to designing through a lens of empathy, accessibility, and humanity. Beyond BMC, I hope to continue creating media that fosters connection and meaningful engagement.

Pathological Illustration

Vitiligo is a chronic autoimmune disease that results in patches of depigmented skin. This two-page spread is designed to educate readers about the condition in an engaging and approachable manner.

1. Final illustration. A close-up of the final tissue cubes illustration depicting the cellular progression of vitiligo in the skin.

2. Production process. A progression of the piece from the initial ideation stage to its completion. From left to right are the initial draft, refined draft, and final piece.

3. Study. Colour combinations from other tissue landscape illustrations were considered for the centerpiece tissue cubes illustration. I chose to move forward with a more realistic palette for clarity.

4. Final illustration. Spot illustration from the final spread. Vitiligo affects people of all ethnicities so I wanted to depict the condition on a diverse range of individuals.

Previous spread. 3D sculpted and rendered neuron infected with prion disease.

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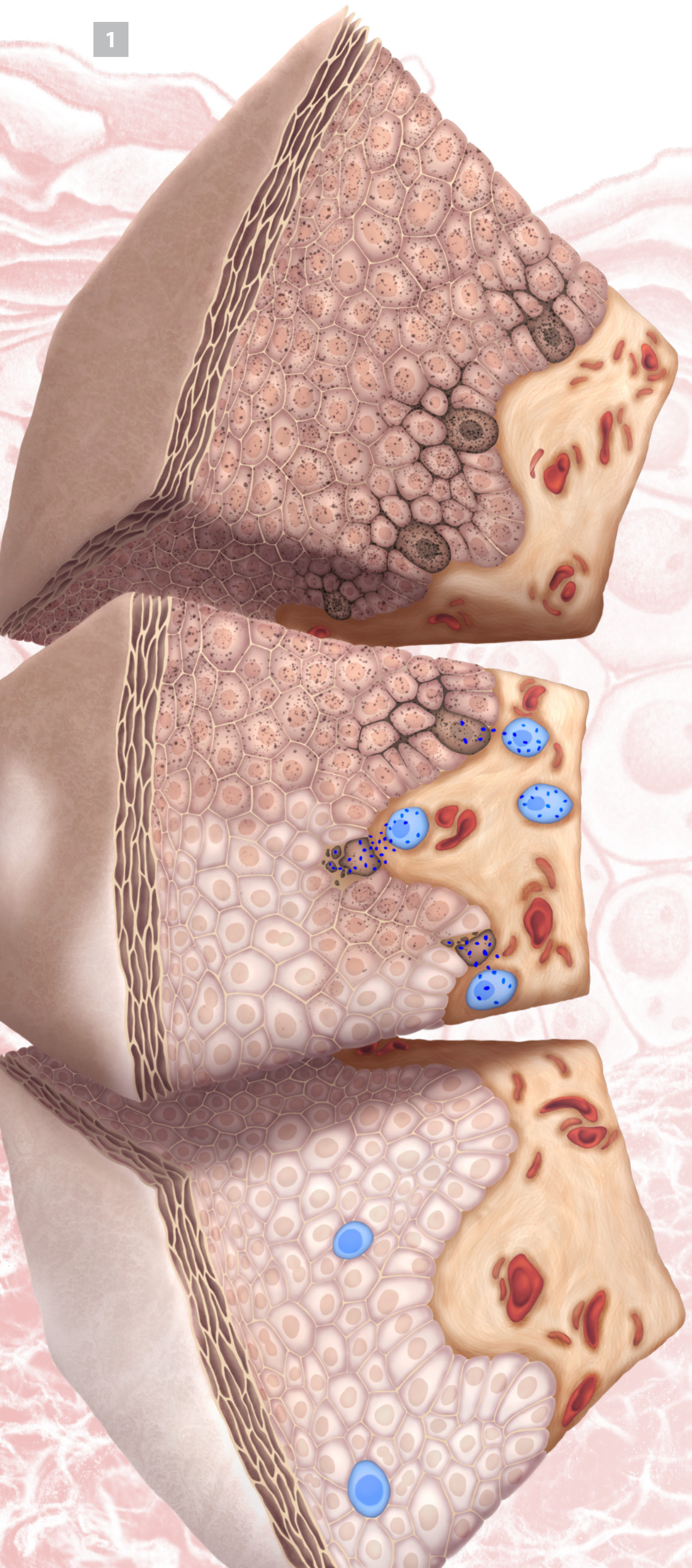

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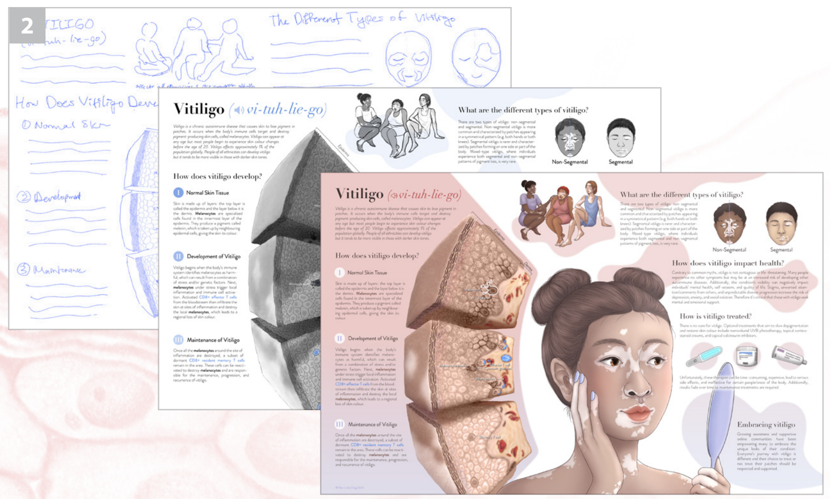

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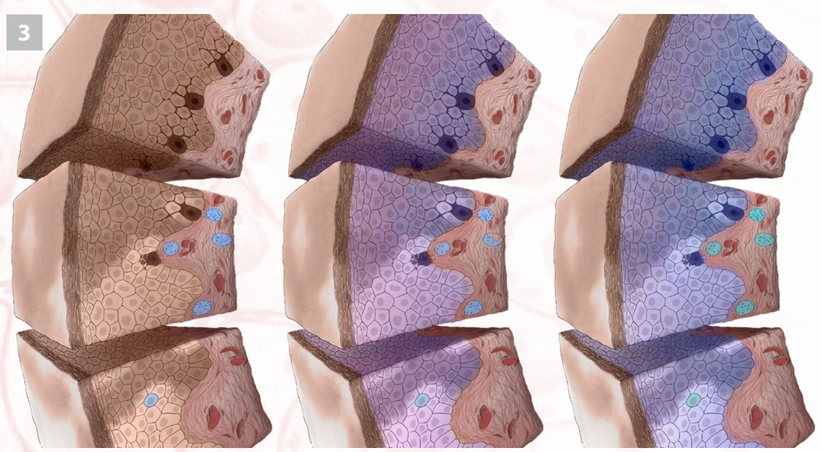

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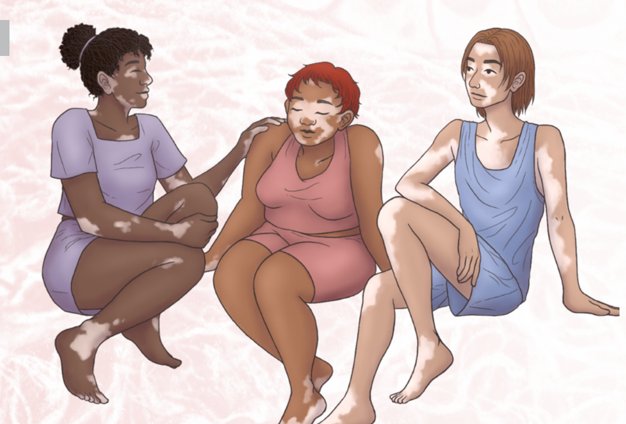

Neuroanatomical Illustration

An illustration of a coronal cut of the cranium as viewed posteriorly. This non-standard view enables viewers to trace the paths of multiple cranial nerves as they emerge from the brainstem and exit the cranium.

1. Final illustration. The final piece includes tables that describe the illustration and provide additional context by listing the foramen through which the cranial nerves exit. Additionally, an orientation image was added to help viewers orient themselves.

2. Final illustration. Close-ups of various tissue textures found in the final illustration. Surgical videos were referenced during the rendering process to capture the appearance of live tissue rather than cadaveric specimens. The illustration was created using Procreate.

3. Final illustration. The final rendered illustration (on the left) juxtaposed with the annotated refined sketch (on the right). The sketch was developed using a blend of reference images and an expert was consulted to ensure its anatomical accuracy.

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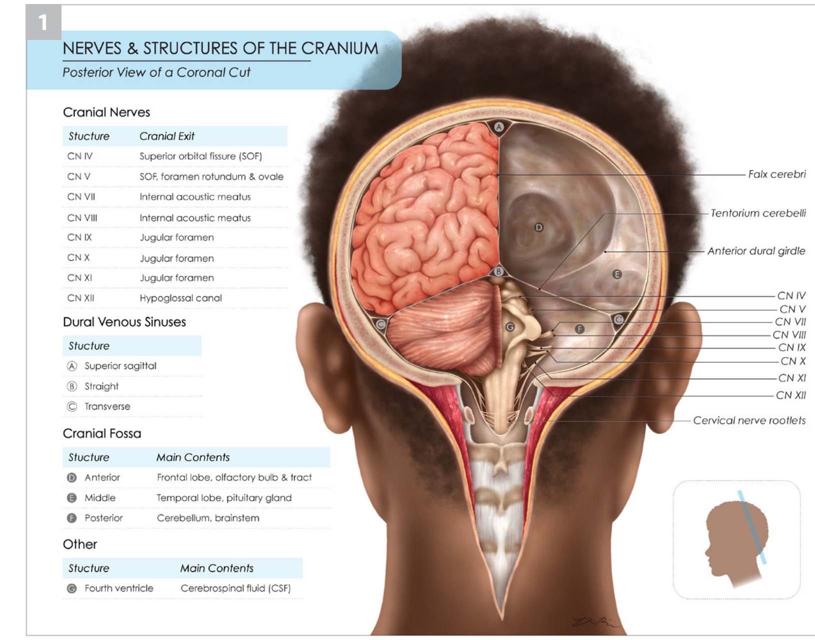

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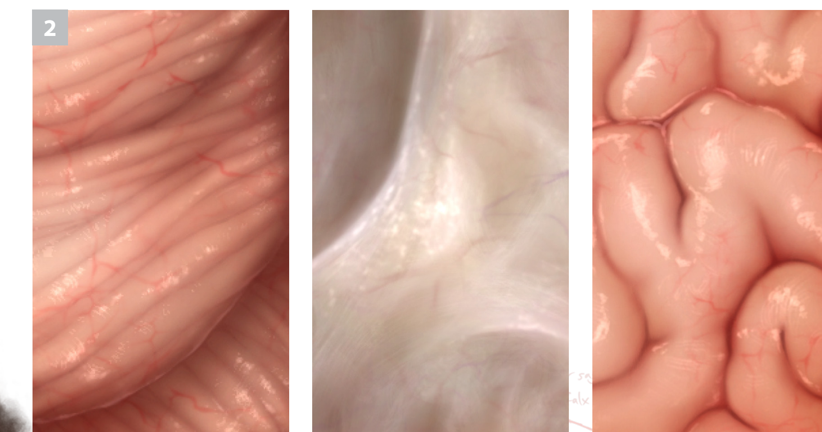

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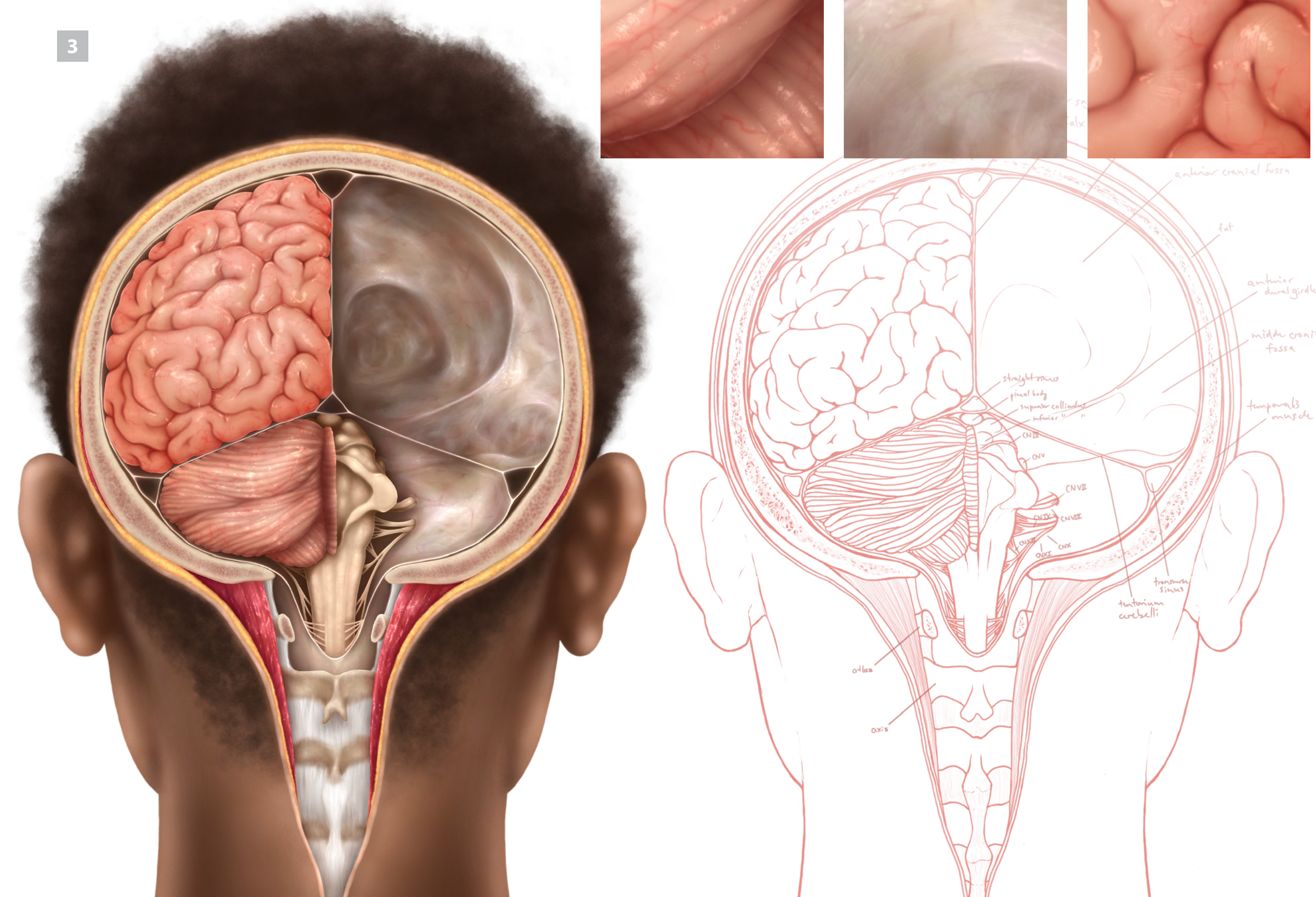

2D Animation

A short animation about the DeLaval cream separator. The video was designed to encourage engagement on Instagram and entice viewers into visiting the Canada Food and Agriculture Museum to see the artifact live.

1. Notes. Considering the widespread use of the DeLaval cream separator from the early 1900s to 1950s, we chose to go with a Western cartoon style reminiscent of the 1930s era to help capture this historical context. A moodboard was created to guide our visual and character design processes.

2. Final illustration. I was responsible for designing the characters featured in the animation for this group project. The final assets were created in Illustrator before being imported into After Effects for animation.

3. Final animation. A storyboard was created based on the script. Corresponding frames from the final animation are shown in the bottom row.

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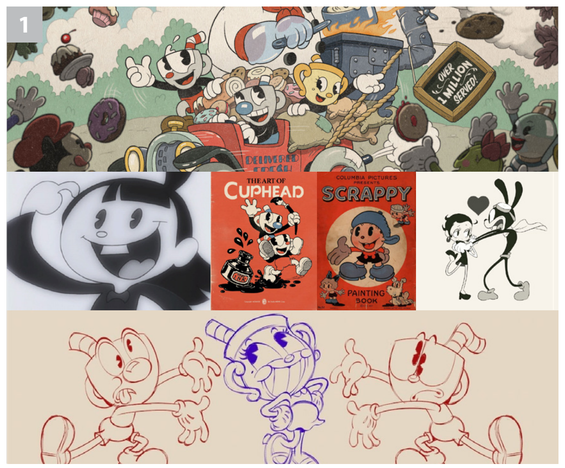

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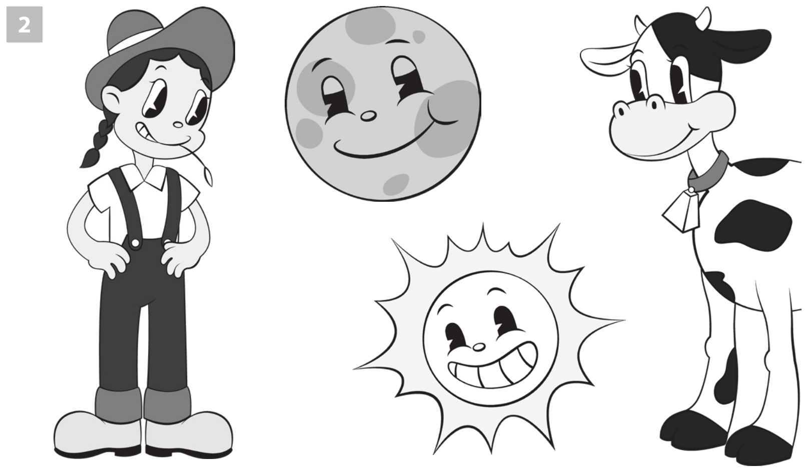

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Interactive Game Design

TreeSearch is an educational point-and-click game designed to teach youth about ecological succession in the Canadian boreal forest.

1. Final illustration. A selection of some 2D assets I created for the game. These elements were designed to enrich the user experience by building on the park ranger theme of the game while seamlessly integrating with its user interface (UI).

2. Production process. As project lead, my responsibilities included chairing meetings, providing support, and keeping the team organized and on track. Additionally, I led the production of 3D assets and the Figma prototype of the game.

3. 3D modelling. The 3D island in the game was modelled in Maya (top left image), textured and coloured in Unity (bottom left image), and exported as an asset package for the Unity team to integrate into the game (right image).

4. Final interactive. Sample wireframes and screen captures from the Unity prototype of TreeSearch.

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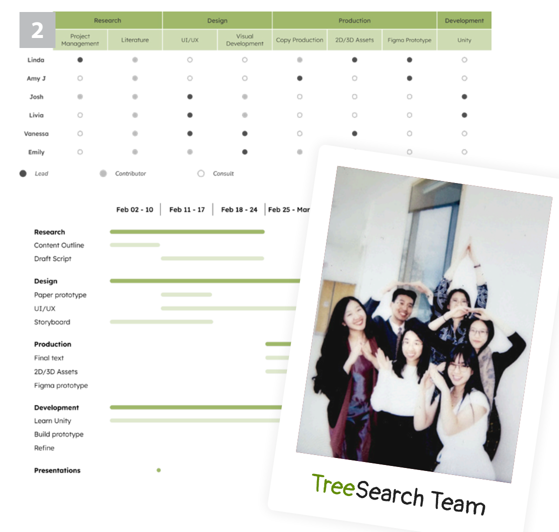

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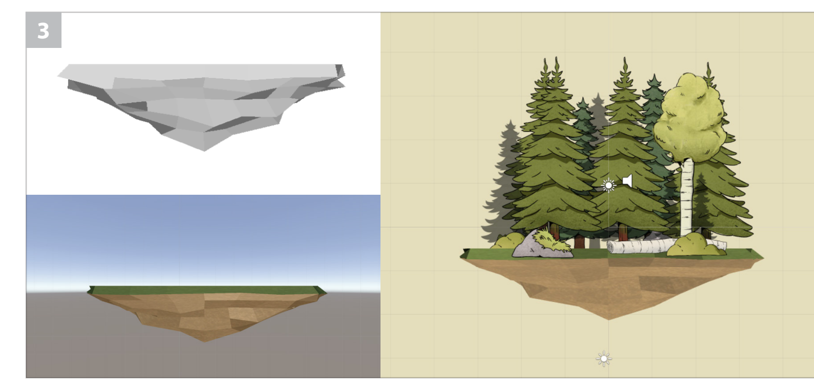

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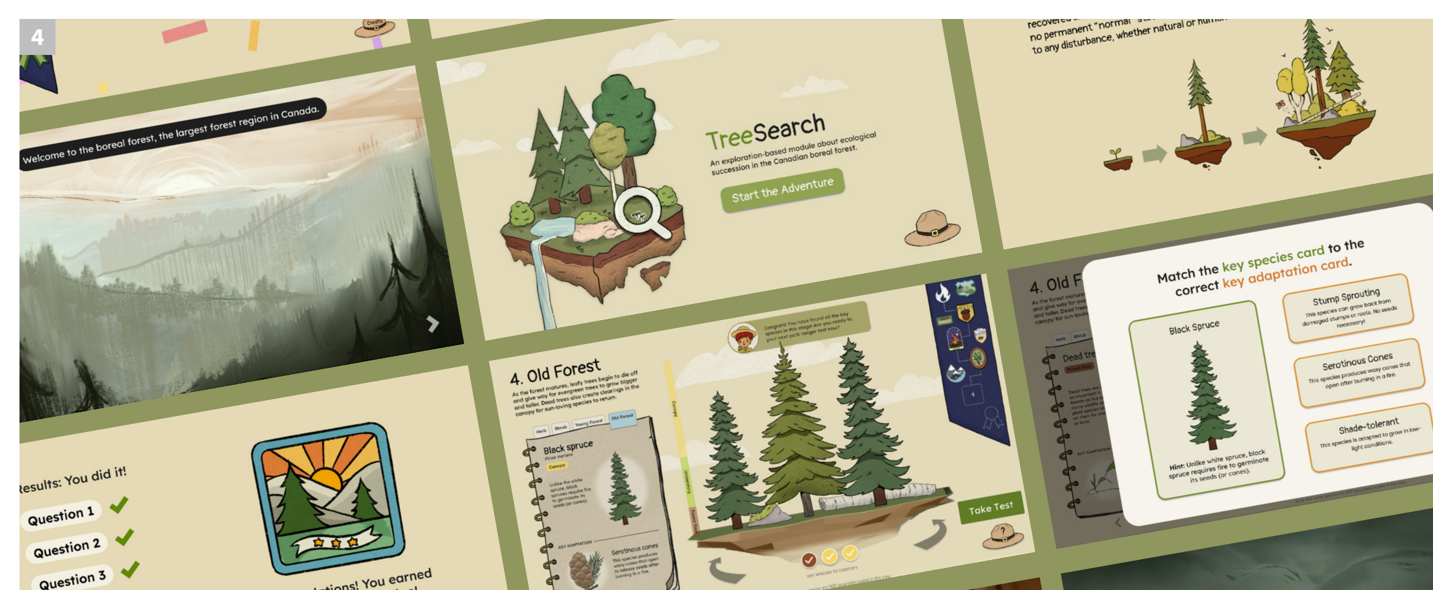

NavEDI: Navigating Equity, Diversity, and Inclusion in the Psychiatric ER

NavEDI is a narrative educational video game designed to teach clinical advocacy and educate medical students about equity, diversity, and inclusion (EDI) in the context of mental health.

1. Final interactive. NavEDI is a fully functional desktop game designed for both Windows and Mac OS. The game has an estimated total playtime of approximately 45 - 90 min.

2. Prototype. I created a high-fidelity prototype of the game in Figma which we used to run usability testing sessions. The results of the study were positive and validated our design decisions for the UI of navEDI.

3. Production process. NavEDI is a joint Master's Research Project between myself and my fellow classmate, Livia Nguyen.

4. Production process. An overview of the major phases of navEDI's development. Focus groups consisting of medical students and youth with lived/living experiences of mental health along with other subject matter experts, were consulted throughout the initial stages.

5. Final interactive. A gameflow diagram featuring some of the main screens a user would encounter as they play through navEDI.

6. Final illustration. I was responsible for designing and creating the character assets for navEDI. Variations in expression were created for each character to enhance the game's immersive and emotional qualities.

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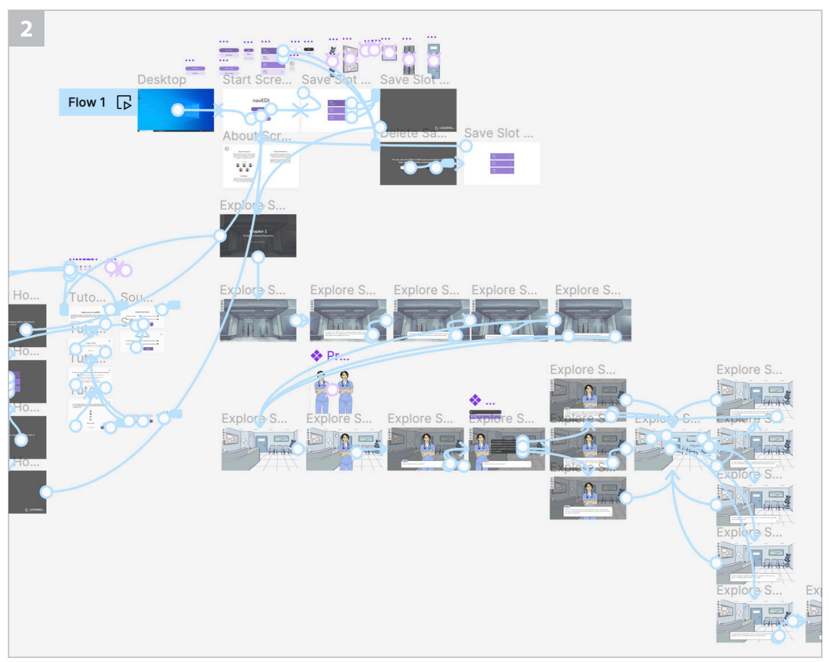

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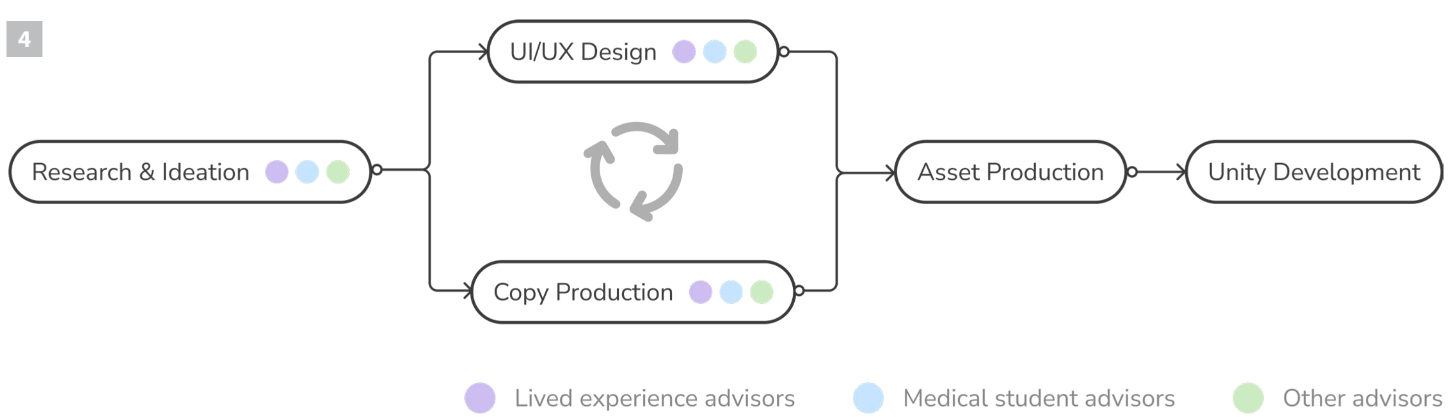

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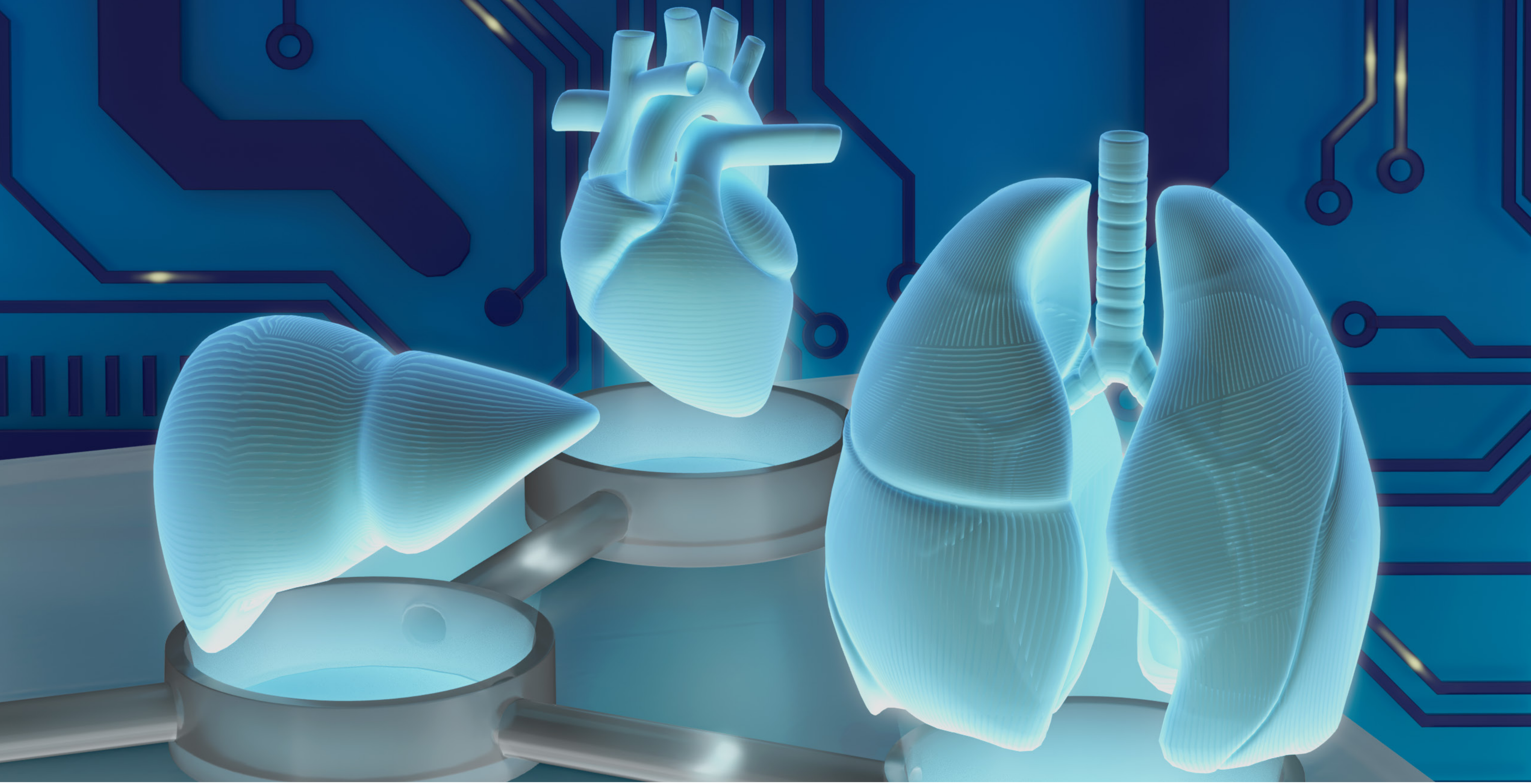


Jessica Feng

I am a biomedical designer with a passion for visual storytelling and interactive media design. I enjoy creating solutions to challenging design problems and exploring creative ways to communicate complex scientific topics. I specialize in UI/UX design and am particularly interested in the application of new technologies like virtual reality (VR) in creating innovative learning experiences in education, science, and healthcare.

Editorial Illustration

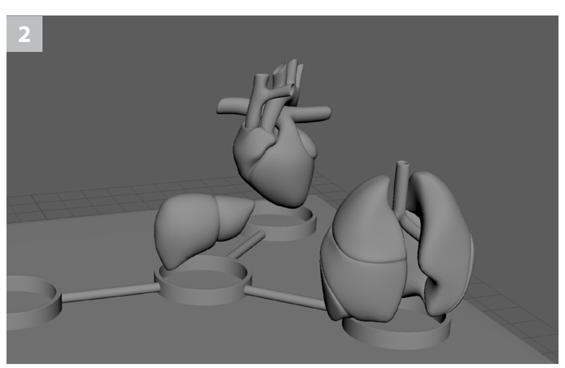
Organs-on-a-chip are microfluidic devices that contain human cells that can mimic organ structures and functions. This mock editorial cover visually communicates the topic using the visual metaphor of holographic organs and circuits.

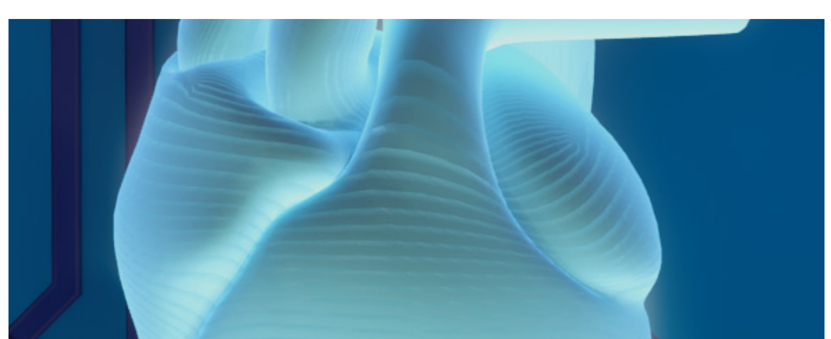
1. Sketch. My ideation process started with a series of thumbnail sketches to explore composition and concept. A comprehensive sketch using colour was established after the layout and design were finalized.

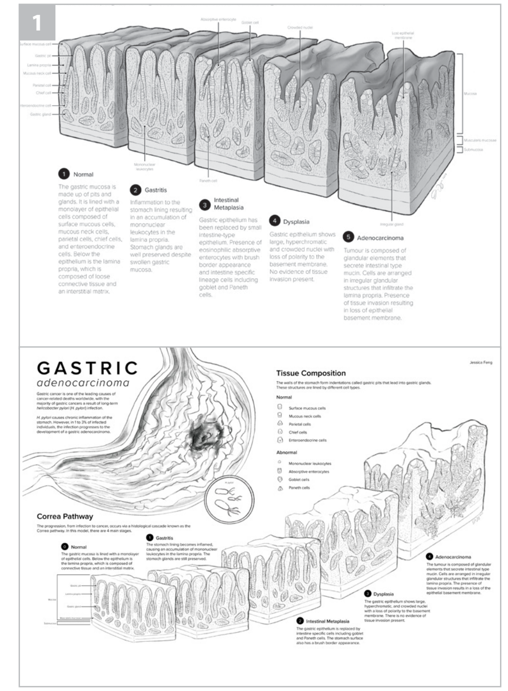
2. Production process. I modelled all my 3D assets in Maya, experimenting with different shader nodes to create the holographic lighting effects on the organs.

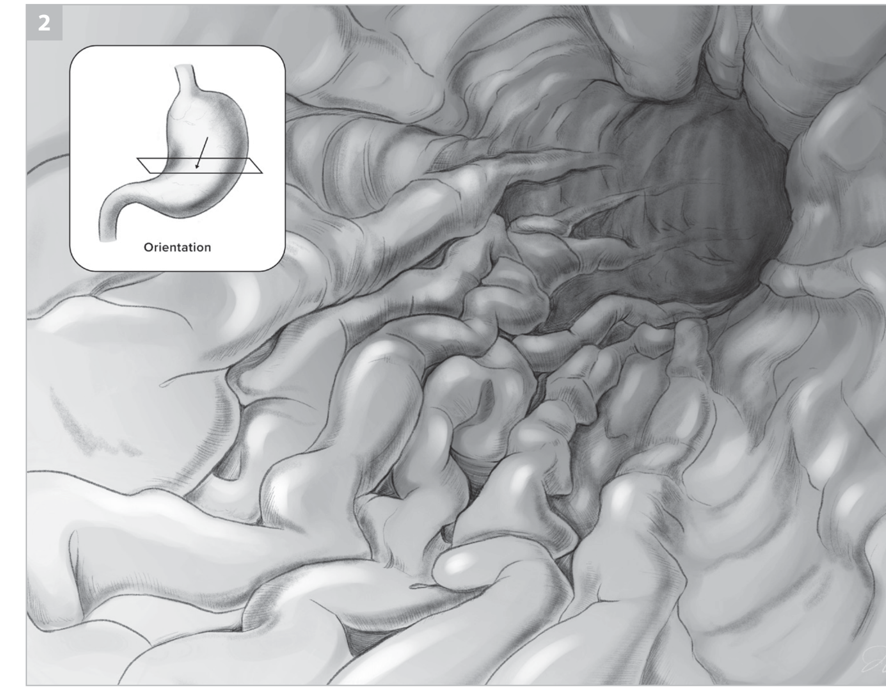
3. Final illustration. The final illustration was rendered on layers in Maya to better control the interaction of lights and reflective materials for post-production compositing in Photoshop.

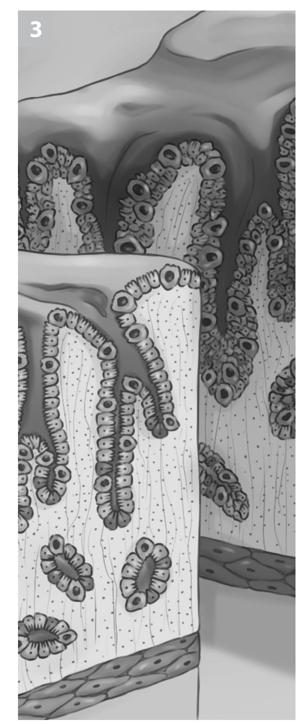
Previous spread. Close-up of my editorial illustration.

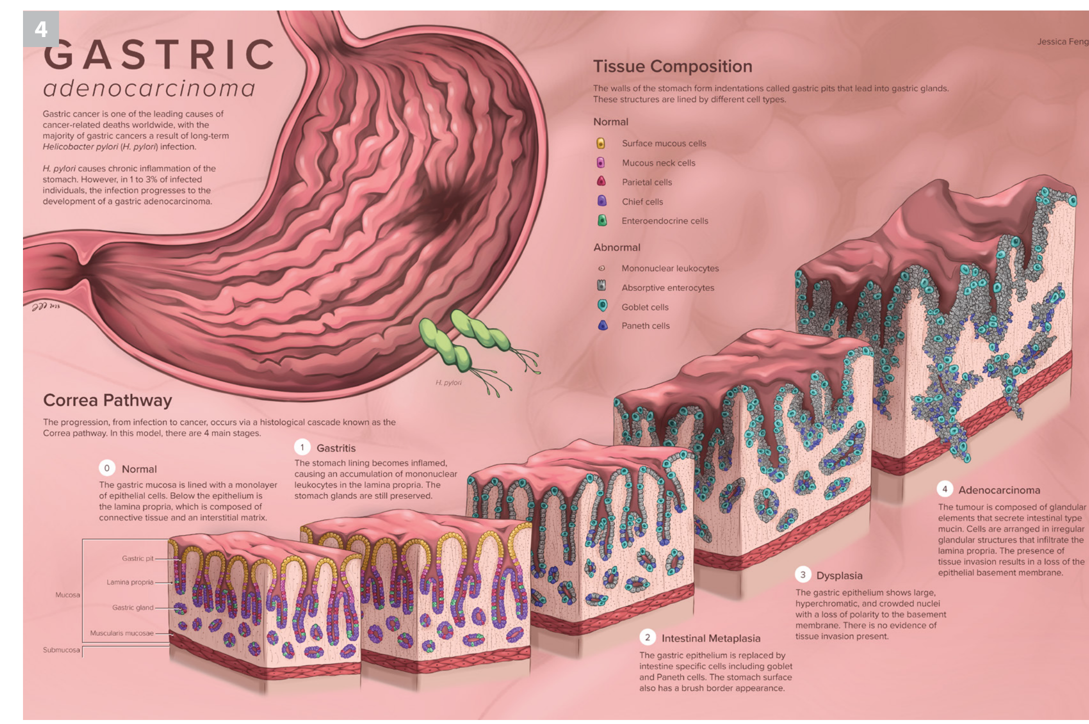












Pathological Illustration

This infographic is a two-page spread on the pathological progression from infection to gastric adenocarcinoma via the Correa pathway. The purpose was to depict the stages at varying scales including at the cellular, tissue, and organ level.

1. Sketch. I started by researching the histological cascade of the Correa pathway, illustrating the progression in a series of tissue cubes. The tissue cube study was then implemented into the design of my two-page layout.

2. Study. A tissue landscape study of the stomach was done to familiarize myself with the internal surface of the organ.

3. Production process. A detailed view of the cellular landscape of the stomach tissue cubes.

4. Final illustration. The final piece combines the tissue cubes depicting the Correa pathway disease progression with the tissue landscape study in the background. The illustration was rendered in Procreate and composited in Illustrator.

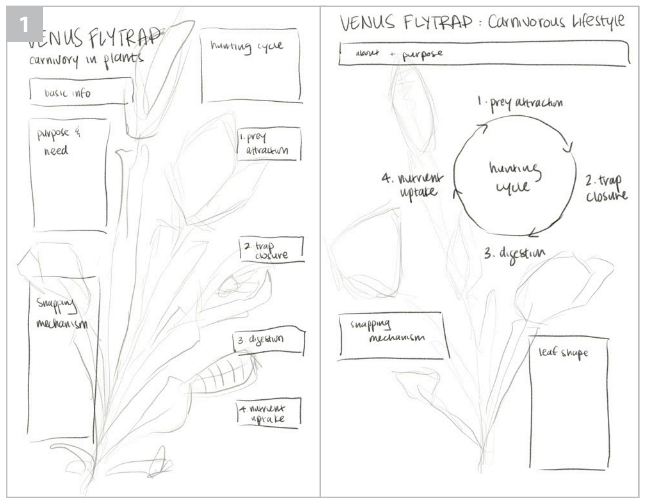
Information Visualization

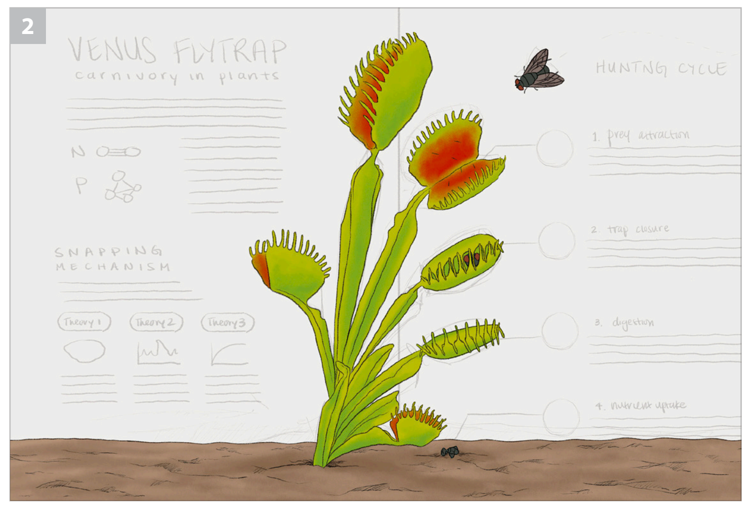
This infographic is a two-page spread on the Venus flytrap, a carnivorous plant well known for its unique leaf shape and prey trapping mechanism. The purpose was to visually represent and explain the complex snapping and hunting cycle of the plant.

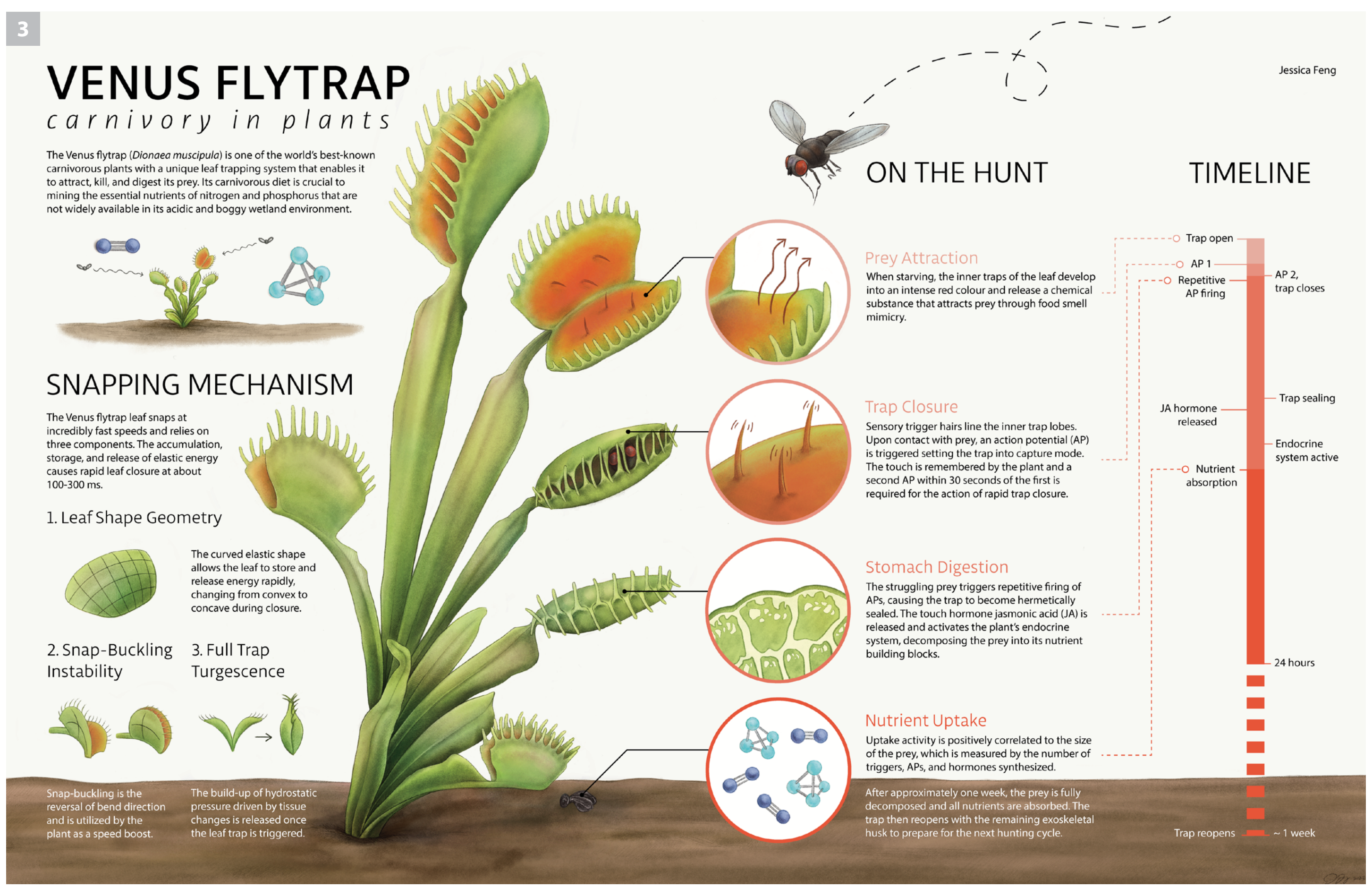
1. Sketch. Ideation started with rough sketches, blocking in the general concept of the Venus flytrap being the focal centre of the piece and its leaves at varying stages of the hunting cycle.

2. Production process. A refined comprehensive sketch mapping out the visuals and major headings to include based on my research.

3. Final illustration. The final illustration depicting the Venus flytrap leaf snapping mechanism at various stages of the hunting cycle rendered in Procreate and composited in Illustrator.







Medical Legal Illustration

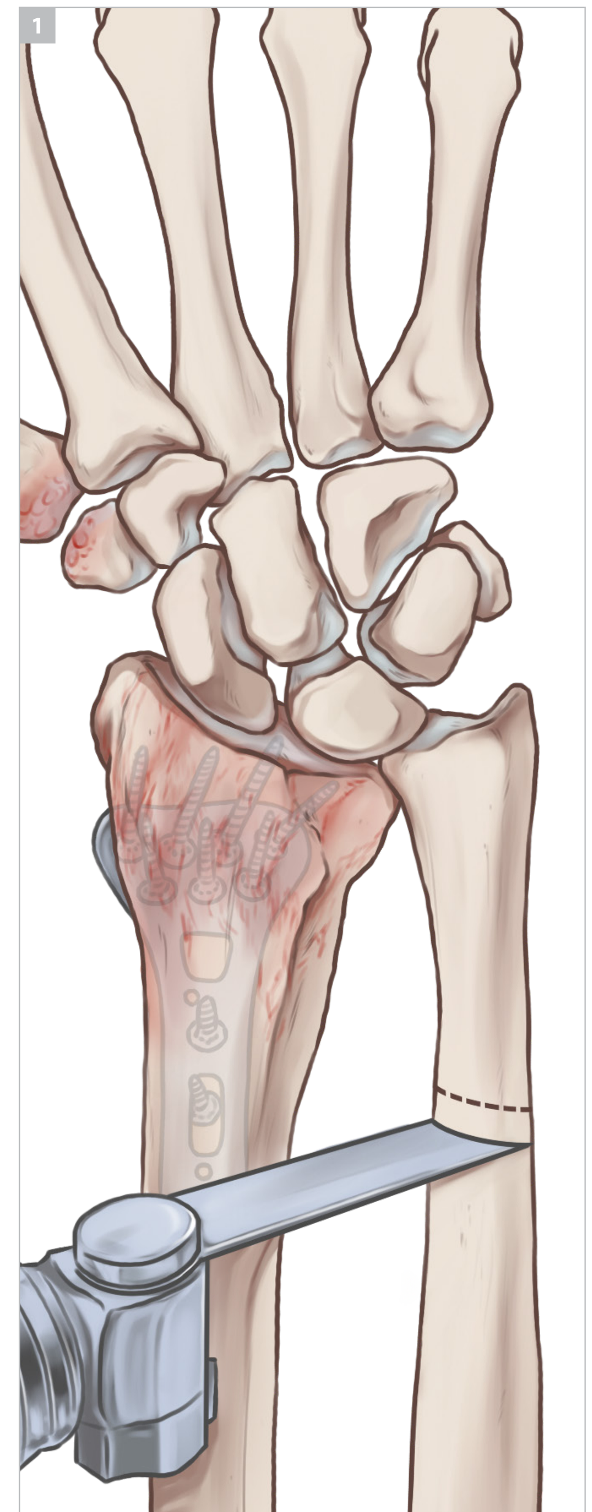
This medical legal exhibit depicts the right ulnar osteotomy surgery sustained by the victim of a utility task vehicle (UTV) rollover case. The challenge of this project was to create illustrative evidence for a courtroom audience that clarifies complex medical concepts.

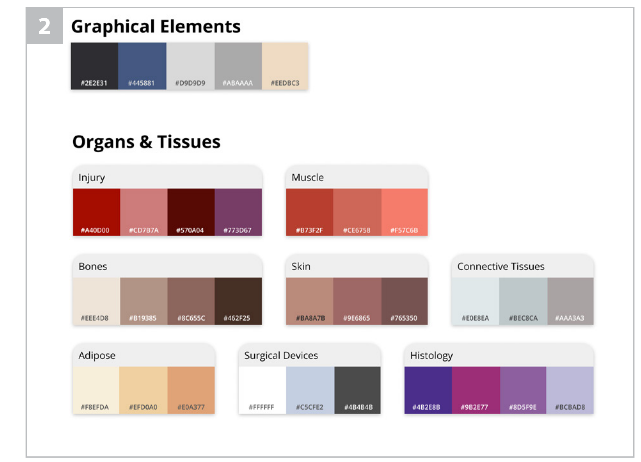
1. Production process. A detailed view of the rendered surgical illustration without labels.

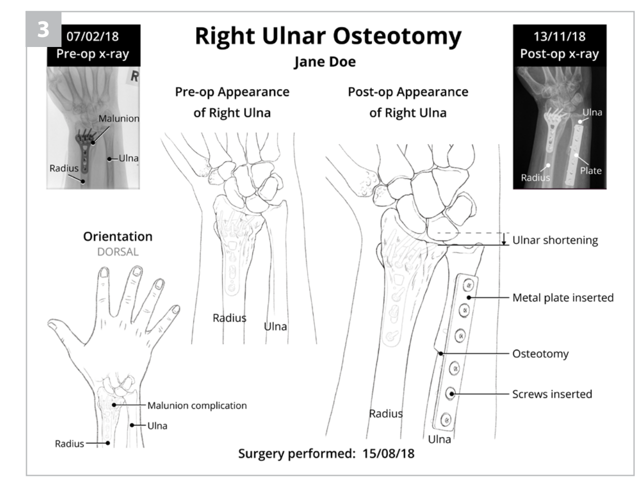
2. Notes. Being the fifth in a series of six exhibits, a style guide was established to ensure that all panels had cohesive storytelling, fonts, colours, and graphical elements.

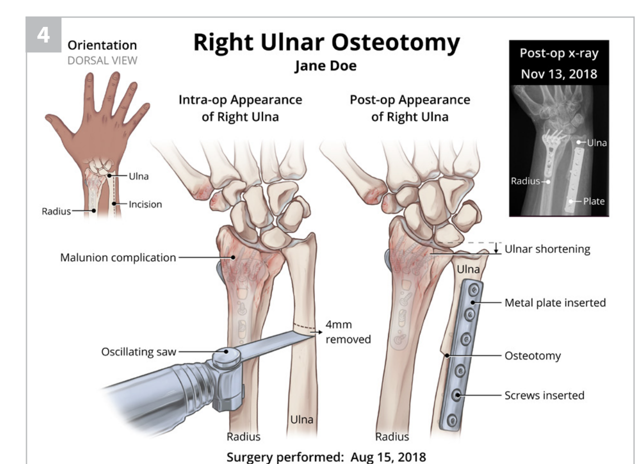
3. Sketch. The comprehensive sketch was based on the client's medical files and radiographic data. I was able to use the X-rays provided to inform the anatomy and orientation of my illustrations.

4. Final illustration. The final illustration adhered to the established style sheet and further included surgical equipment to help reinforce the storytelling. The piece was rendered in Procreate and composited with Figma.









Institute of Medical Science (IMS) Virtual Reality Clinical Skills

The Institute of Medical Science (IMS) Virtual Reality (VR) Clinical Skills Initiative is an interactive VR-based educational tool to be part of a new clinical skills course. The project aims to provide graduate research students with an introductory exposure to clinical environments and scenarios.

1. Storyboard. The original storyboard sketches establishing the application content, user flow, and design requirements.

2. UI design. Wireframes were then developed in Figma based on my storyboard sketches. A style guide was created for consistent user interface (UI) design, colour, font, and layout.

3. UX design. To help understand my target audience, I created two personas who were representations of my key audience. Each persona also had a corresponding user journey that was developed to determine where my project and application could fit into their education and learning experiences.

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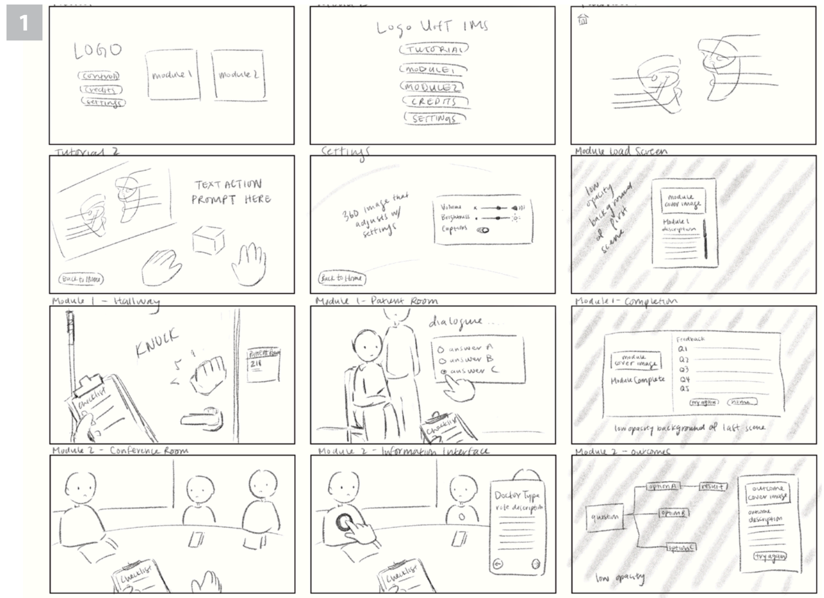

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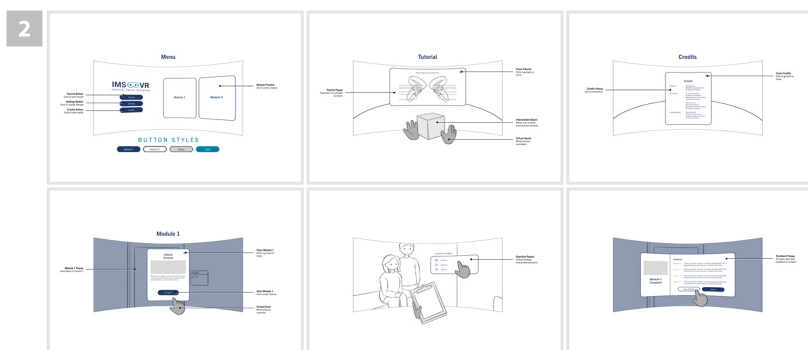

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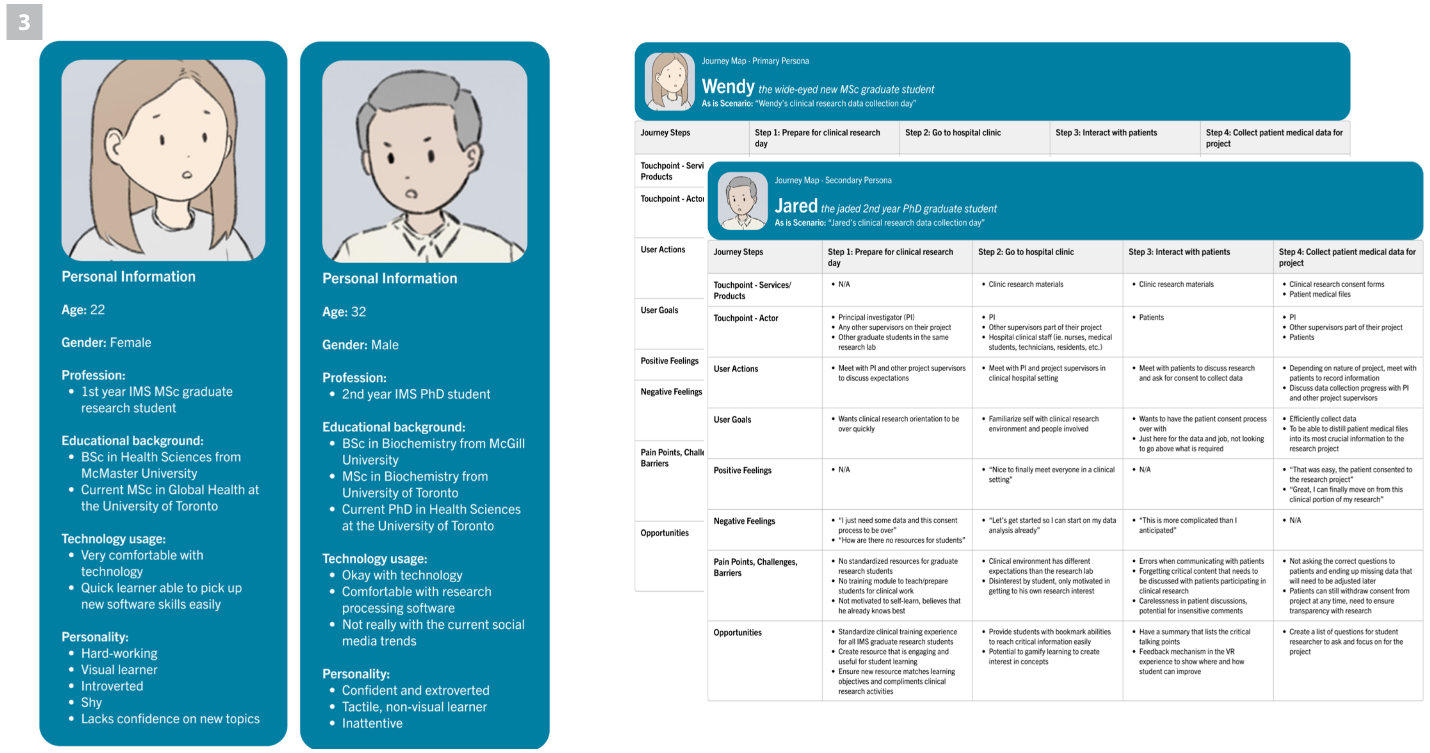

4. Production process. A showcase of some of the interactable UI canvases designed and developed in Unity.

5. Prototype. The VR application was built in Unity using a mixed-reality design – a blend of both real and virtual space. Exploration of the environment in VR is completed through watching real-world, 360-degree panoramic video footage. Knowledge-based decision-making points in the module are completed through user interactions with 3D models and digital UI canvases.

IMS VR
clinical skills initiative

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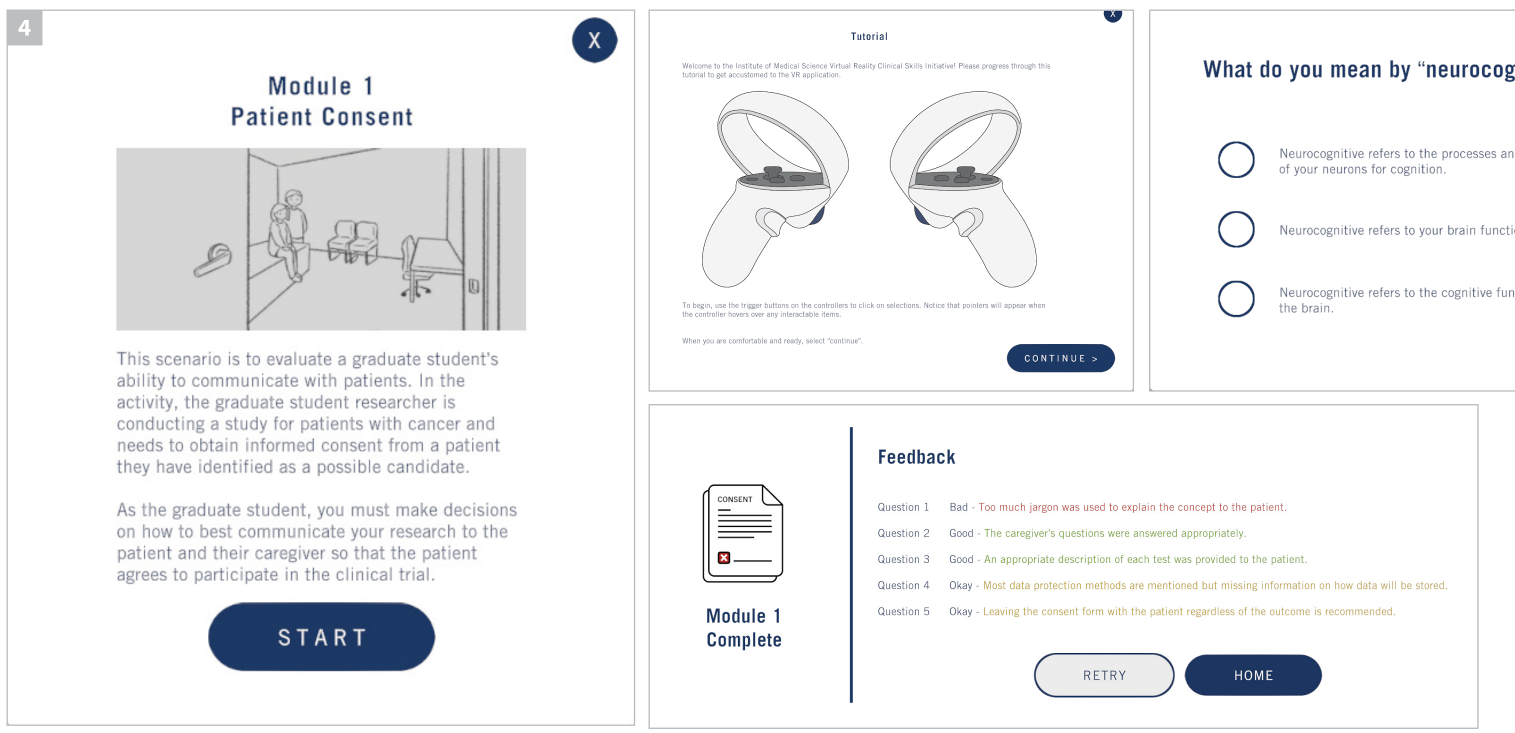

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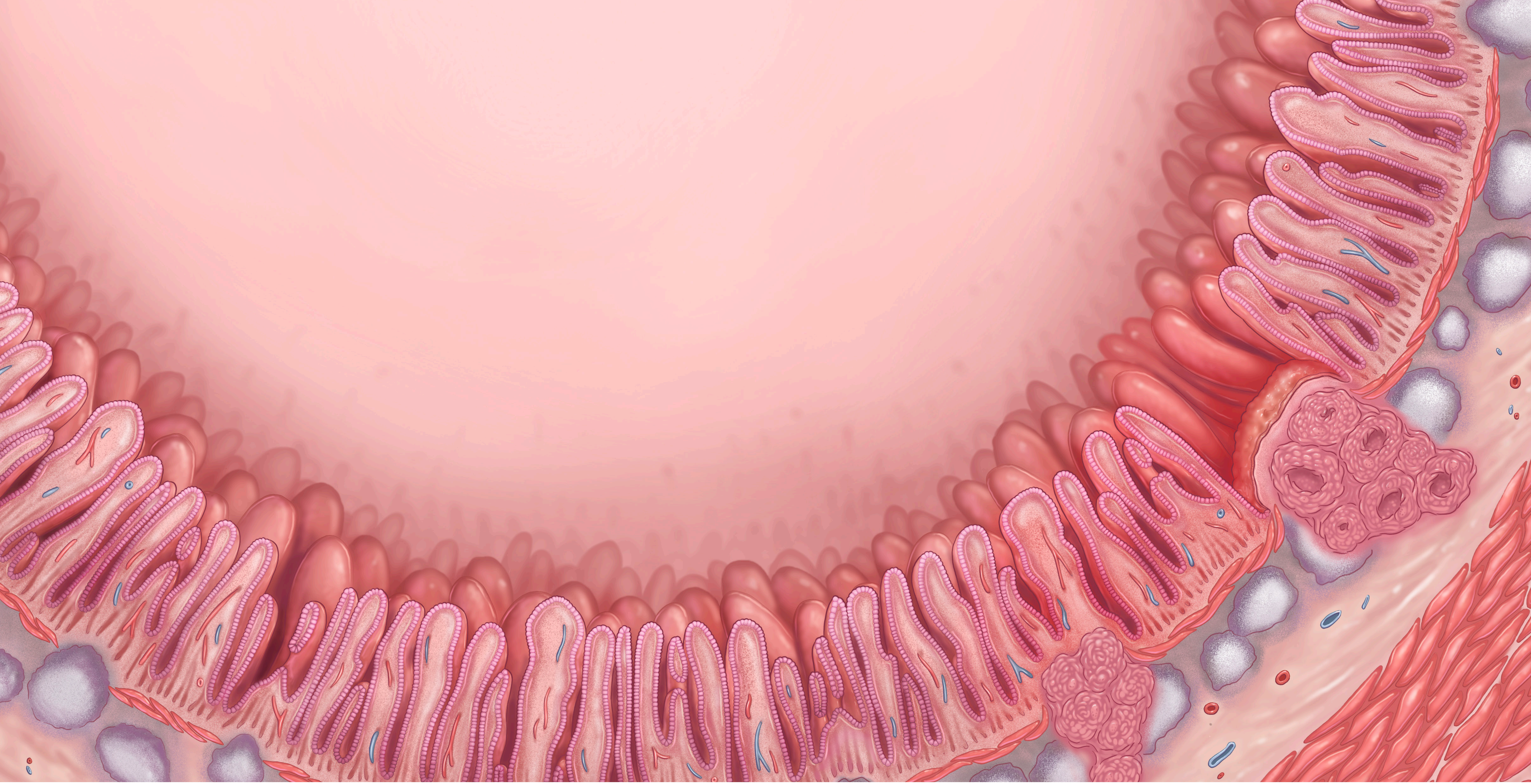


Ashlyn (Ash) Fieldhouse

I am a scientific visualizer with a strength for condensing complex information and solving communication problems. With a background in communicating scientific principles to a lay audience with fine art, I truly believe that art is the best way to make science and healthcare information more accessible to more people. I am excited to continue to learn diverse information and use the skills I've learned in the Biomedical Communications program to share that knowledge with others.

Information Visualization

The goal of this infographic is to communicate the science behind colour change in cuttlefish using a variety of information about cuttlefish physiology and behaviour.

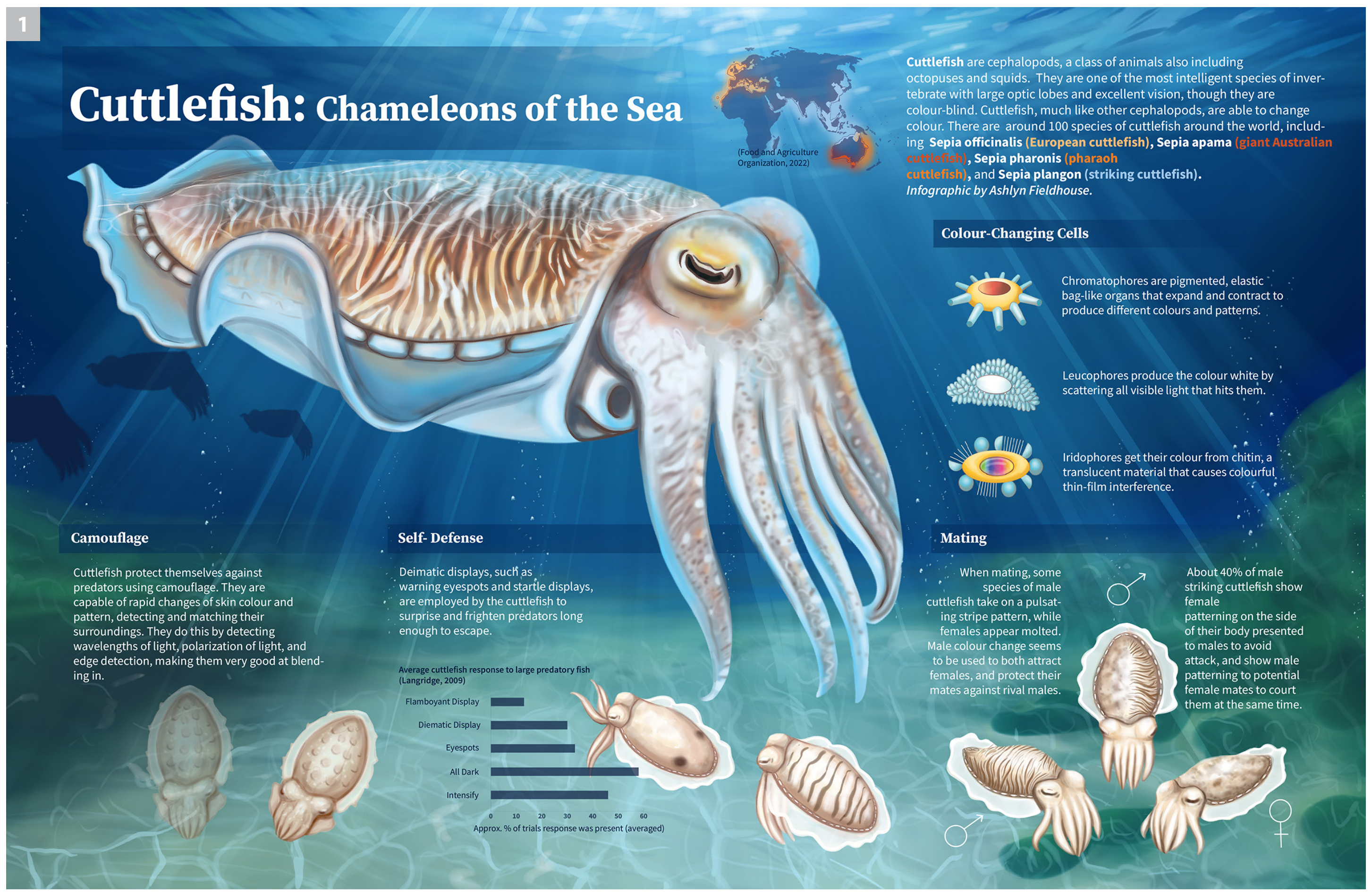
1. Final illustration. For this final illustration, I included information about cuttlefish (top right), colour changing cells (middle right), and behavioural uses for colour changes (bottom).

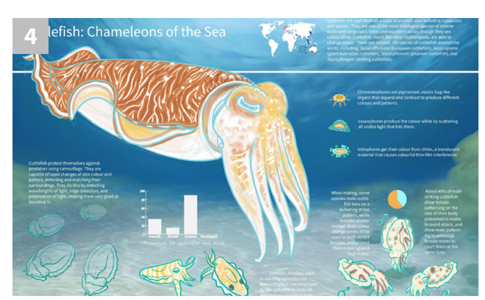
2. Production process. I rendered each icon separately before arranging them with text and graph elements.

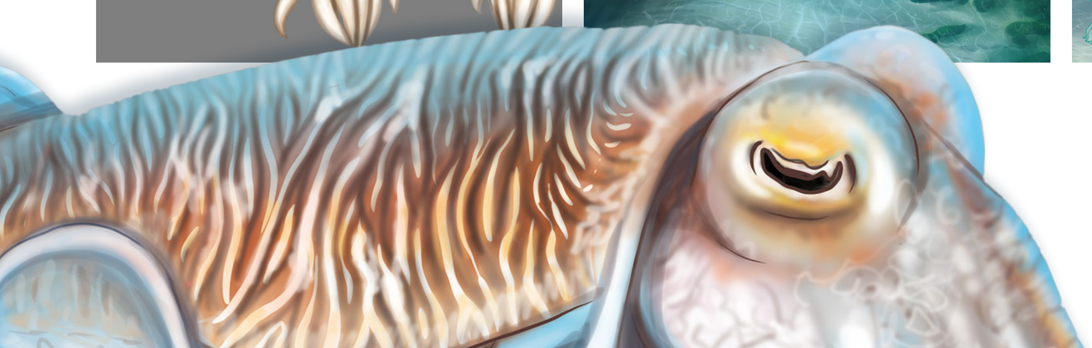
3. Production process. I began designing my layout by rendering my background as a starting point.

4. Sketch. I created a series of sketches to work out layout, colour, schemes, and copy before final rendering.

Previous spread. A cellular landscape showing the route of infection and pathogenesis of bovine tuberculosis in the human gastrointestinal tract.







Anatomical Illustration

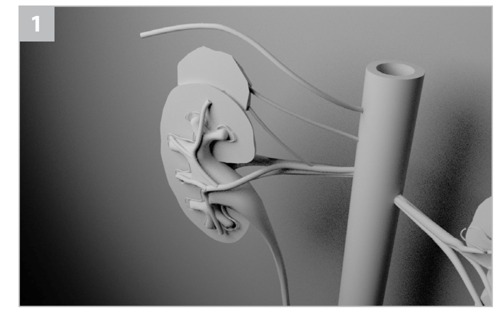
This illustration depicts the sectioned kidney, including structures that are underrepresented in anatomical illustration. This includes the path of the posterior segmental artery, the three-dimensional structure of the renal pelvis and calyces, and the interior of the suprarenal gland.

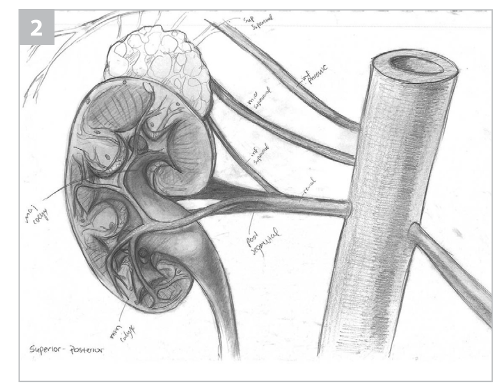
1. Study. I arranged this maquette using a found kidney model and 3D modelled elements for use as one of several maquettes and reference images.

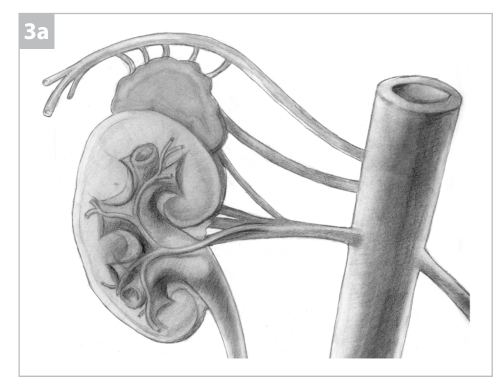
2. Sketch. Creating this piece involved several rounds of sketches to incorporate multiple sources of information and consultation with an anatomist.

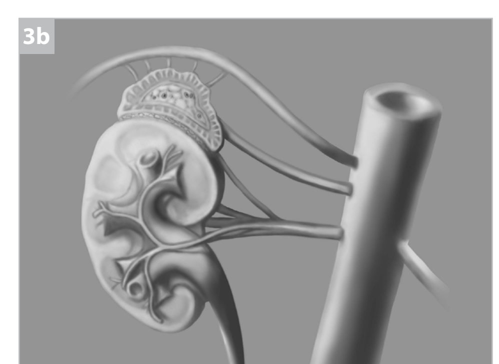
3. Production process. 3a. I began rendering with graphite on paper, then scanned and cleaned it to continue rendering digitally. **3b.** I rendered digitally in greyscale before adding colour and final highlights.

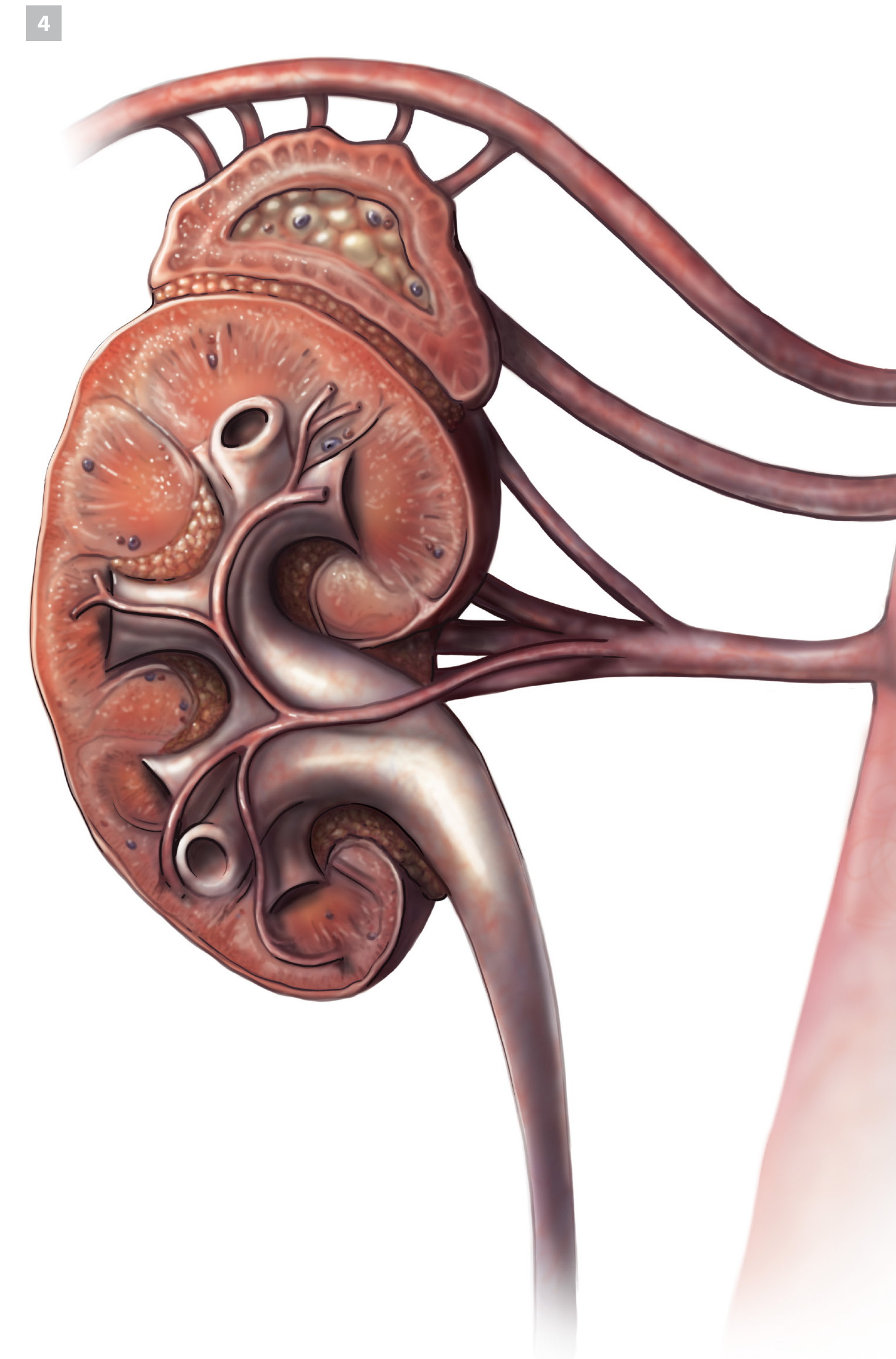
4. Final illustration. I designed this final illustration for a page in an anatomical atlas. It includes the segmented kidney and suprarenal gland, as well as their blood supply.





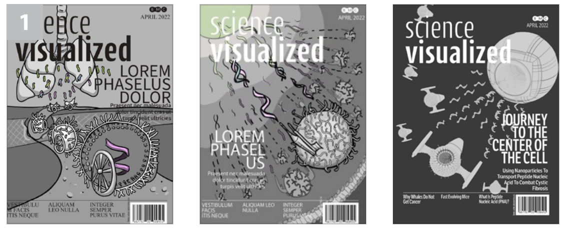


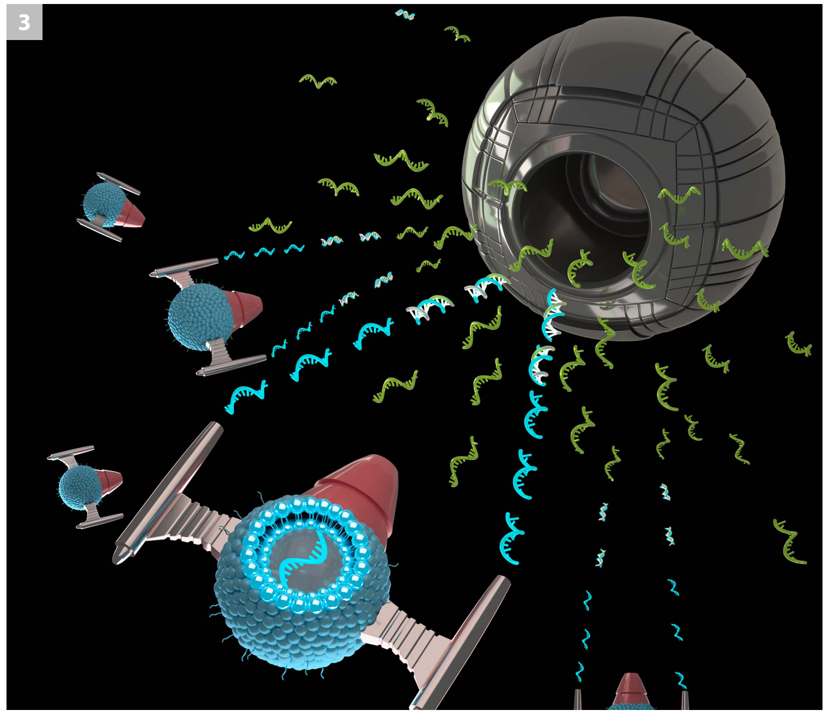


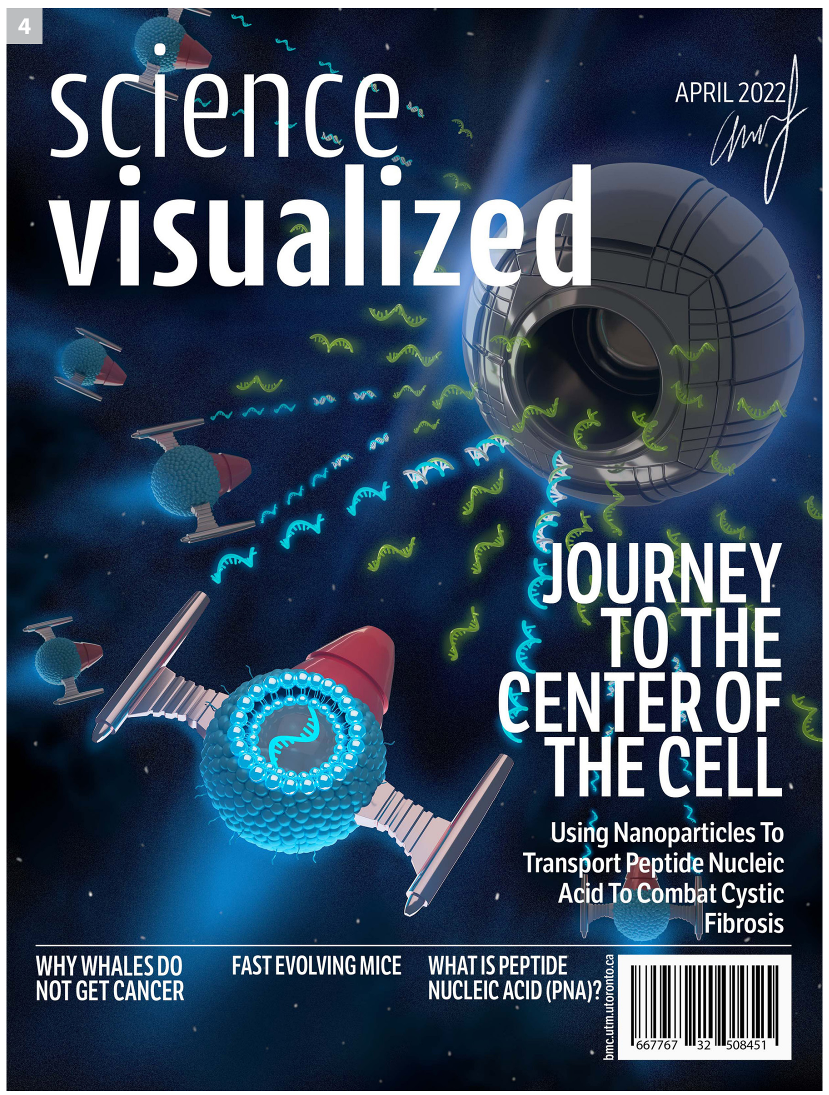


Editorial Illustration

Cystic fibrosis is difficult to treat, as it involves transporting large molecules past cell membranes. This editorial cover uses a 'space battle' metaphor to describe a research paper aiming to solve this constraint using lipid polymer nanoparticles to transport peptide nucleic acid (PNA) into cells.







1. Sketch. I created several thumbnail sketches of visual metaphors for the transport of PNA into the cell by nanoparticles. The rightmost 'space battle' metaphor was chosen.

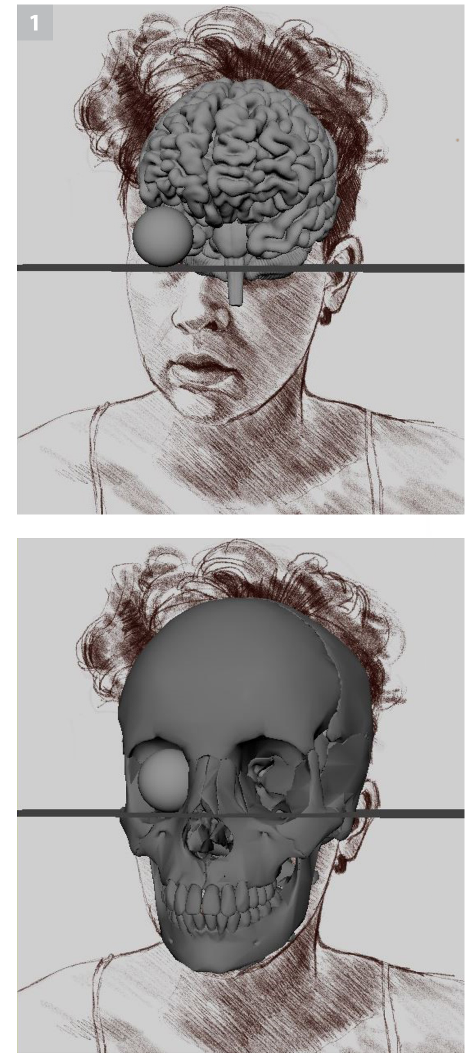
2. Sketch. I included all planned 3D modelled assets, post-processing elements, and text in this comprehensive sketch.

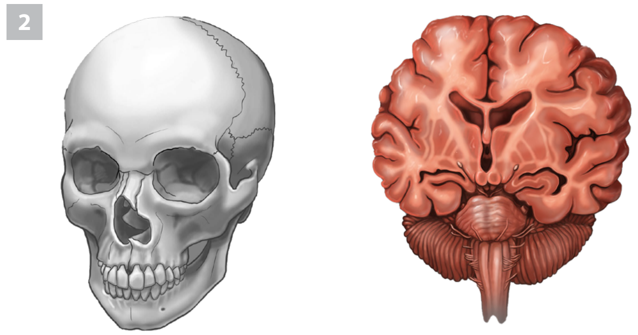
3. Production process. Once all elements were modelled, textured, lit, and rendered in layers, I composited and adjusted them in a separate program.

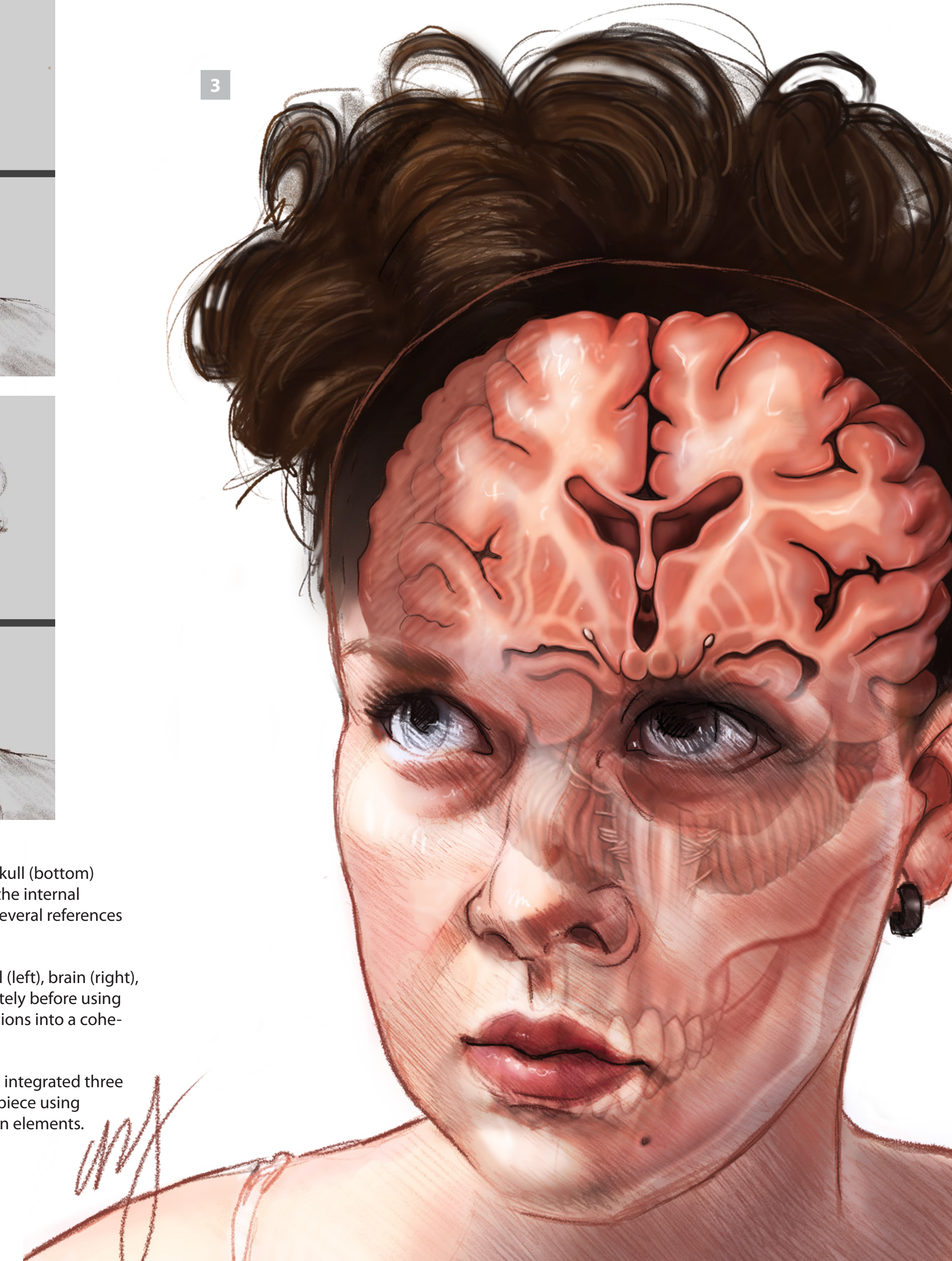
4. Final illustration. After compositing, I digitally painted a background and additional elements, and added text elements to create a final editorial cover.

Neuroanatomical Illustration

Our brains are integral to our functioning, experiences, and who we are as individuals. As such, adding an in situ brain to a portrait adds a humanizing feature to neuroanatomical illustration. For this illustration, I depict a coronally-segmented brain in relation to the anatomical landmarks of my own face.







1. Study. I oriented found brain (top) and skull (bottom) models with my sketched portrait to align the internal anatomy with my facial features as one of several references used for this illustration.

2. Production process. I rendered the skull (left), brain (right), and portrait layers of my illustration separately before using transparency to integrate the three illustrations into a cohesive whole.

3. Final illustration. For this final portrait, I integrated three separate illustrations into a single finished piece using strategic transparency and additional drawn elements.

Epitranscriptomics and Memory

Epitranscriptomics is a new topic in molecular biology which may provide insights into memory formation. However, it is highly dynamic and complex, making it difficult to understand. This 2D/3D animation introduces the topic of epitranscriptomics in memory formation using visual metaphor and storytelling techniques to enhance understanding.

1. 3D modelling. I used this concept sketch (left) to create a 3D modelled 'factory' (right), as a metaphorical representation of a ribosome.

2. 3D modelling. I designed these characters to make the proteins involved in epitranscriptomics (such as FTO and FMRP) more memorable. (Order from left to right: FTO sketch; FTO 3D model; FMRP sketch; FMRP 3D model).

3. Production process. 3a. This partially-rendered 2D element was created to compare Purkinje neurons to trees. **3b.** This partially-rendered scene employs real-world examples to introduce the importance of epitranscriptomics and memory. **3c.** This conclusion scene represents future directions for epitranscriptomics research.

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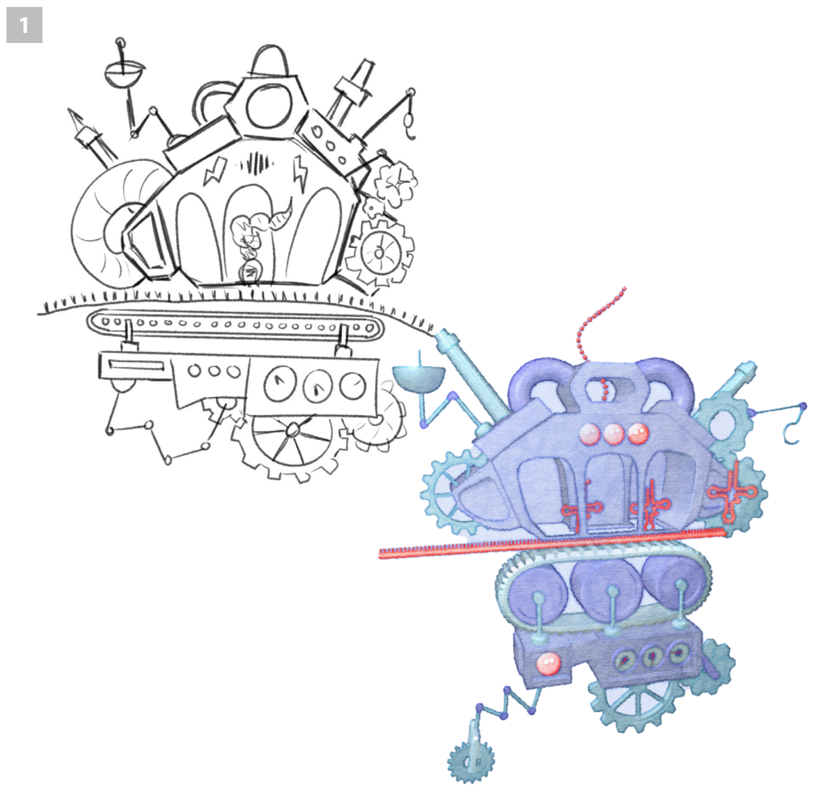

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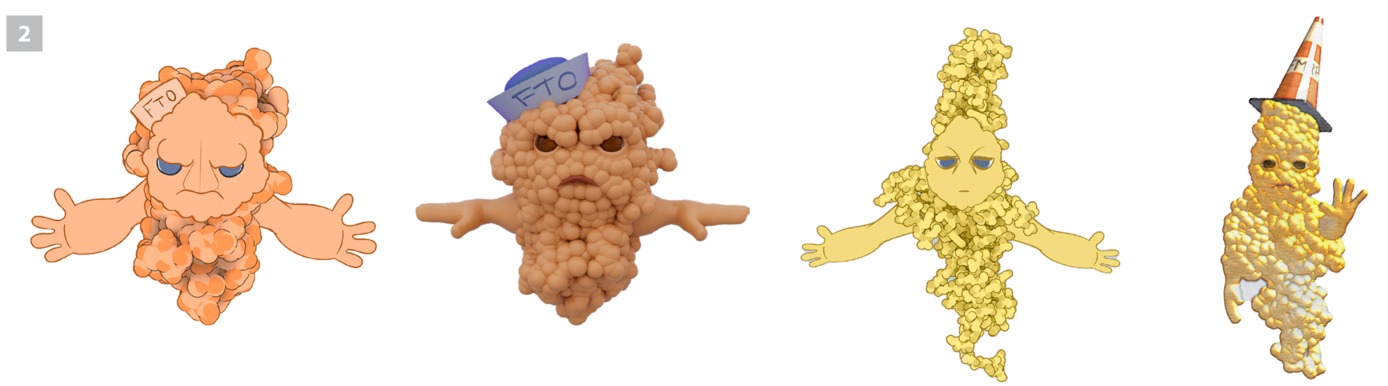

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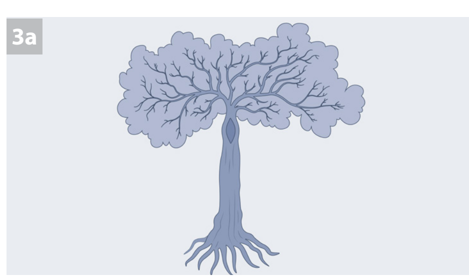

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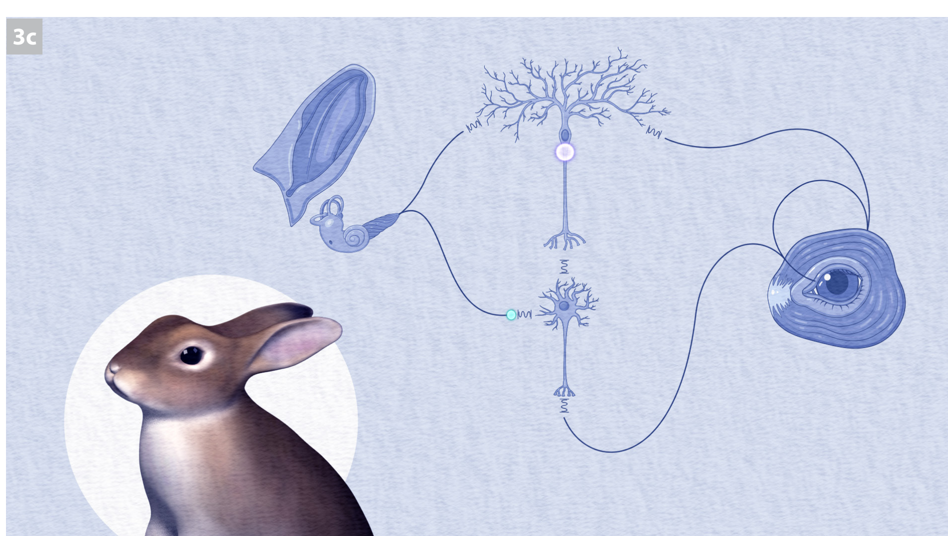

4. Production process. These process images compare human and rabbit anatomy.

5. Motion design. The rigging for a 2D walk cycle.

6. Production process. 6a. Partially-rendered 2D DNA and mRNA. **6b.** A still showing a nucleus within a neuron. **6c.** A still showing mRNA as it exits the nucleus through a nuclear pore. **6d.** Project concept art.

7. 3D modelling. A series of stills showing the process of creating a 3D, rigged rabbit model from scratch.

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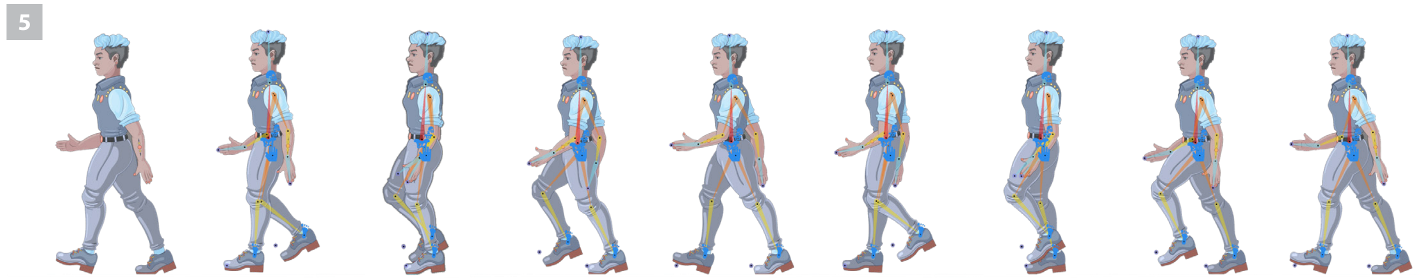

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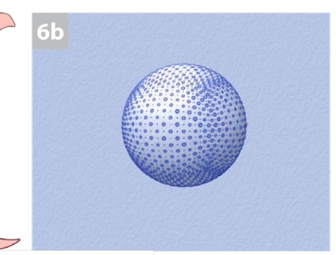

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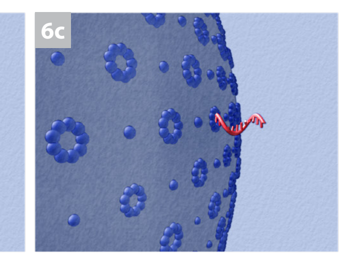

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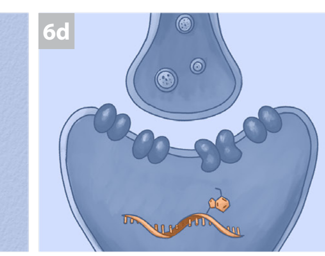

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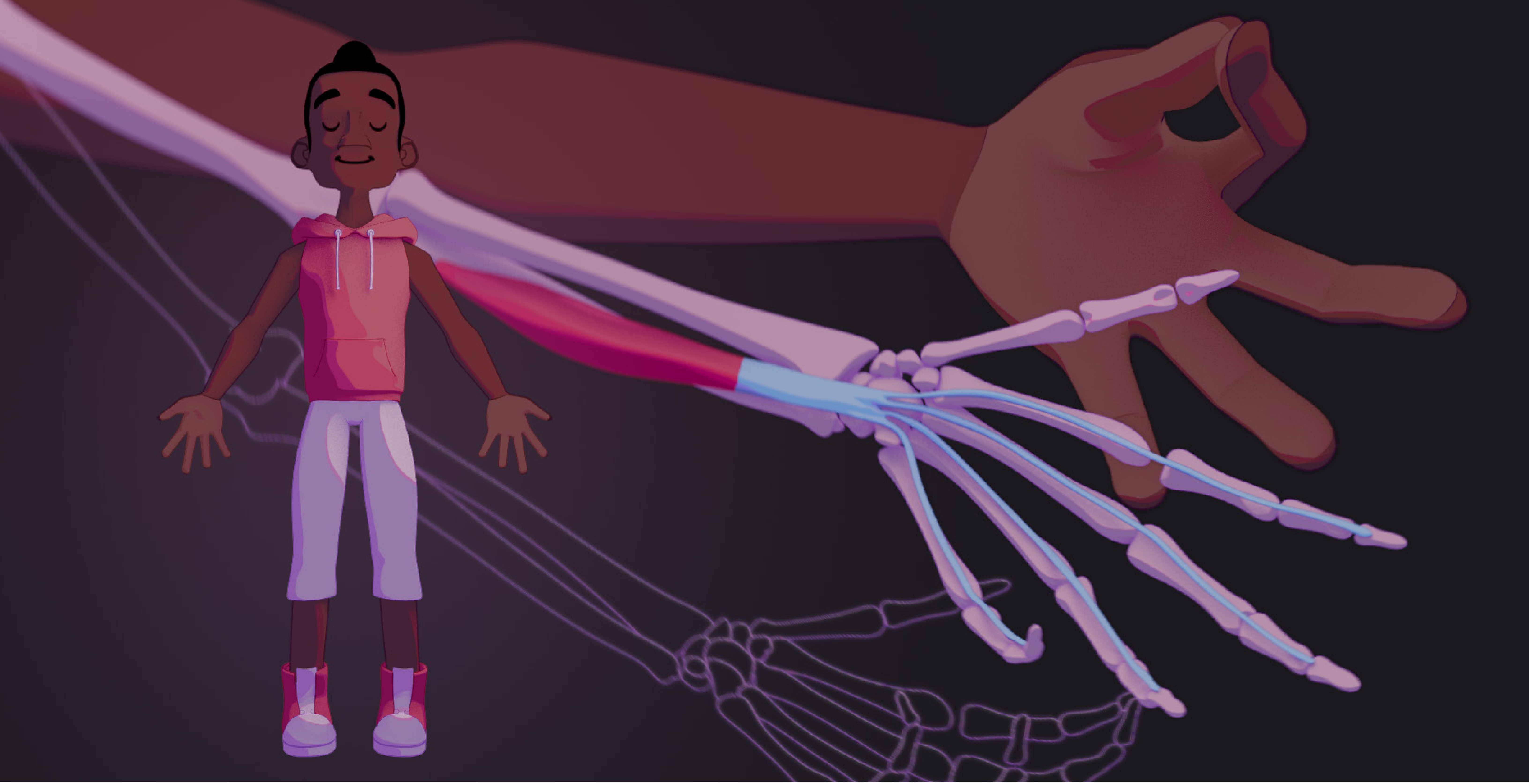

Neramy Ganesan

As an animator and illustrator, I love working with colour, movement, and story while problem-solving to communicate complex topics effectively. The impact of science visualization keeps me curious during the iterative design process, and I strive to continue developing resources that make science more accessible to a variety of audiences. Improving health literacy is a top priority of mine, and my work at BMC holds this at its core.

Neuroanatomical Illustration

This illustration visualizes the gross anatomy of a sagittal cut of the brain in relation to features of the skull as well as external anatomy of the face.

1. Final illustration. I completed all sketching and painting in Photoshop.

2. Sketch. I used a photo of myself as reference at this stage and while rendering the lighting.

3. Production process. I used a brain model to guide the gyri and sulci of the left hemisphere.

4. Production process. Knowing that the brain would be pink, I rendered the face with blue hues and the skull with yellow.

Previous spread. A still from my Master's Research Project.

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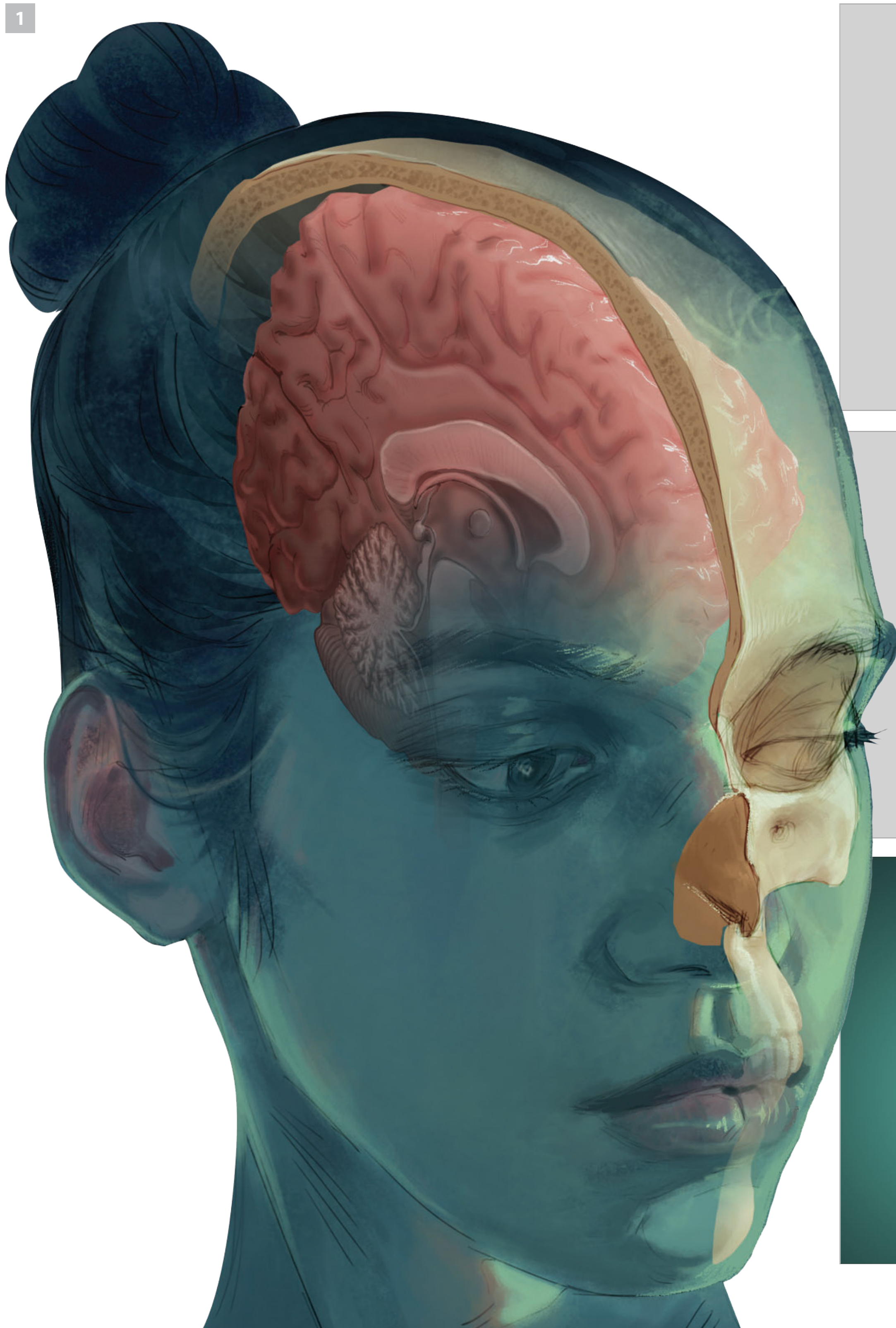

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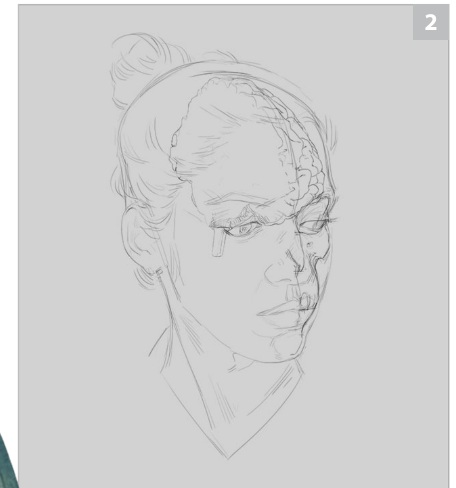

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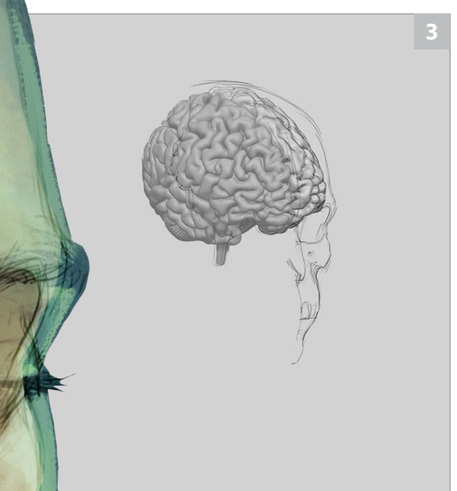

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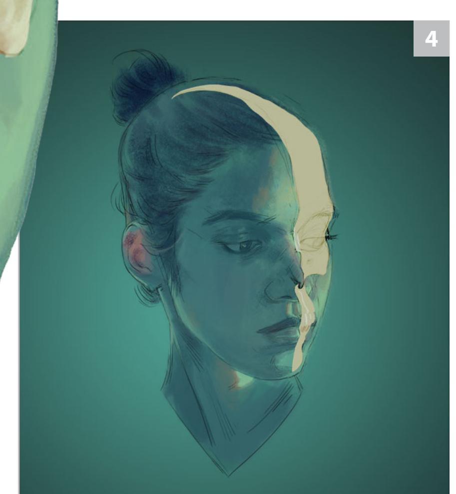

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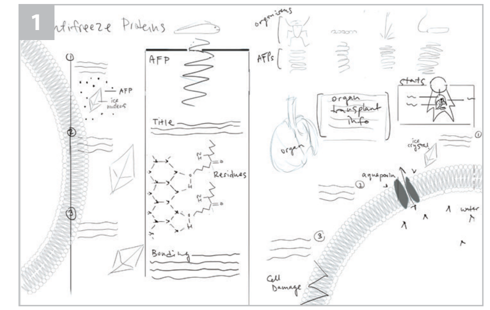

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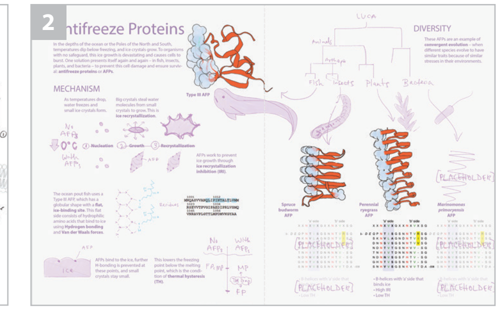

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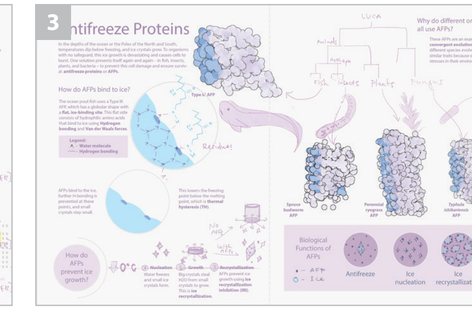

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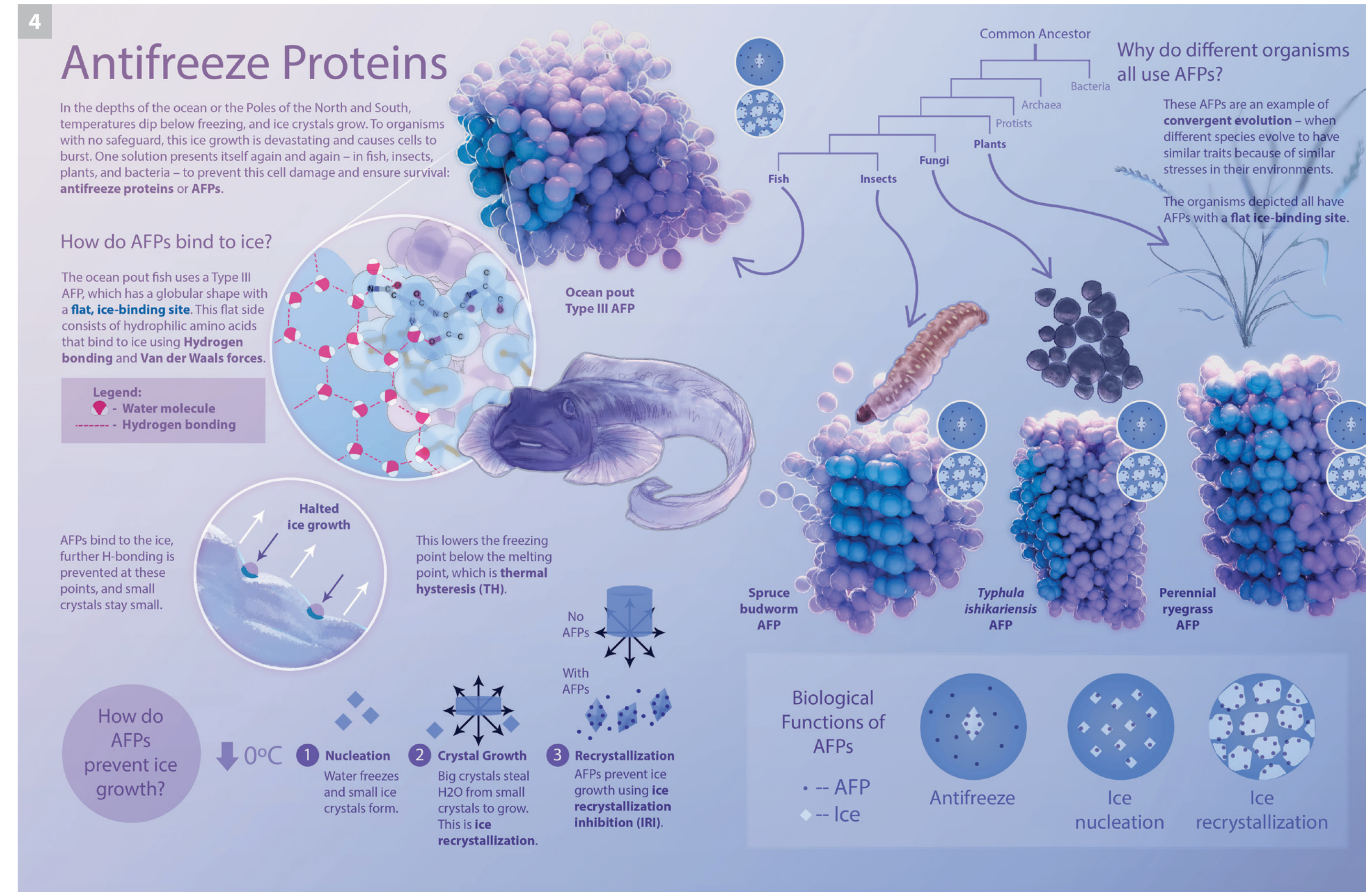

Molecular Visualization

This molecular visualization informs a general audience about the science of antifreeze proteins (AFPs). The diversity of life that produces AFPs is shown with examples of a fish, insect, fungus, and plant.

1. Sketch. A thumbnail sketch exploring mechanisms and applications of AFPs.

2. Production process. A layout draft with placeholder Protein Data Bank (PDB) assets. I decided on the subtopics of "mechanism" and "diversity" at this stage.

3. Production process. A finalized layout draft with final copy and placeholder assets. I updated the proteins to better clarify the ice-binding sites.

4. Final draft. I rendered 3D elements in Maya and 2D assets in Photoshop. I chose colours to highlight the ice-binding aspect across different scales.

Editorial Illustration

With this mock journal cover, I illustrated the core idea of a research article focusing on using functional pyelocaliceal renal models instead of patients in assessing different methods of kidney stone passage, particularly rollercoasters.

1. Sketch. Intial sketches for 2 different potential topics for this assignment. I chose the second topic, with the sketch depicting a kidney stone on a rollercoaster.

2. 3D modelling. Playblast of the 3D models.

3. Production process. Colour and layout sketch.

4. Final draft. I used lighting to add drama and focus to the final kidney, which is flying out to signify the higher likelihood of kidney stone passage from sitting in the back seat.

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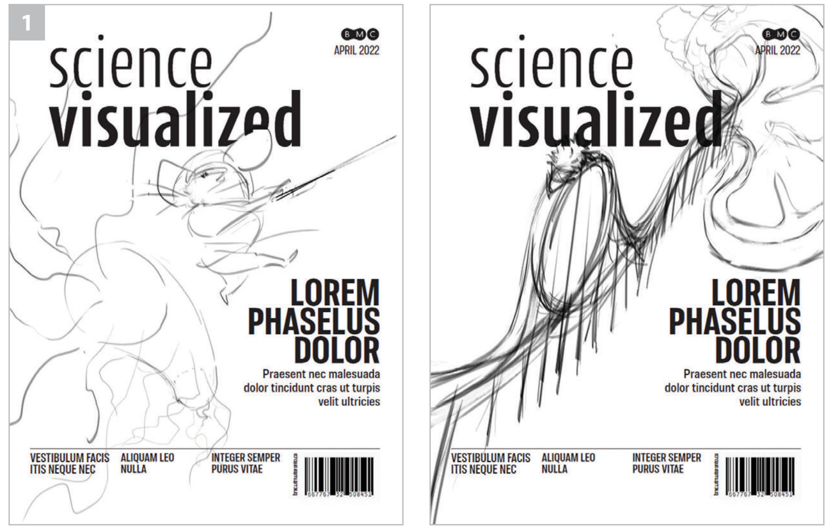

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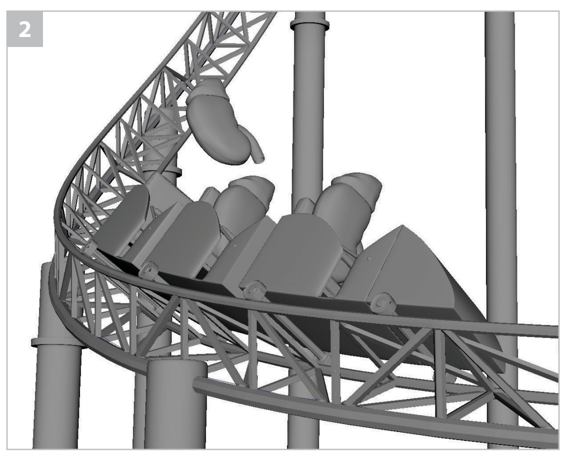

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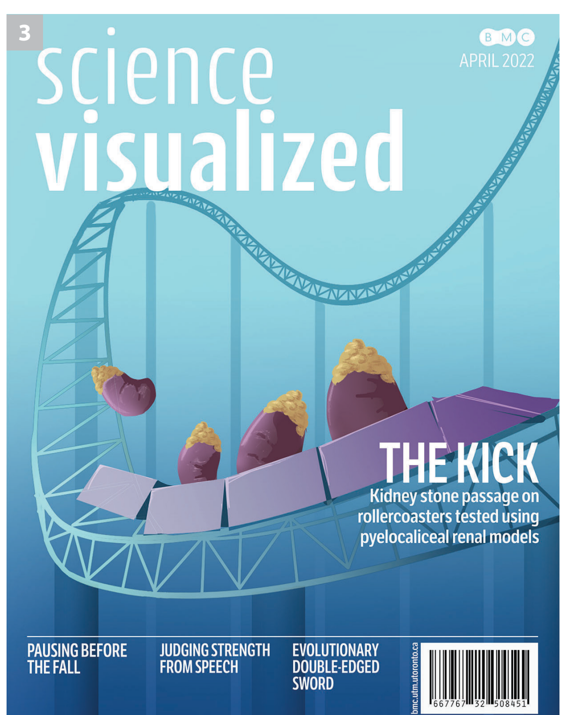

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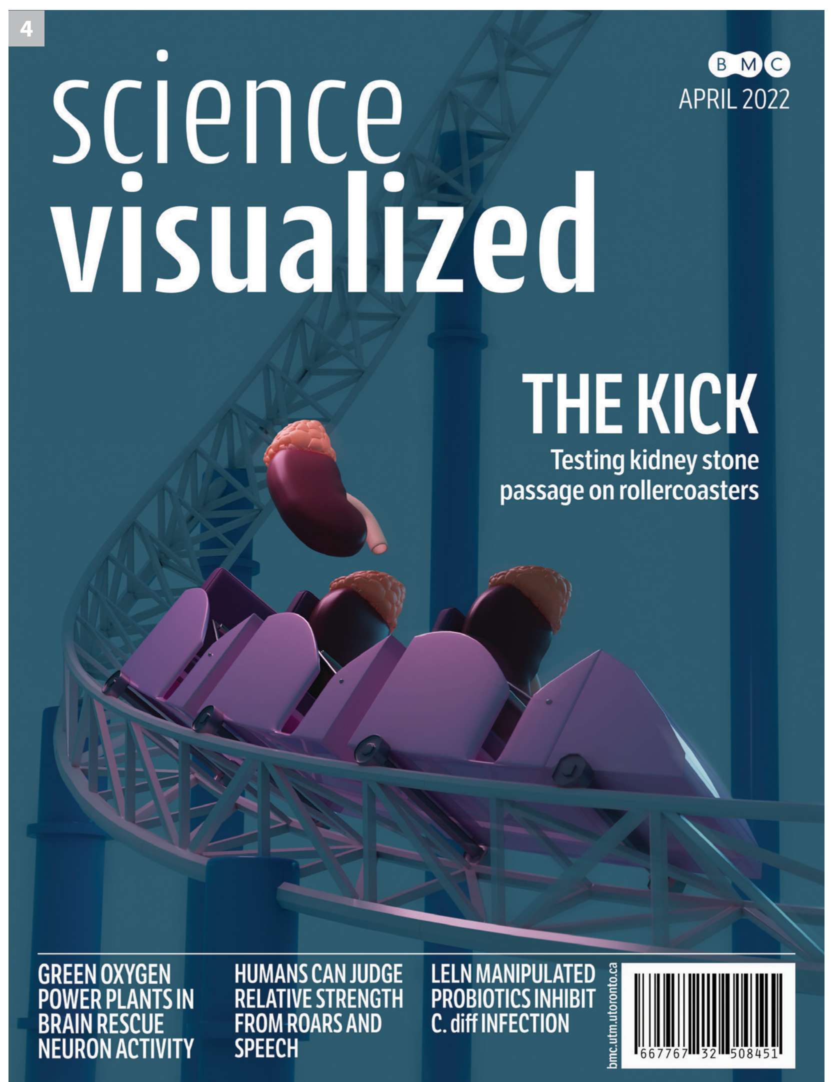

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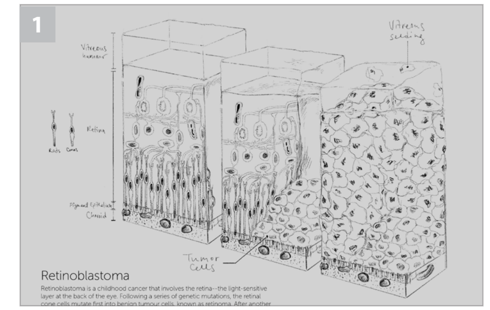

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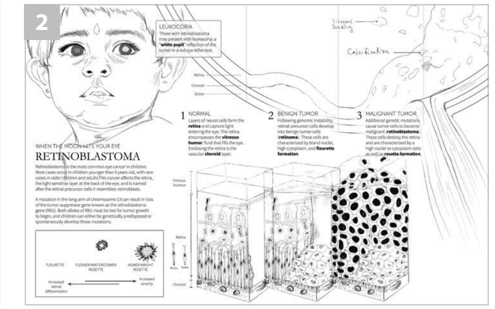

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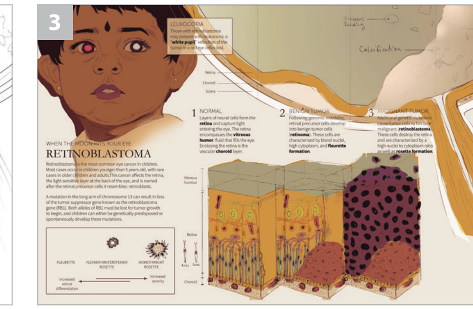

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Pathological Illustration

Retinoblastoma is the most common pediatric eye cancer, so I illustrated this for a lay audience. Early detection is key, and understanding how this cancer manifests can help parents and guardians make sense of what their child may be experiencing.

1. Sketch. I looked at the layers of the retina and how tumor cells develop in this area through a tissue cube study.

2. Sketch. I finalized the linework and copy at this stage for approval.

3. Production process. I decided on base colours and received critique on the cancer cells' colour diverging from the real-life tissue colour.

4. Final illustration. I adjusted the colours overall to make the cancer cells/tissue more salient.

Nerve Transfer and Tendon Transfer Surgeries for Cervical Spinal Cord Injury

A 2D/3D animation that explains nerve and tendon transfer treatments for improving upper limb function for those with cervical spinal cord injury. The goal is to increase awareness of these treatments, particularly in online spaces.

1. 3D modelling. Test 3D models and renders. I learned about character modelling, rigging, and animating at this stage.

2. Storyboard. Select storyboard images.

3. Production process. Finalized 2D assets for the nerve transfer and tendon transfer diagrams. I designed these illustrations and animations to be simplified and approachable, while maintaining key anatomical relationships.

4. 3D modelling. Character modelling progression. After the initial pass, I redid the character model from scratch to have a more refined silhouette that highlights key features: the head, neck, arms, and hands.

5. Final animation.

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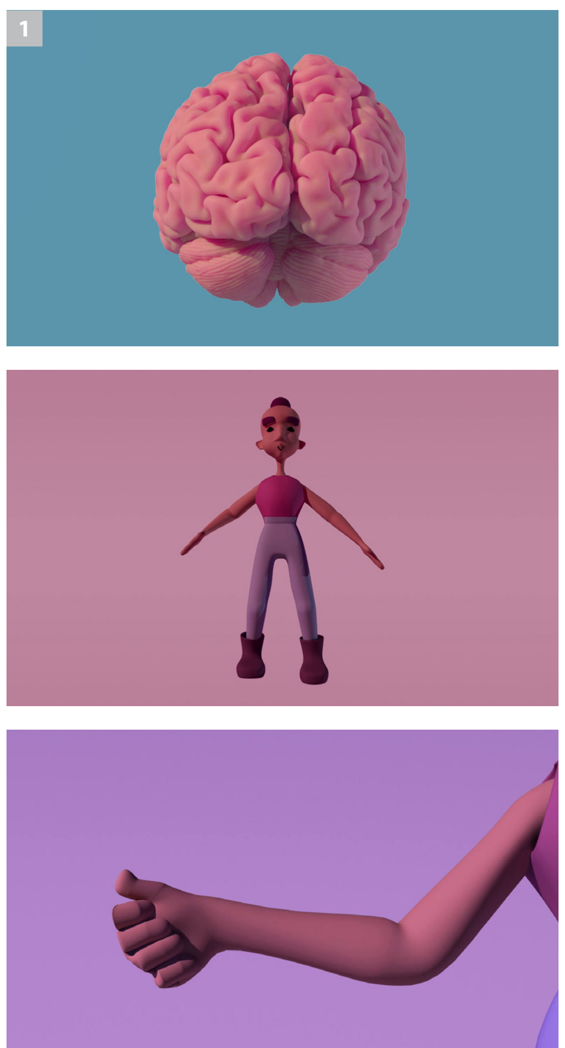

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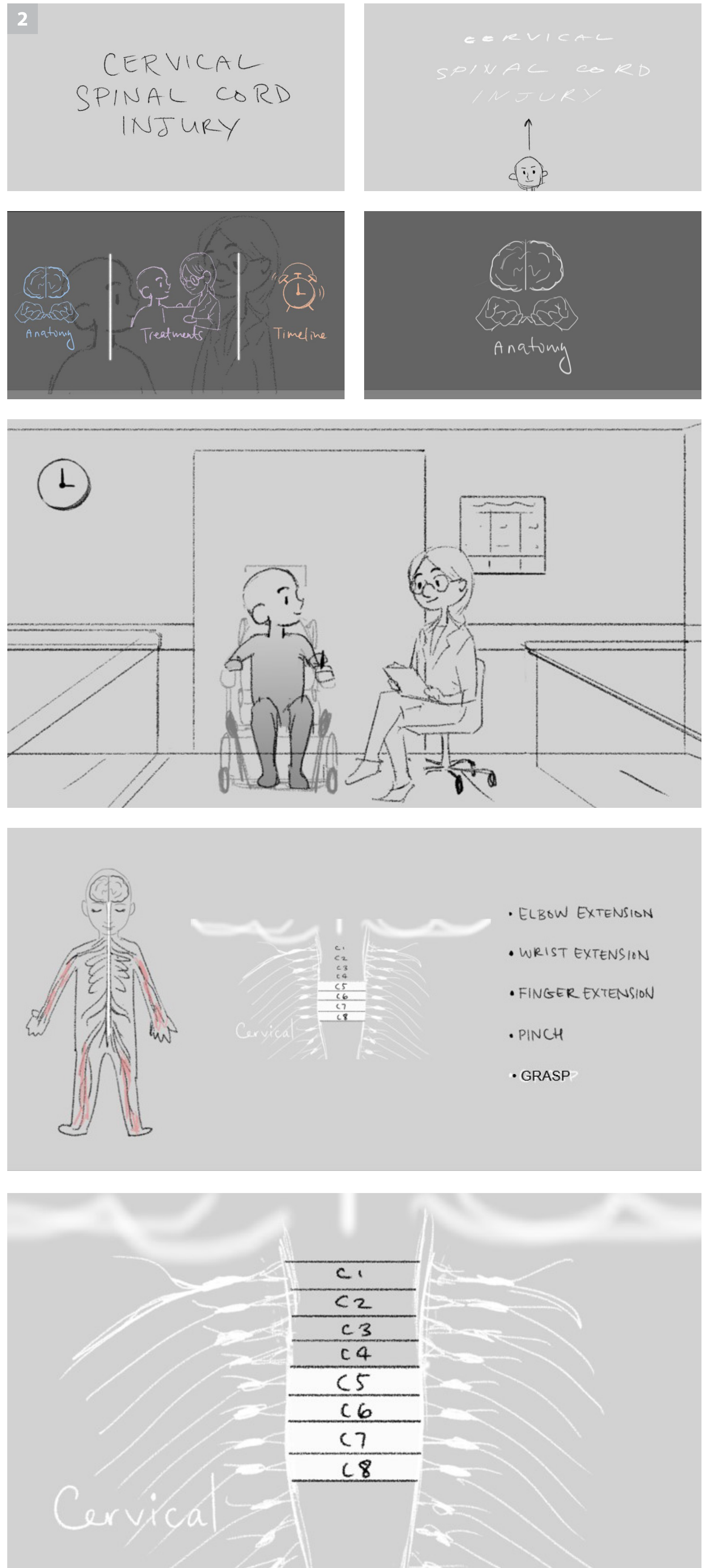

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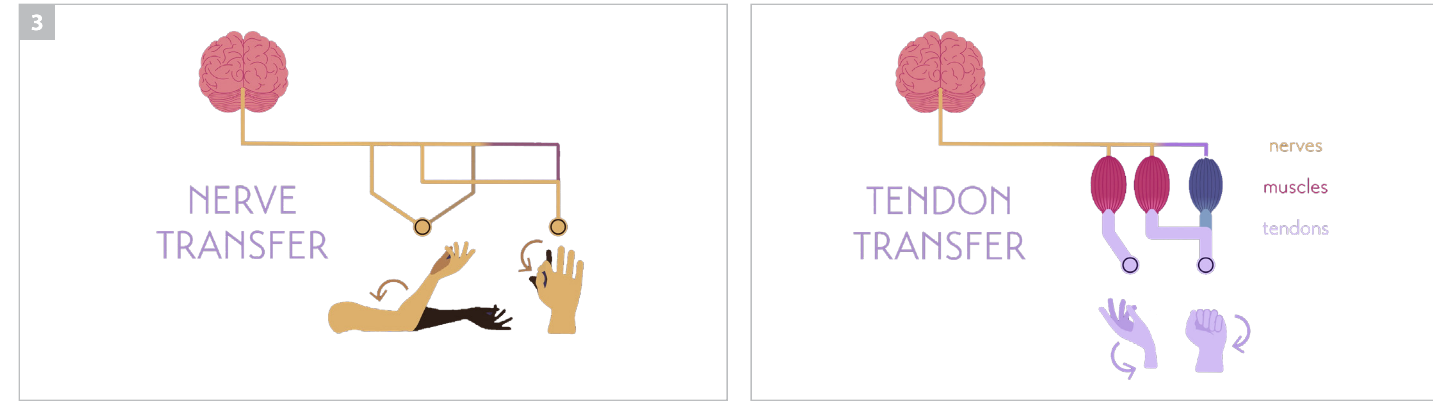

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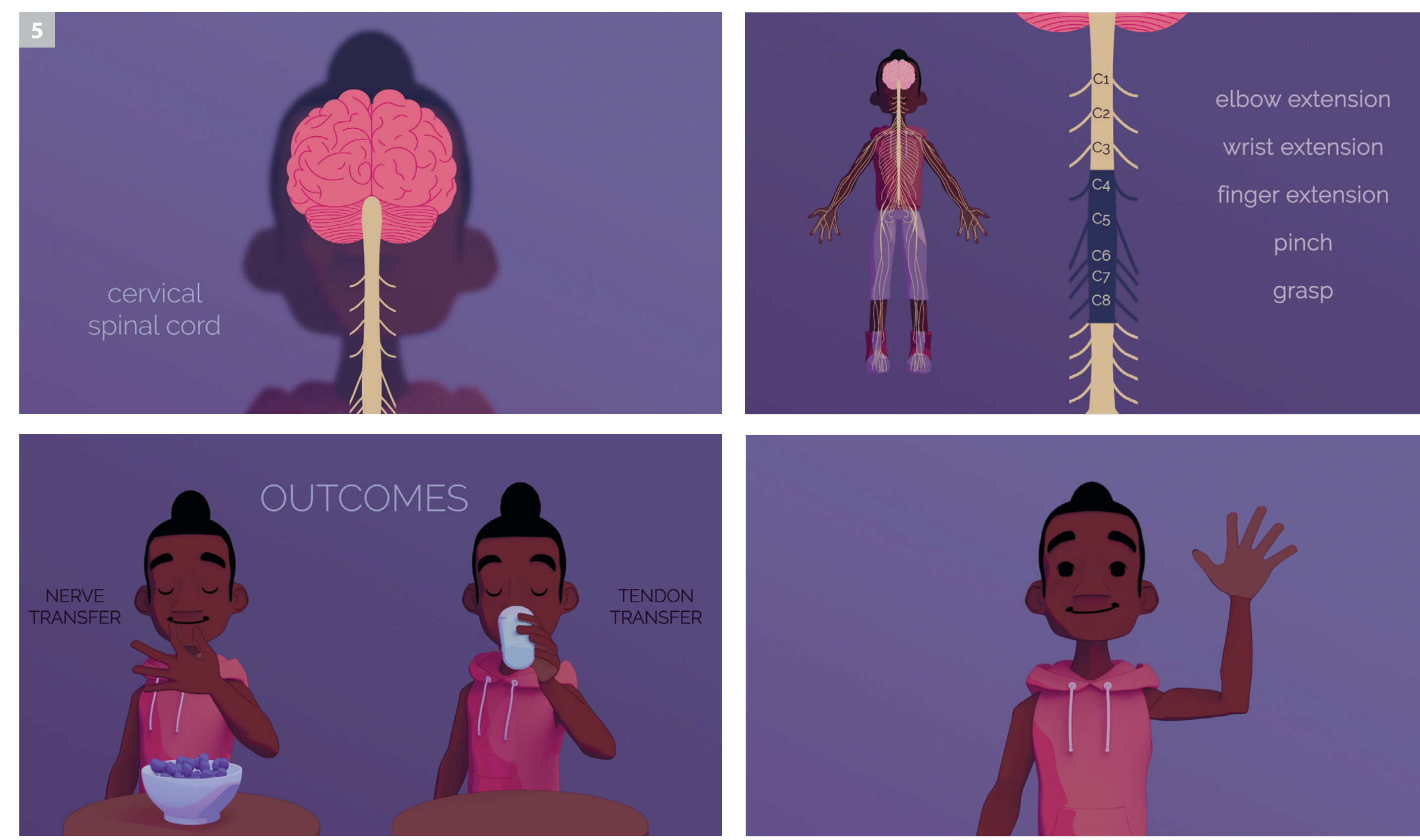

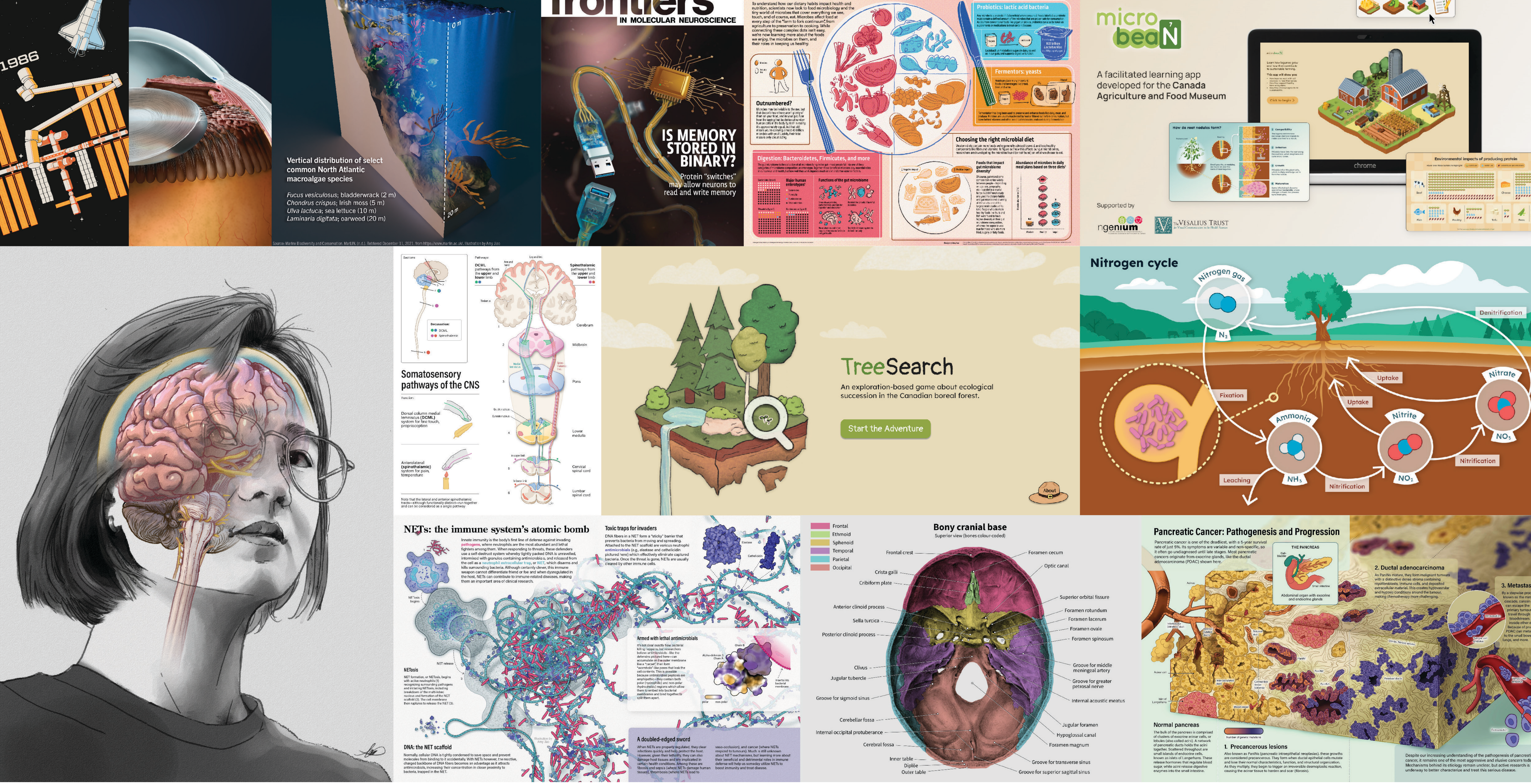

Amy Jiao

One belief I will carry with me, throughout my career, is that good science communication stems from one's passion to learn and share. Through BMC, I have become an empathetic problem-solver who creates visual solutions that convey both expertise and excitement to share knowledge with others. In the future, I hope to help inspire new learning by contributing to exhibits at informal science institutions, centres, and museums.

Editorial Illustration

In terms of scientific visualization, equating the brain to a computer is not a new idea. Here I wanted to bring my own take on this visual metaphor, in a way that combined accuracy and wow-factor.

1. Production process. Concept and layout exploration sketches, initially in black and white to focus first on value contrast and not colour.

2. 3D modelling. This was my first experience with hard surface modelling, and I was even able to scour my desk junk drawer for references!

3. Final illustration. The objective was to produce a striking central subject in a convincing style and environment.

Previous spread. A compilation of many of my projects created during my time at BMC.

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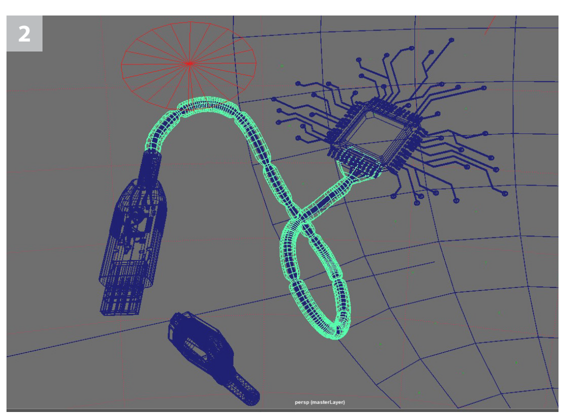

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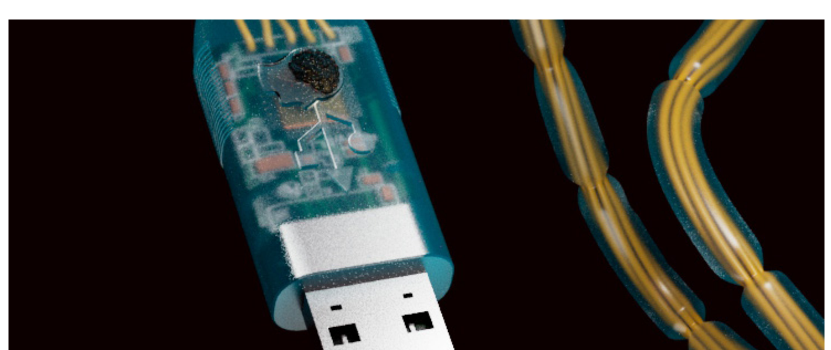

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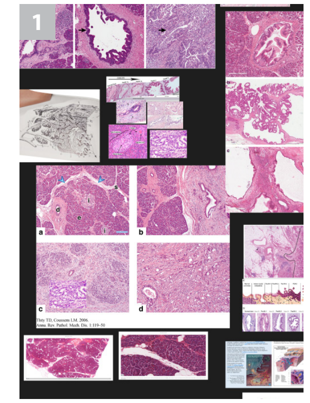

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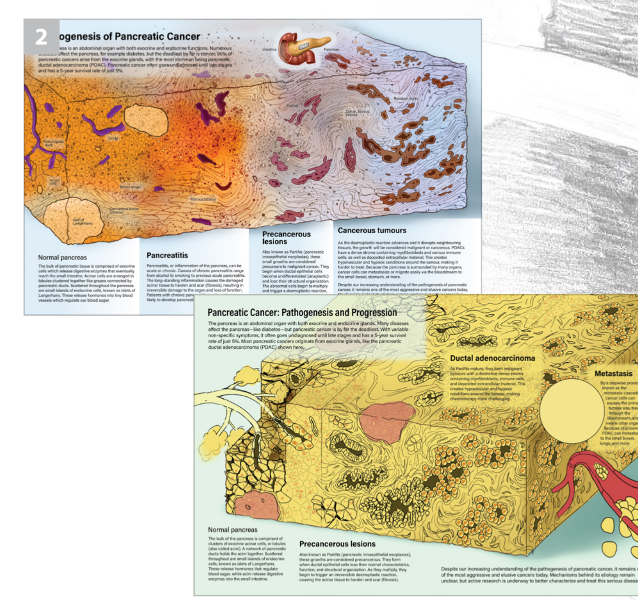

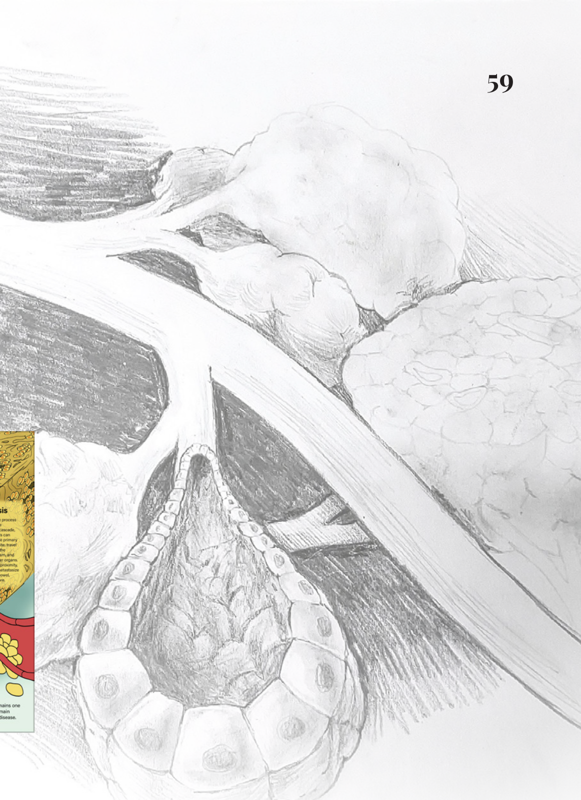

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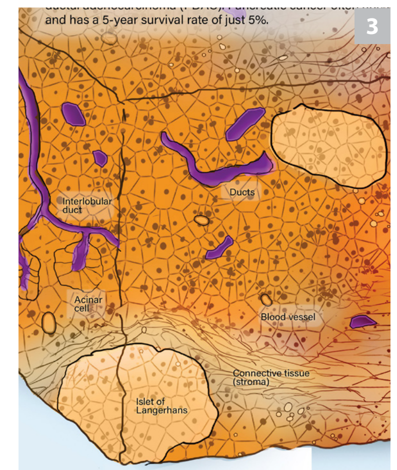

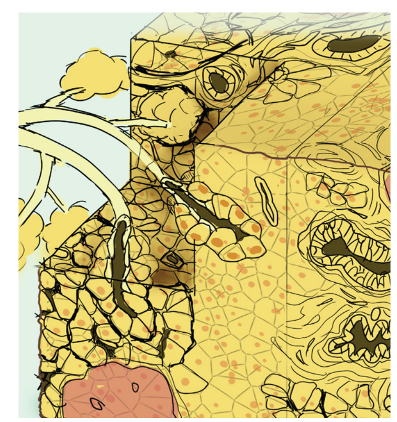

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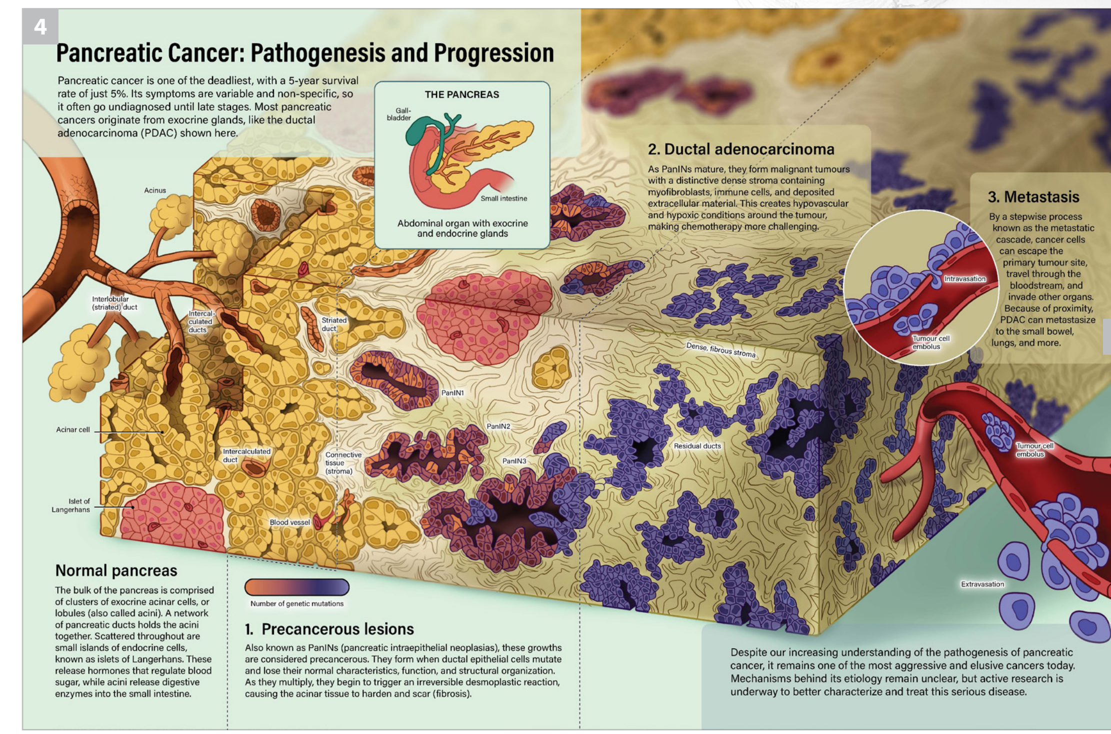


Pathological Illustration

I chose pancreatic cancer for this project in honour of my late grandfather who passed away during my studies at BMC. As well, it is a notably deadly and poorly diagnosed cancer, which highlights the need for effective visualizations on its pathogenesis.

1. Notes. Content research, most of which was pathological imaging.

2. Sketch. Early layout drafts.

3. Study. Close-up of the early sketches depicting the pancreatic tissue.

4. Final illustration. This illustration takes a schematic visualization approach to show the progression of pancreatic ductal adenocarcinoma (PDAC), the most common type of pancreatic cancer.

Molecular Visualization

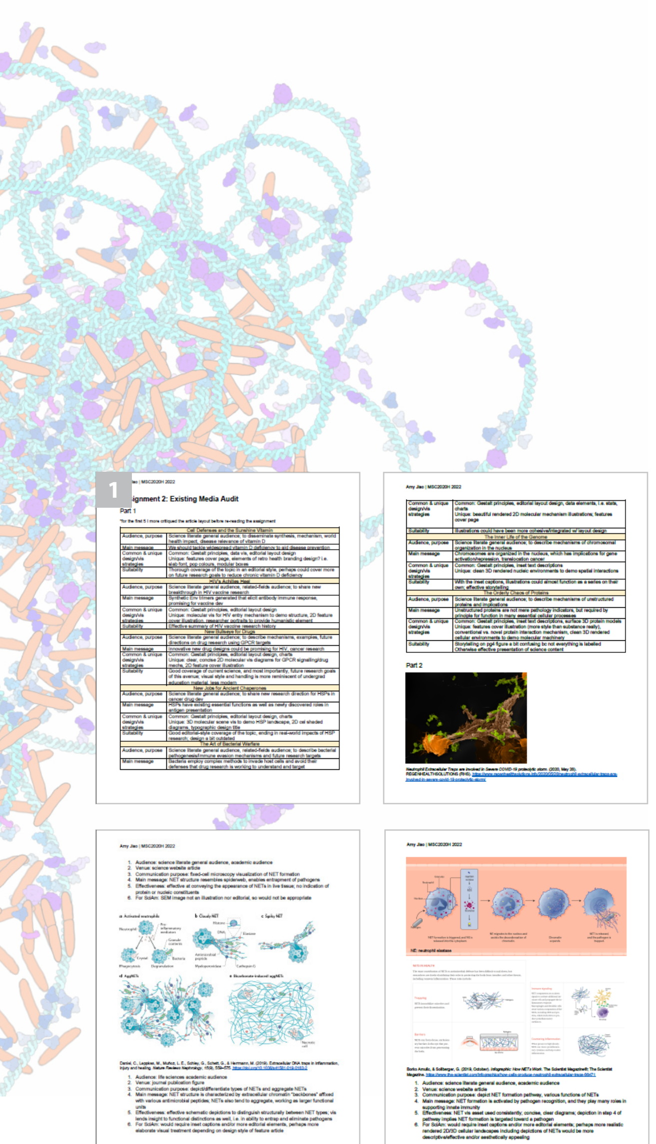
My second undergraduate major was immunology, and I've been fascinated with innate immunity and neutrophil extracellular traps (NETs) ever since I first learned about them. In this visualization, I wanted to pay homage to the beautiful complexity of NETs with a striking graphic style.

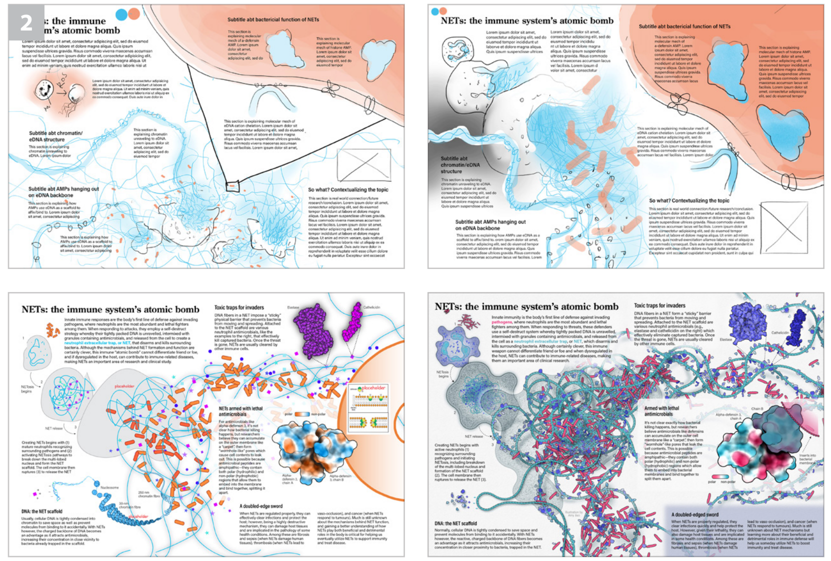
1. Notes. Existing media audit of the subject matter; it was one of my favourite parts of the assignment.

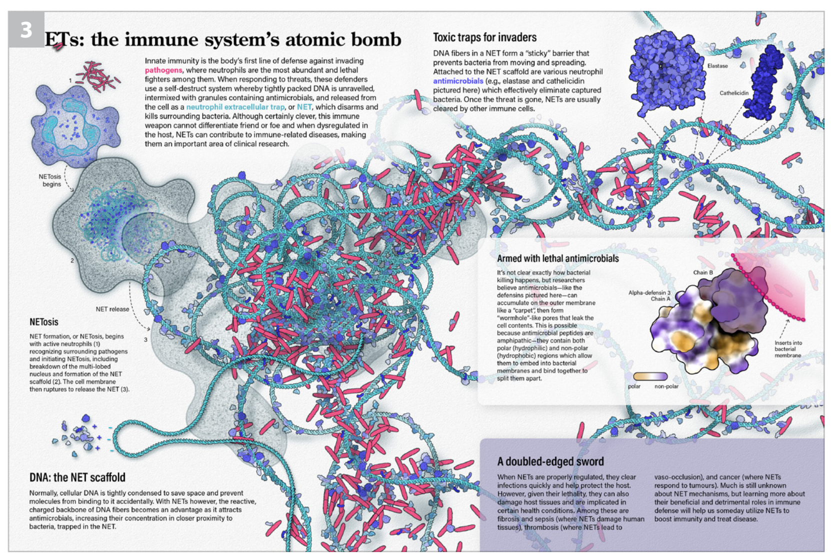
2. Sketch. Iterative layout drafts and colourization draft.

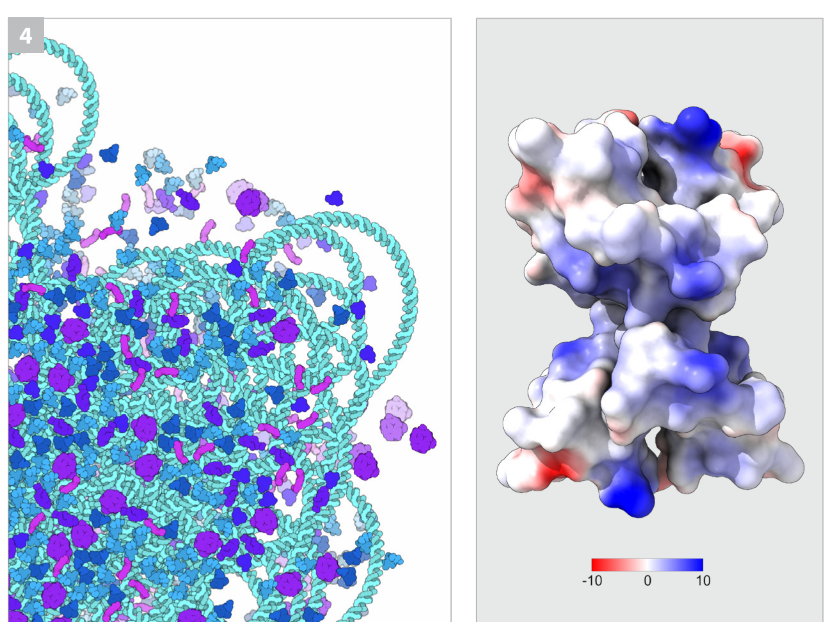
3. Final illustration. One of my creative goals here was to push a bold visual style for the NET, which due to its name already lends itself a useful metaphor.

4. Production process. Asset procurement and exploration.









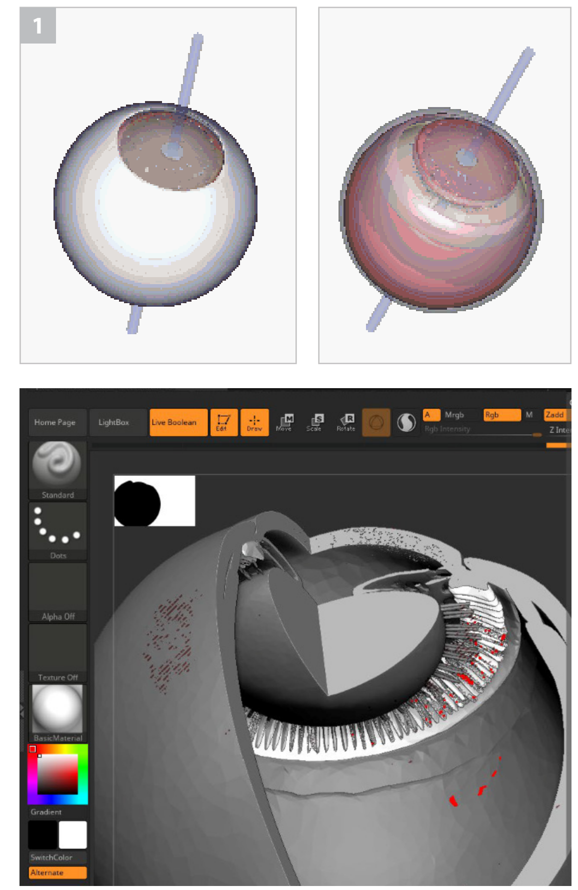
Anatomical Illustration

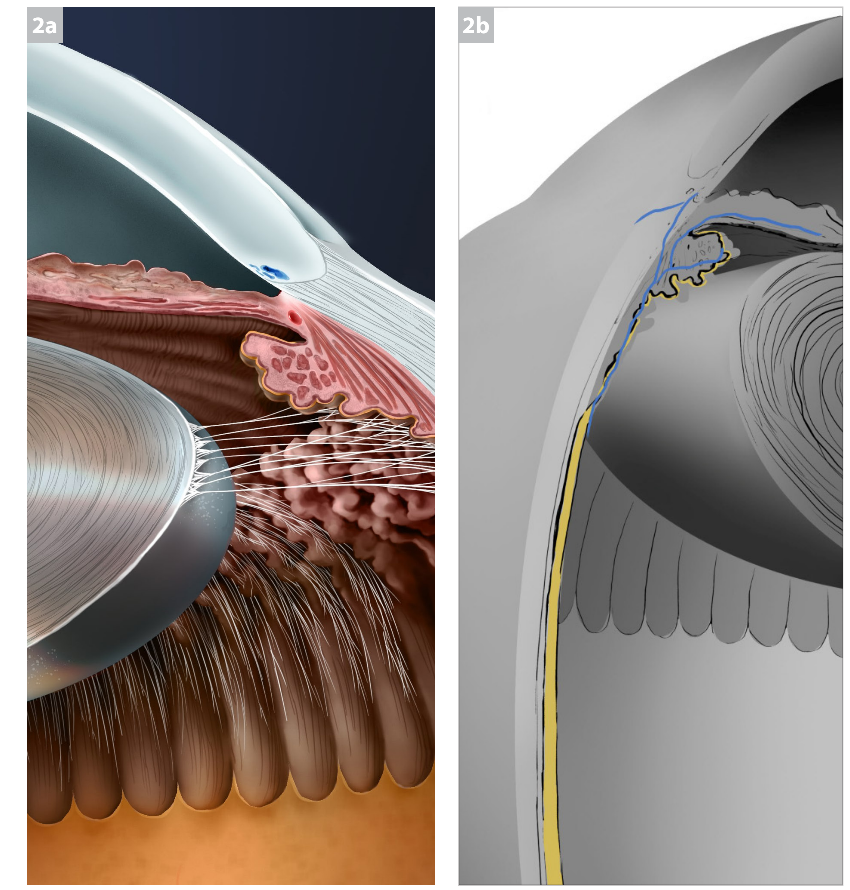
The fine anatomy of the eye is complex and remarkable. Researching the subject matter and putting together this illustration was a challenging but rewarding project.

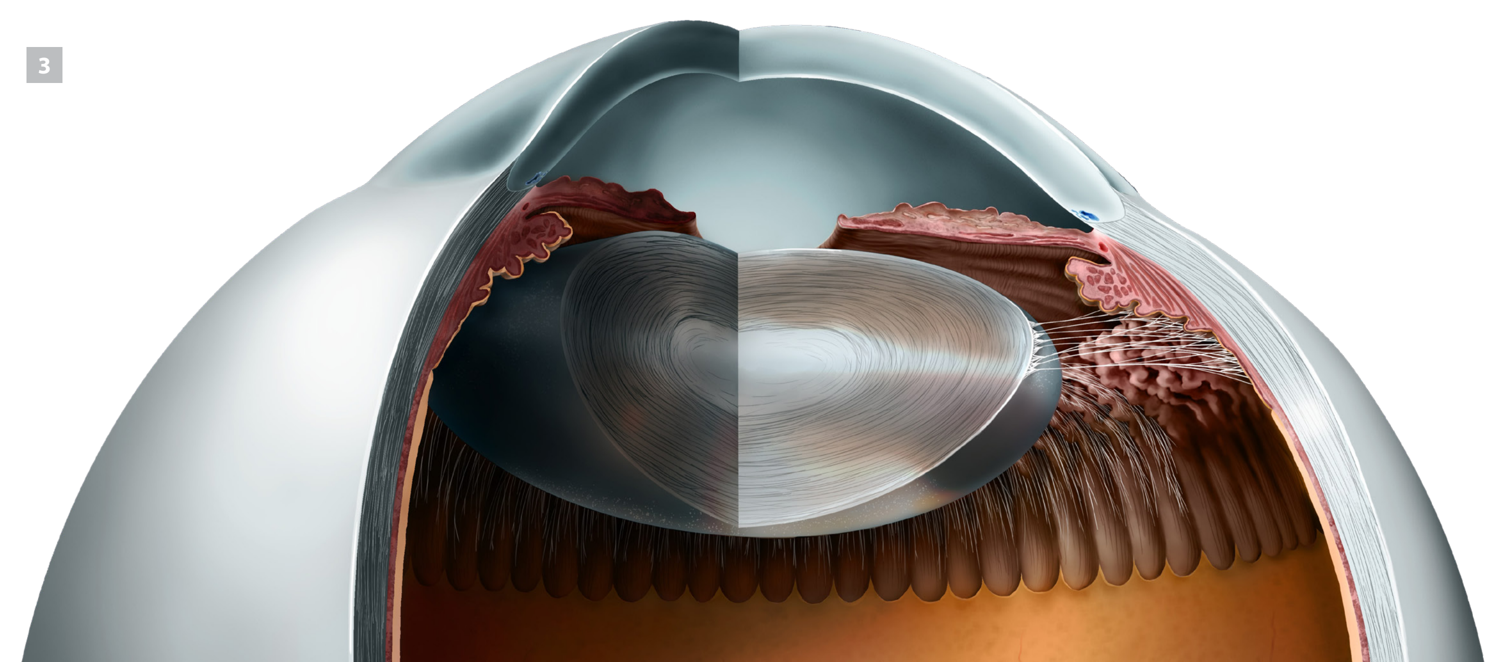
1. 3D modelling. Refining a scanned model retrieved from the BodyParts3D database.

2. Production process. 2a. Close-up of the final illustration showing fine anatomical details. **2b.** Preliminary details added. Colour sections were blocked out in Illustrator to bring into Photoshop for painting.

3. Final illustration. This illustration maintains a straightforward composition and viewing angle to keep the viewer's focus on the posterior anatomical features of the eye. Again, attention is paid to accurately depicting the size and scale of components.







MicrobeaN: A Museum Learning App on Symbiotic Nitrogen Fixation in Legumes

MicrobeaN is a web-based multimedia teaching tool designed for classroom use by museum educators. It introduces essential agroecology topics with a learner-driven interpretive approach to science communication and engagement. Developed in collaboration with the Canada Agriculture and Food Museum, Ottawa.

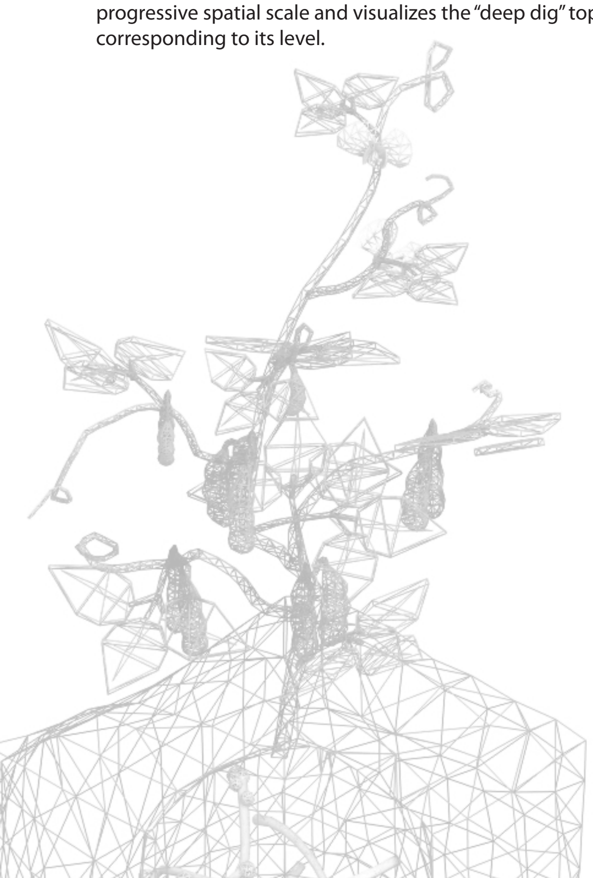
1. Final interactive. MicrobeaN app homepage. Availability was limited to desktop only to avoid development complications. The homepage features one 3D world seen later on, as well as learning objectives to prime the user.

2. UX design. Sitemap and user flow of the app structure, integrating previous user research as well as content script developed with the science advisor of this museum client.

3. UX design. User personas and journey map, built upon research conducted during a needs assessment with a focus group of education and management staff from the museum client.

4. UI design. Iterative wireframes. I initially focused on low-fidelity wireframes to nail key user interace (UI) structure, then worked up as content development came together.

5. Final interactive. 5a. Designed as a teaching aid to spark group discussion, user testing was conducted with museum educators to evaluate the best modality (illustration, interactive, animation) for each topic area. **5b.** 3D worlds which divide MicrobeaN into sections. Each highlights one level of progressive spatial scale and visualizes the "deep dig" topics corresponding to its level.



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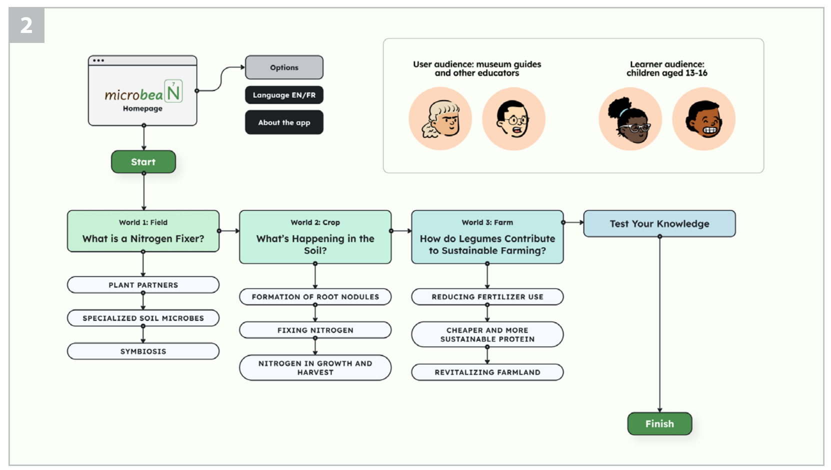

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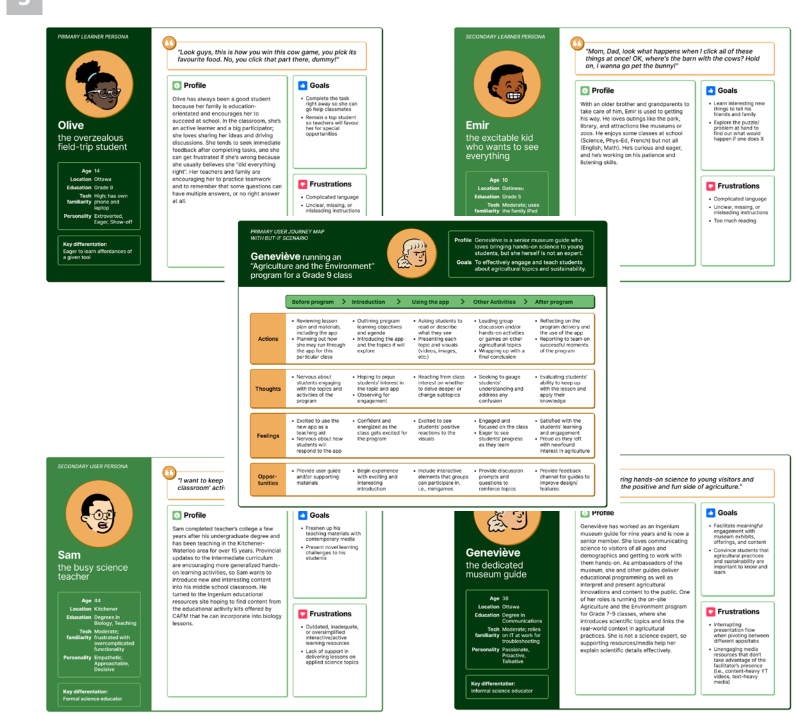

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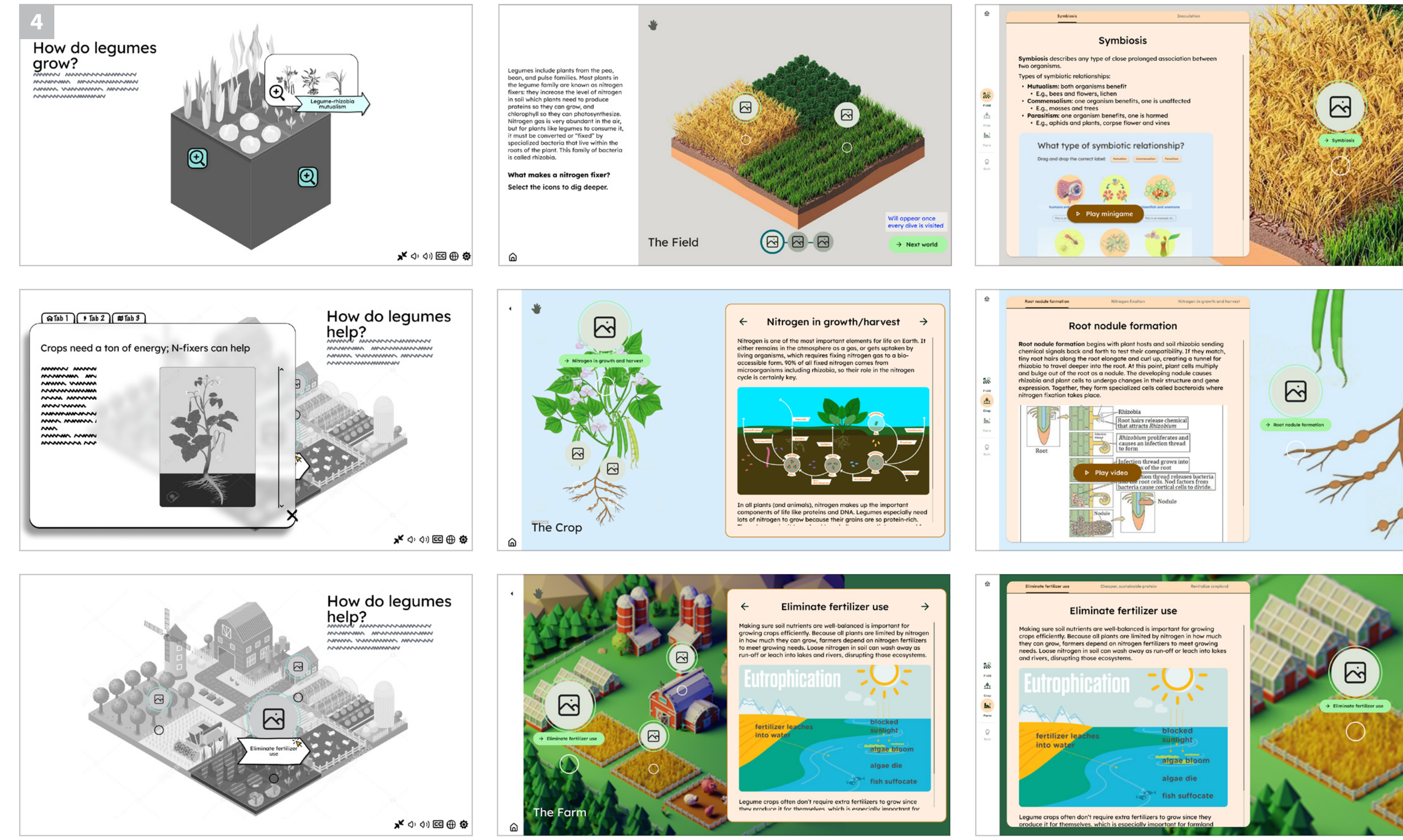

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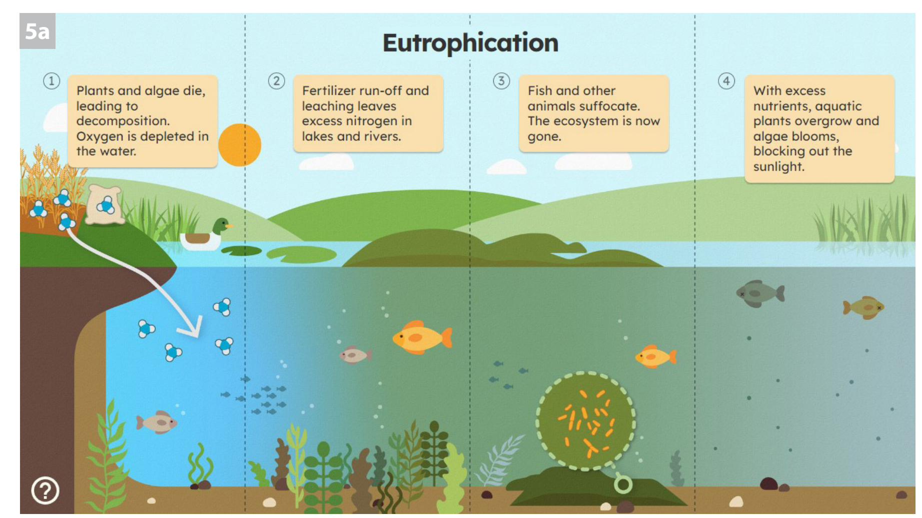

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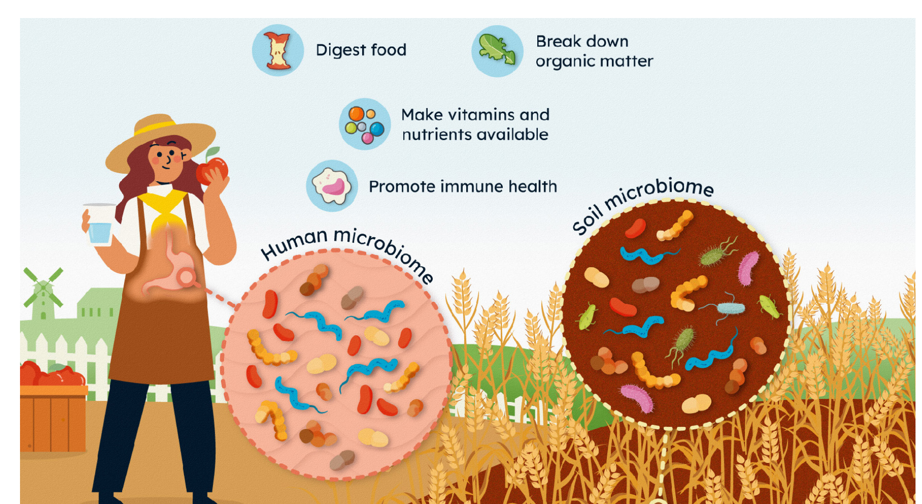

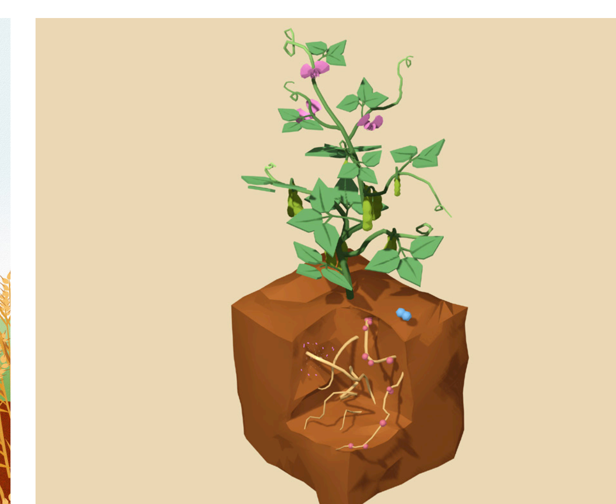

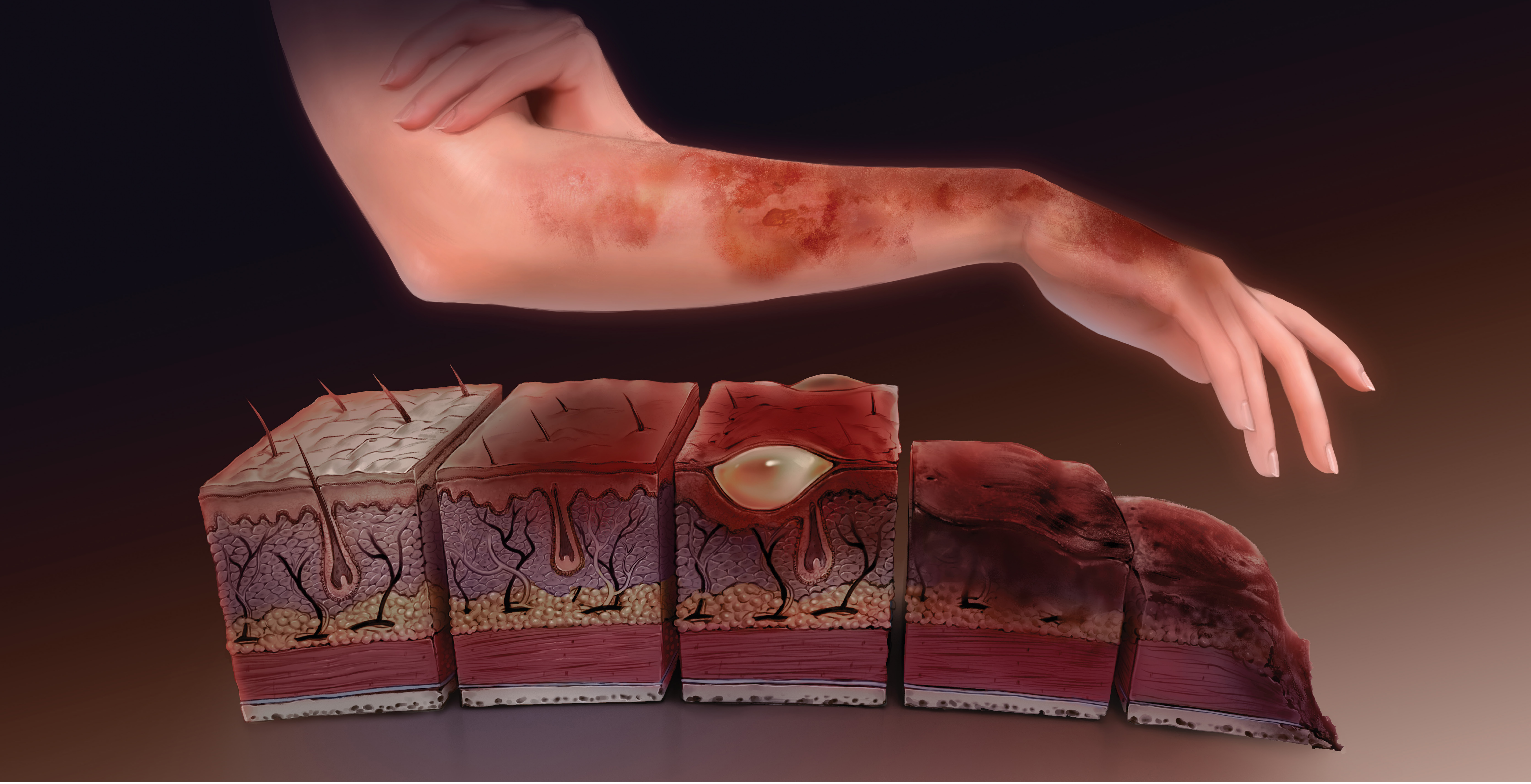

Viktoriya Khymych

I am a biomedical illustrator and designer passionate about solving science visualization problems and engaging interactive design. With a passion for innovation, I'm dedicated to simplifying concepts and sparking curiosity through captivating storytelling. My favourite kind of work would be the type that begins with an idea and ends with a story. There is something special about visually transforming complex science into a clear and engaging narrative that keeps me passionate about what I do.

Anatomical Illustration

This is an anatomical illustration depicting the relationship between the superficial and deep layers of the posterior compartment of the left knee from a non-traditional viewpoint.

1. Final illustration. I completed the greyscale to colour render in Photoshop. I added atmospheric reflected light to bring the illustration to life.

2. Study. In my initial sketches, I considered illustrating a "cake slice" cut of the knee with hanging muscles and visible vasculature and nerves, but ultimately opted for a cleaner blunt cut for clarity.

3. 3D modelling. I built a simple 3D maquette to map out the initial angle of the cut and the plane depth. I added surface detail such as skin texture and muscle definition so that I could use it as a base for my final render.

4. Production process. I blocked in the basic shapes and then went on to add detail in greyscale, incorporating techniques such as photobashing for added realism.

Previous spread. A two-page spread on the pathophysiology of thermal burns.

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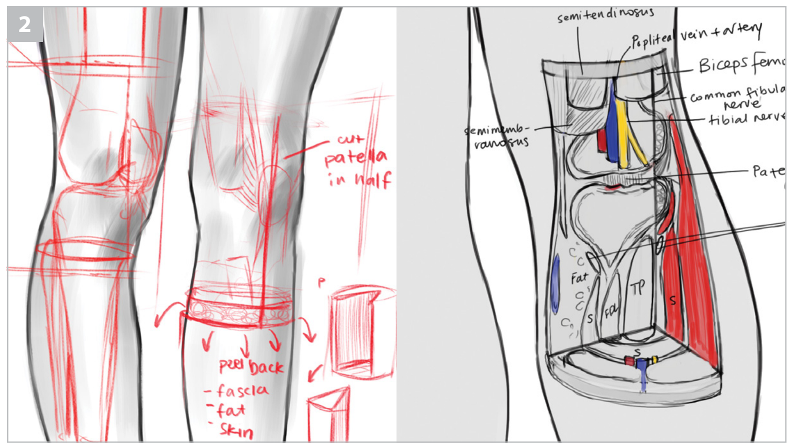

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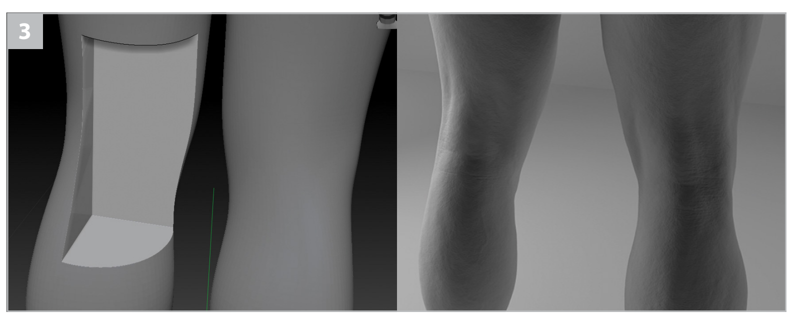

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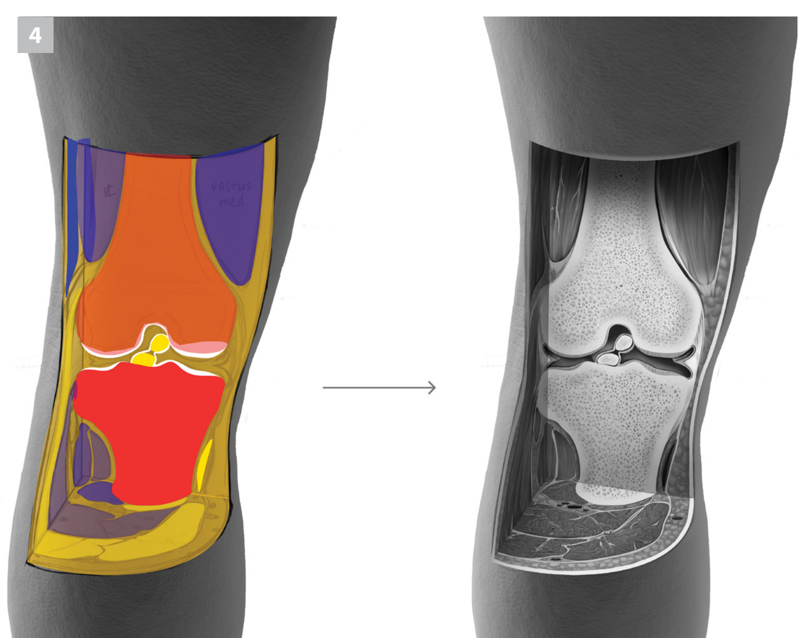

Neuroanatomical Illustration

An editorial illustration created to accurately depict the gross anatomy of the brain in situ while using a painterly style and vibrant palette inspired by Art Deco illustrations.

1. Final illustration. Close-ups of the final piece.

2. Production process. I sketched the brain and the portrait separately before "fitting" the brain inside the cranium. I used 3D models, anatomical atlases, and photo reference to make sure the relationships between the brain, the brain case, and the external features of the head are correct.

3. Final illustration. The final piece is an intersection of complexity and accuracy, and the vibrant and creative elements of American magazine and poster illustrations of the early 20th century.

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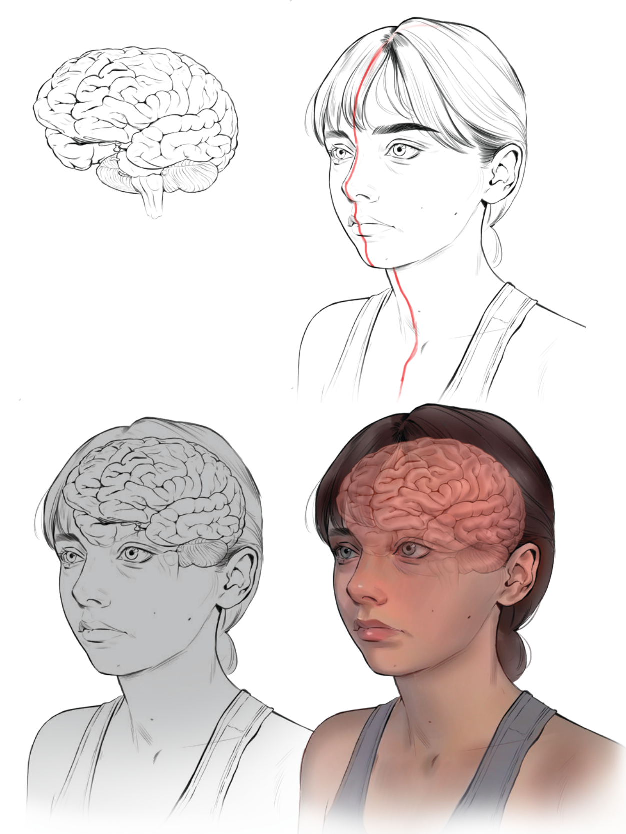

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Molecular Visualization

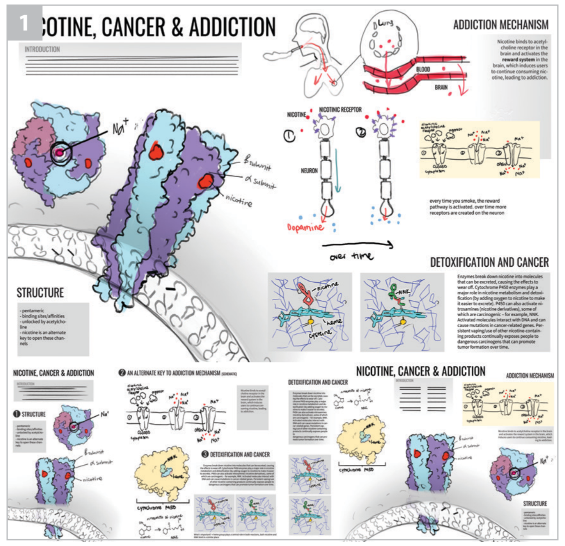
This mock Scientific American spread is intended to educate a general audience on the molecular mechanisms behind addiction and cancer by nicotine and its derivatives, such as nitrosamines.

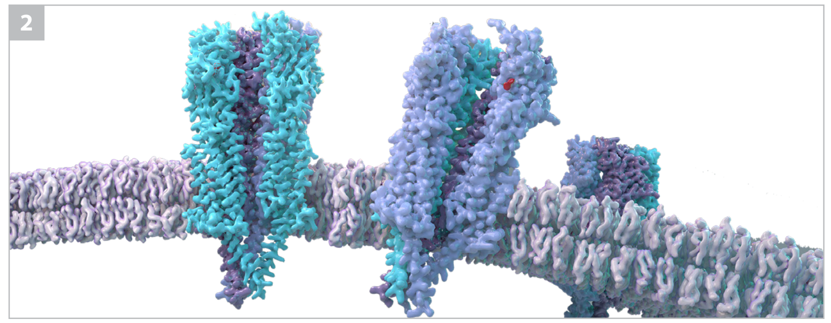
1. Sketch. High level thumbnail sketches exploring the narrative and layout.

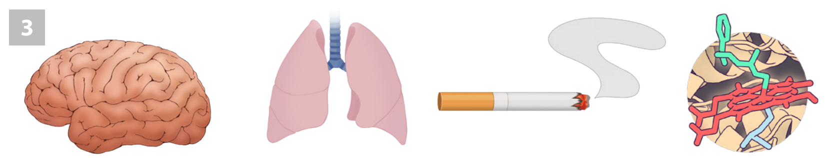
2. 3D modelling. A render of the nicotinic acetylcholine receptors embedded in the cell membrane.

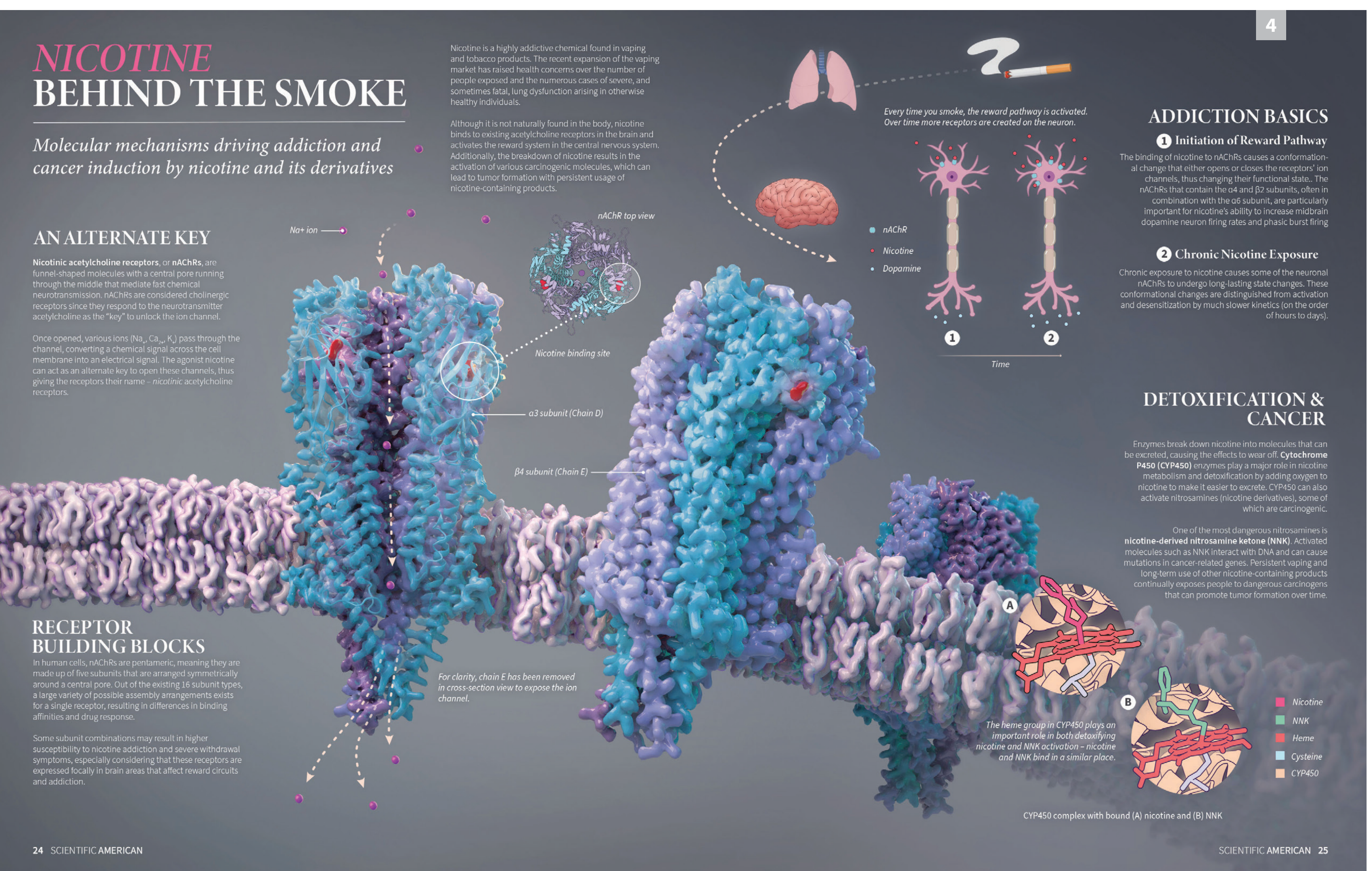
3. Production process. Small illustrations used throughout the piece. Considerable care and time was spent making the rendering level match the quality of the spread.

4. Final illustration. The final mock Scientific American spread.









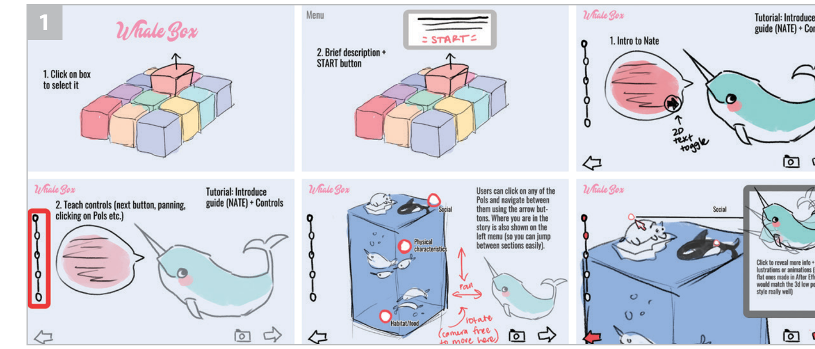
Interactive Animation

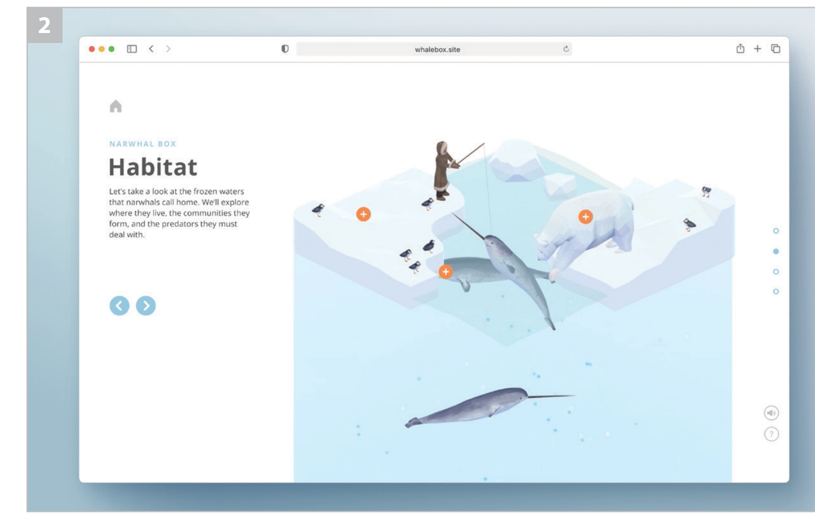
Whale Box is a web-based interactive educational experience that lets users explore the social and physical characteristics of different whales. Working in a team of seven, we focused on the narwhal module and created a lively 3D environment intended for wildlife conservation outreach and education.

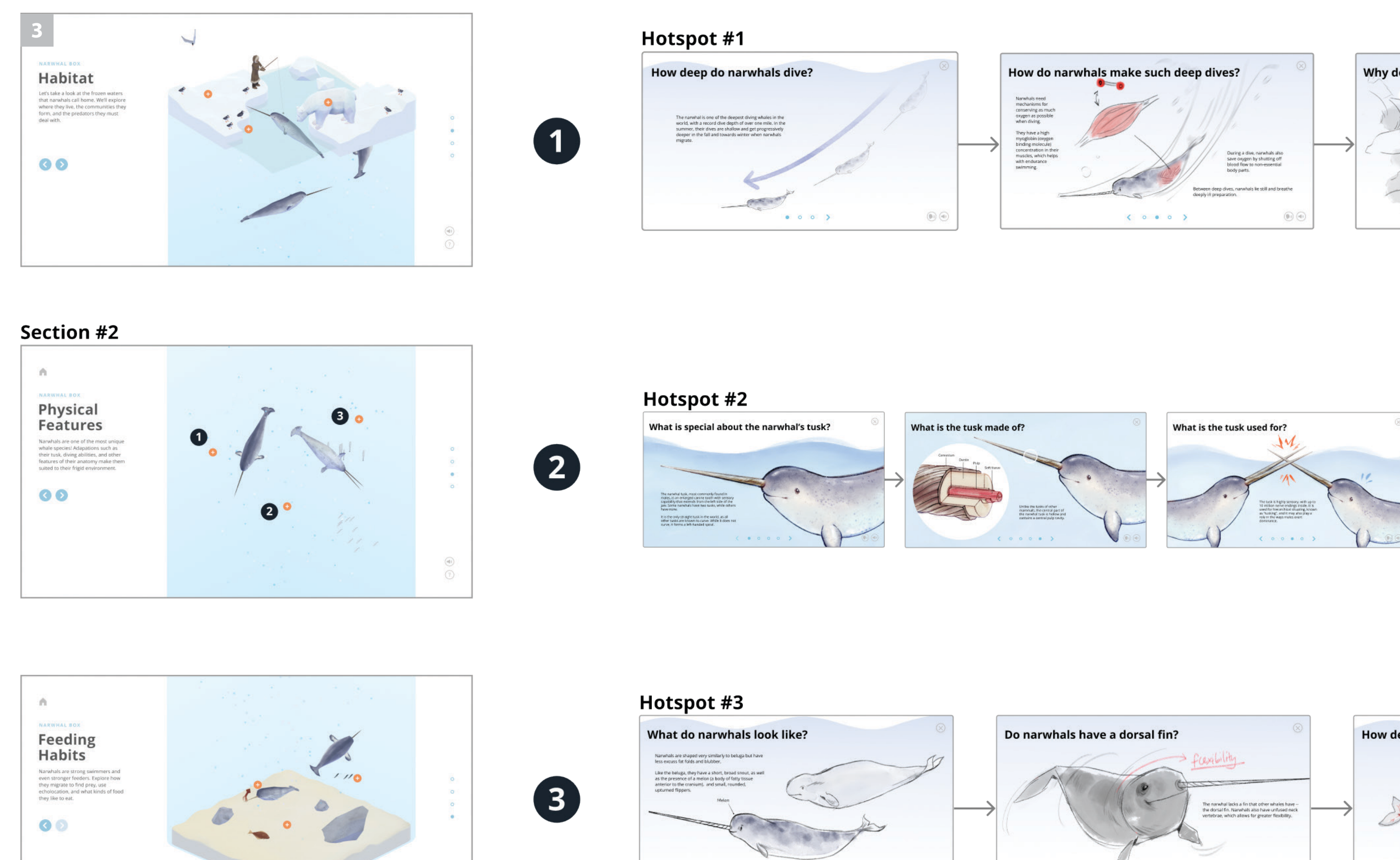
1. UX design. We considered a lot of potential ideas for the look and feel of the user experience for Whale Box. This is one of such early explorations, specifically focusing on the introductory portion of the application.

2. Final interactive. The final interactive piece was assembled in Unity and exported to be viewed on the web.

3. Final interactive. Close-ups of the 2D animated elements accessible through the hotspots in the module. We created loopable simple animations in a lively watercolour style for added interactivity.







barebones.

barebones. is an interactive multimedia learning tool for undergraduate skeletal physiology instruction. It aims to enhance the understanding of skeletal physiology among undergraduate students, providing context for real-world applications.

1. Prototype. The final version of **barebones.** is a web-based application accessible through a URL.

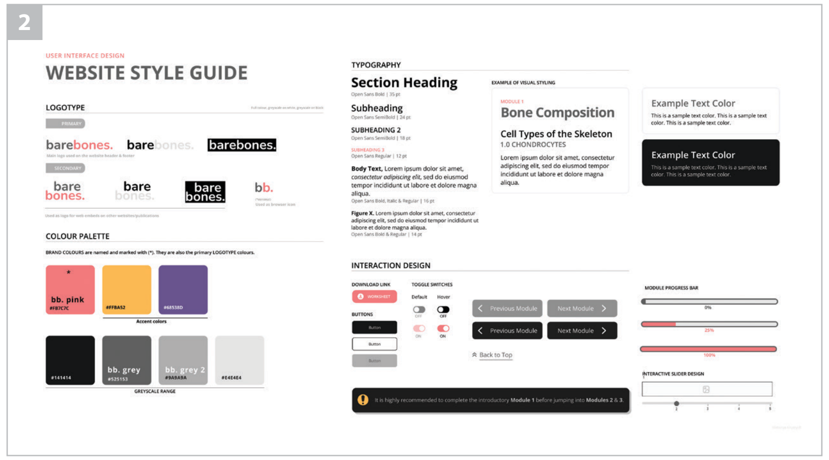
2. UI design. I created a website style guide outlining a comprehensive set of standards regarding the visual elements, colour scheme, and typography.

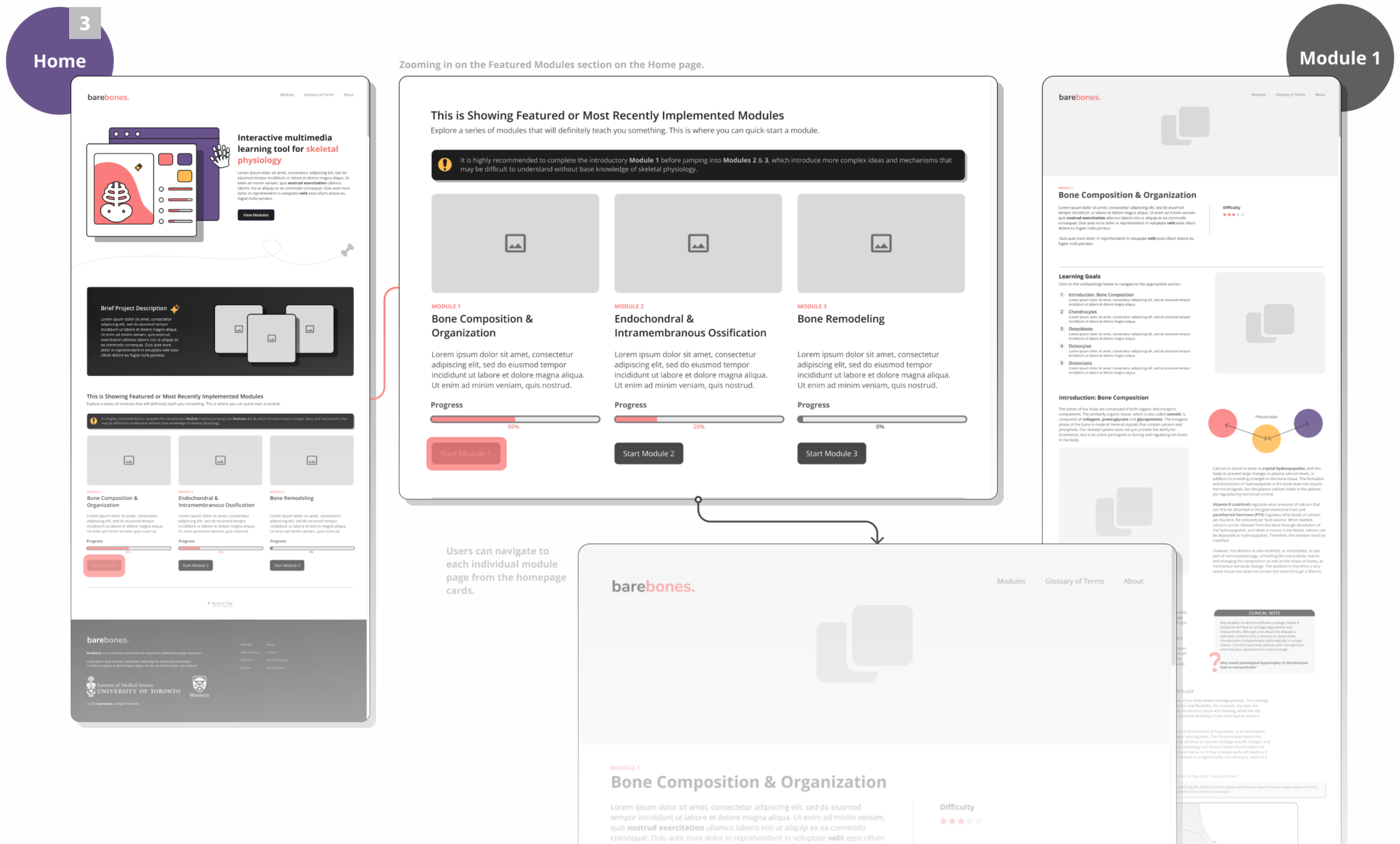
3. UX design. Wireframes for the **barebones.** site were created to explore the layout and improve the user flow of the tool.

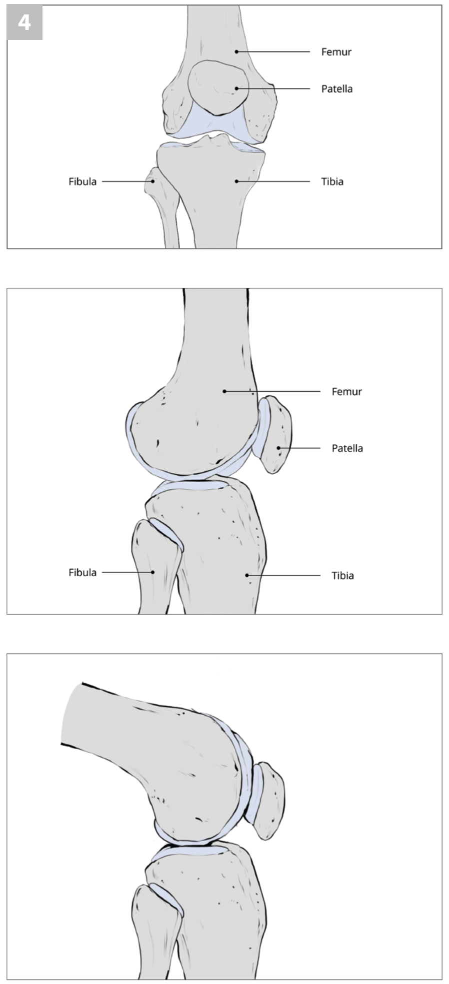
4. Storyboard. This is an example of an initial interactive slider storyboard that I created after finalizing the content script.

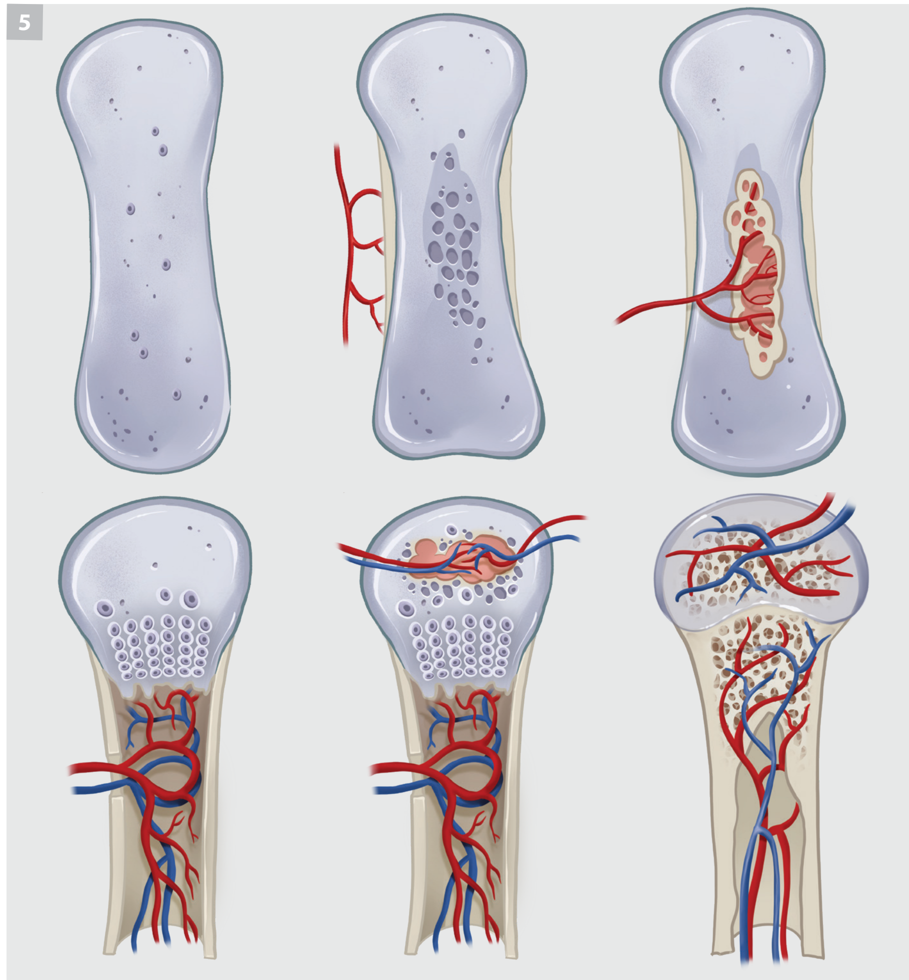
5. Production process. All of the 2D illustrated assets were completed in Procreate.

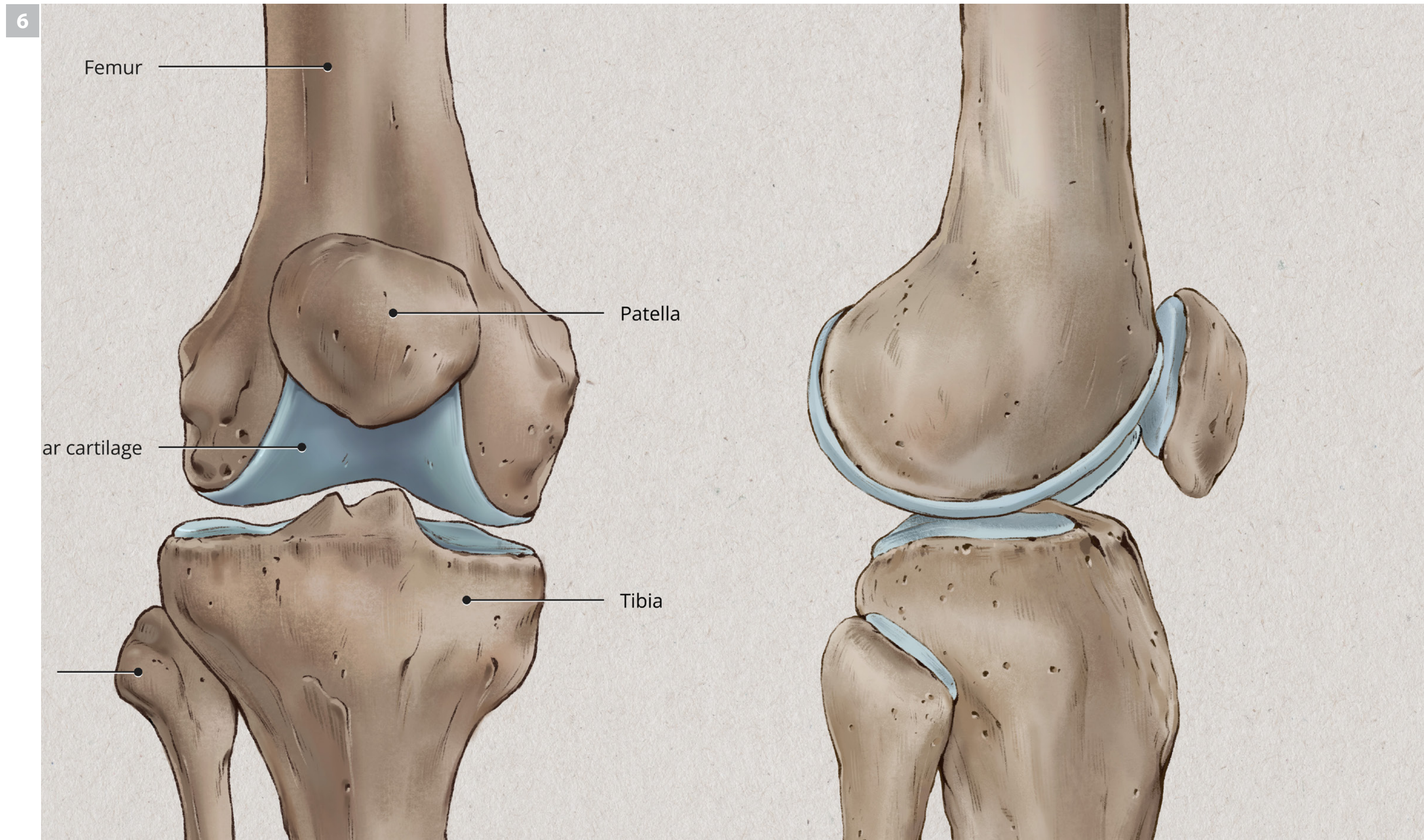
6. Production process. This is the final draft of the tibia and femur illustration used to make the corresponding interactive slider depicting the protective role of articular cartilage in the knee joint.

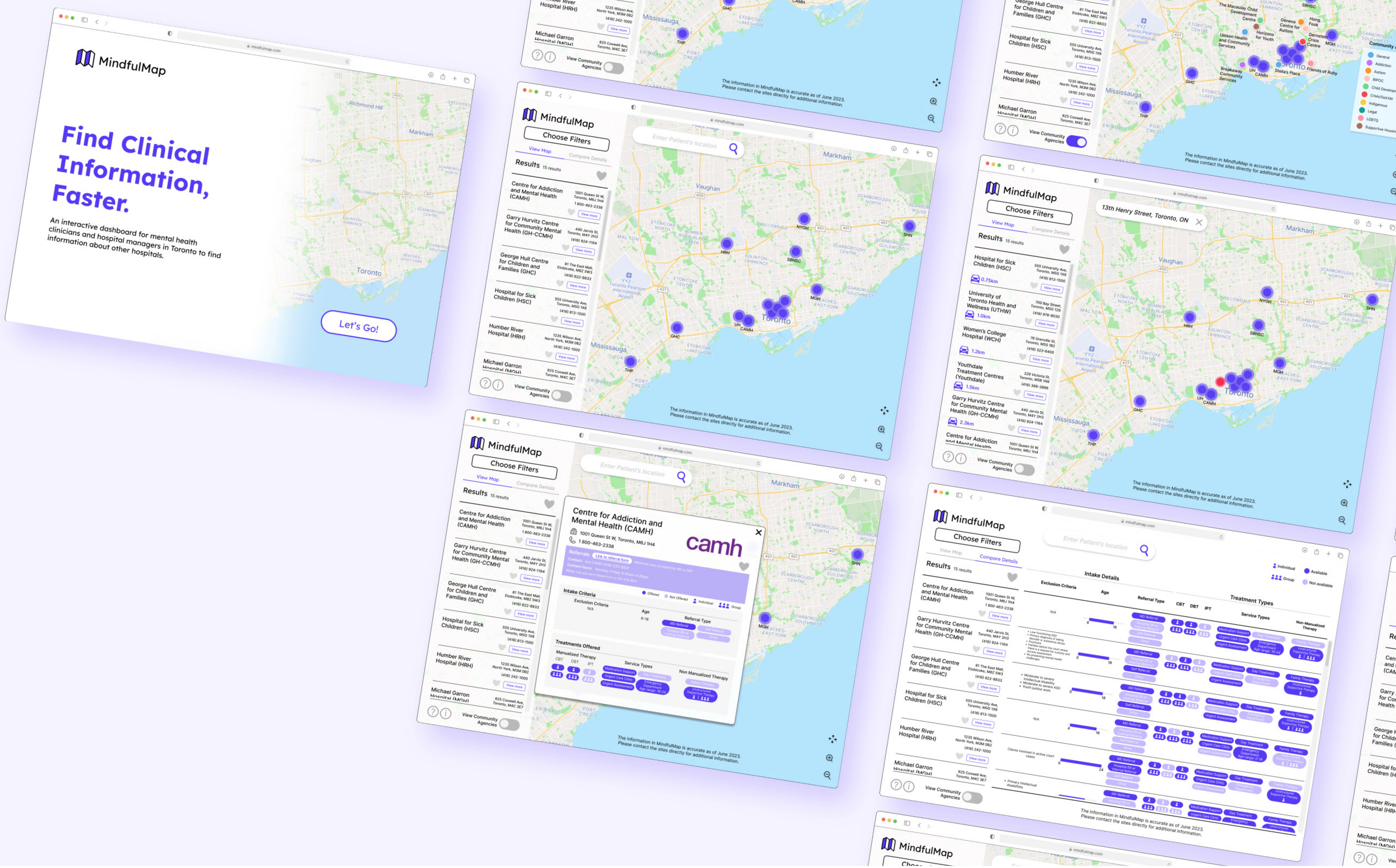






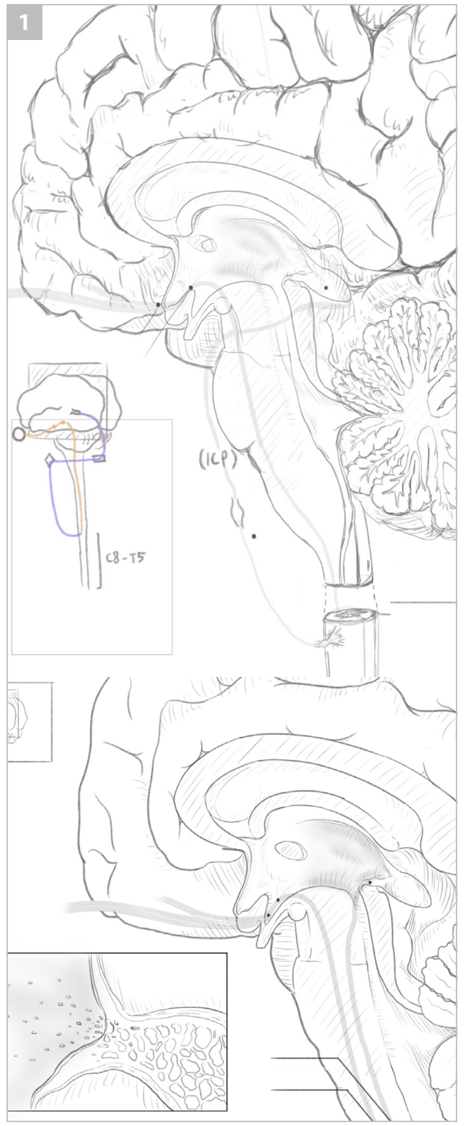


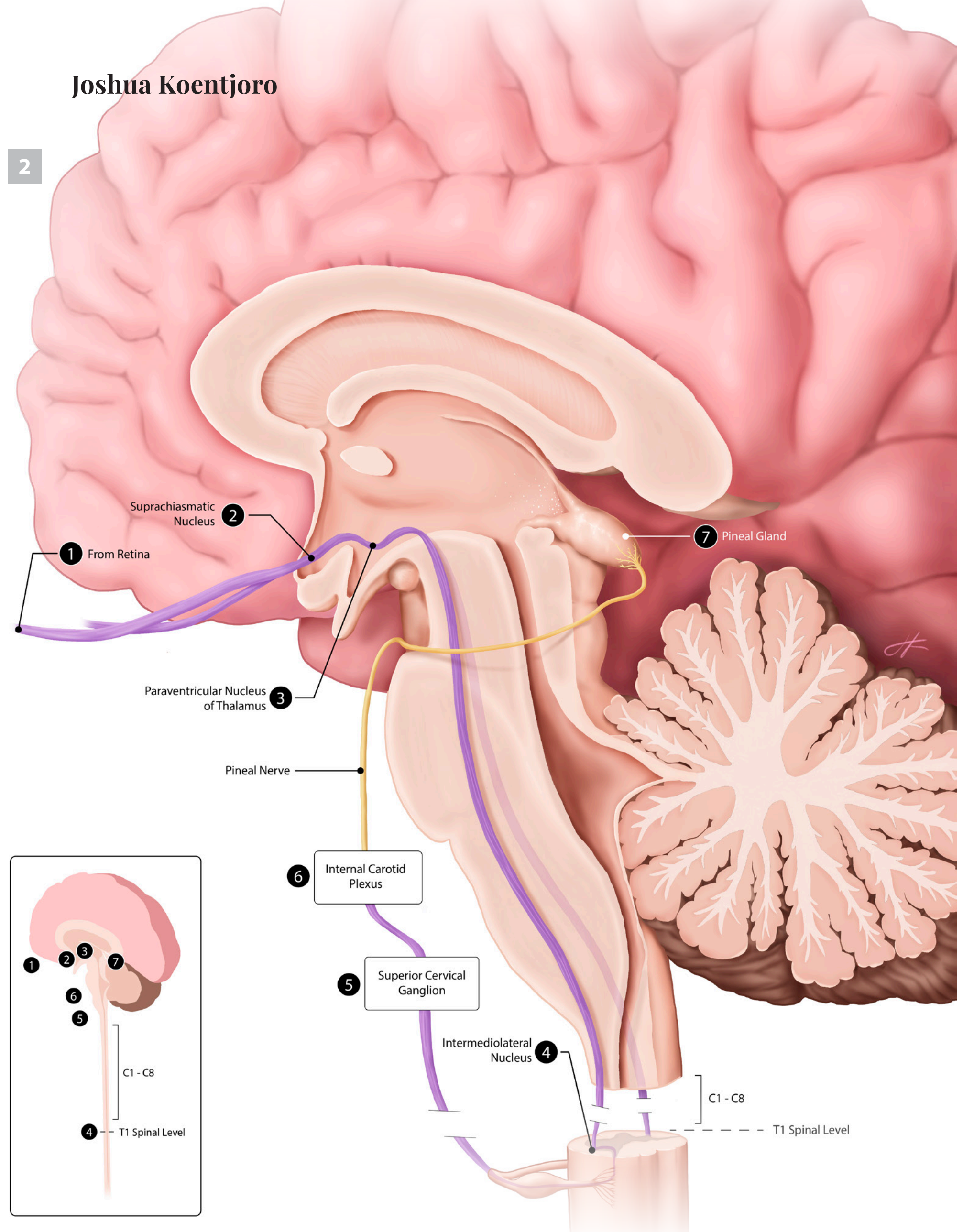


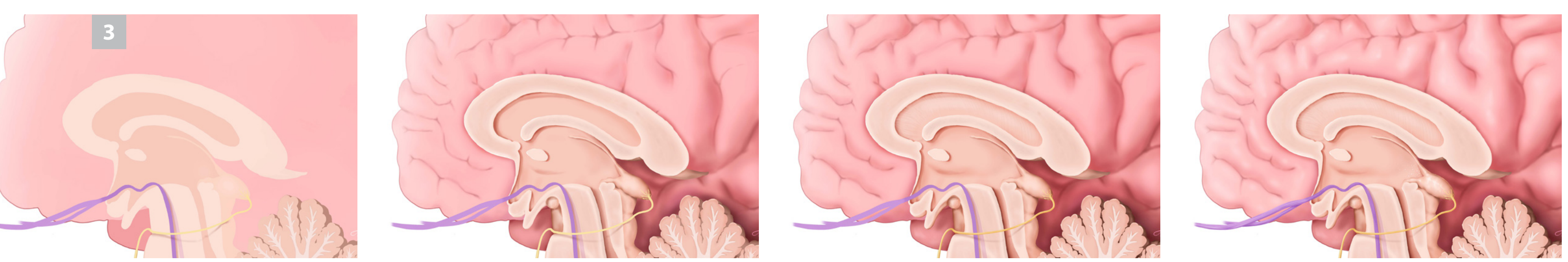


Joshua Koentjoro

Driven by my curiosity, I am a problem-solver and storyteller with a passion for thoughtful designs. During my time at BMC, I became thoroughly interested in interactive design as well as UI/UX design and their role as the interface between the healthcare system and its consumers. These touchpoints shape the experiences of those receiving but also giving care. Through my particular interests and skills, I aim to create designs that push the healthcare system towards a more equitable future.







Neuroanatomical Illustration

The pineal gland is an unassuming structure within the midbrain area that serves an important function in our daily lives. This illustration highlights its sympathetic pathway that controls melatonin release in response to light/dark cycles.

1. Sketch. Early sketches of the illustration. I tried playing with the layout structure to highlight the pineal gland and its sympathetic structure as one linear narrative.

2. Final illustration. The final illustration shows the sympathetic pathway connected to the visual system in purple and highlights the pineal nerve connecting to the pineal gland in yellow.

3. Production process. A progression of the illustration. From left to right, the base colour is laid, then the shadows are drawn in. Afterwards the shadows are deepened before highlights are added last.

Previous spread. Wireframes of MindfulMap, my Master's Research Project.

Anatomical Illustration

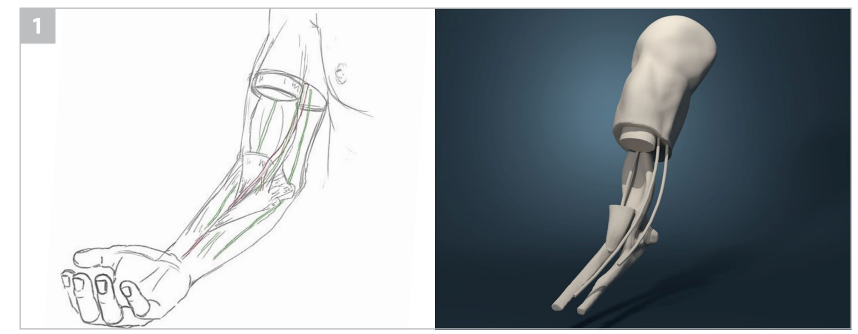
The cubital fossa is an area at the elbow containing many muscles and neurovasculature passing through. This illustration aims to act as a visual reference for students by peeling away layers of the Fossa to show overlapping structures below.

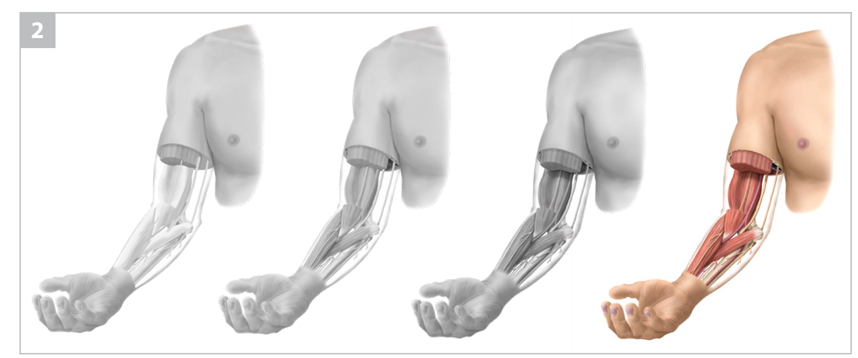
1. Sketch. The overall concept of the illustration was first sketched and then created as a 3D model in Cinema4D to finalize the volumes.

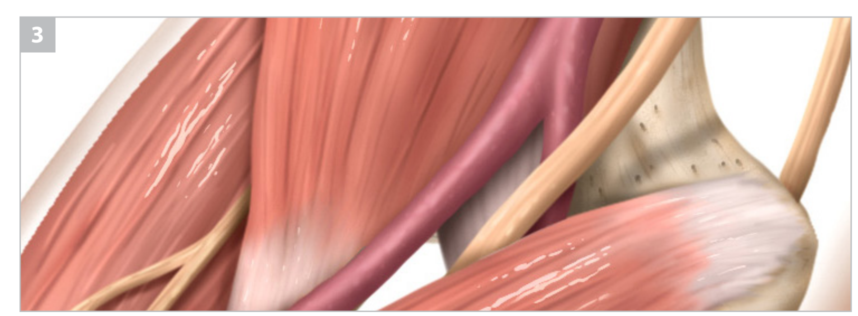
2. Production process. The illustration was created using Photoshop by first painting a greyscale version to finalize the lighting levels. Afterwards, the illustration was colourized and brought to life with details like specular highlights on the muscle bodies.

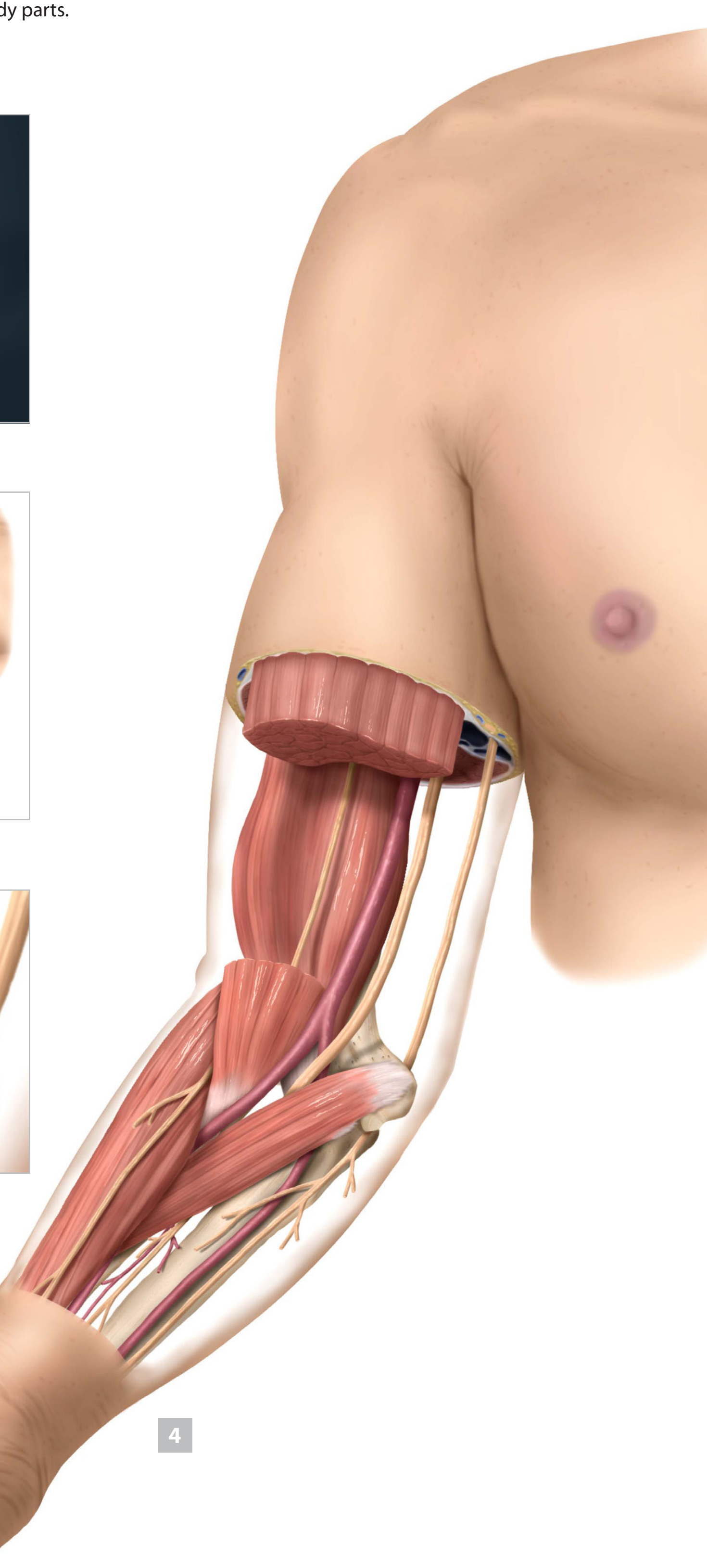
3. Final illustration. The layers of the structures are shown intentionally to portray the intricacies of the cubital fossa. In this image, the biceps brachii (middle muscle) is shown diving in between the brachioradialis (left muscle) and the pronator teres (right muscle).

4. Final illustration. By using a combination of hard cuts at the top of the arm and a softer gradient below the cut, the illustration offers the audience plenty of contextual clues in relation to other body parts.









Data Visualization

Counting Every Breath aims to analyze the statistical correlation between stages of cancer at the time of diagnosis and how subsequent treatments affect survivability.

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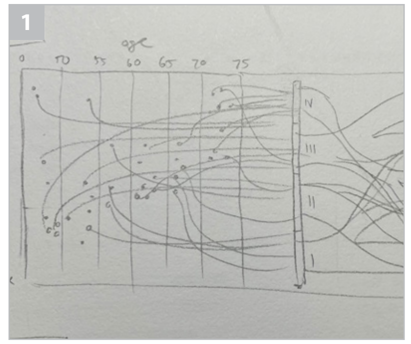
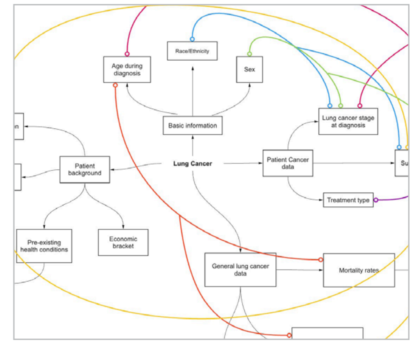

1. Study. For the initial design, I wanted to create a narrative through a continuous use of various data visualizations. What I came up with was a combination of dot plot matrices and sankey charts. A word association map was used to relate associated ideas together to create the graphical representations

2. Production process. Sourced from the National Health Institute (NIH), the data was cleaned and plotted using Tableau and RawGraphs. After exporting the visualizations, Adobe Illustrator was used to clean up the design.

3. Final illustration. The final piece features dot plots of individuals aged 53 - 90 with various cancer stages at the time of diagnosis. These individuals are then tracked through the sankey diagram to the subsequent forms of treatment and their eventual mortality.

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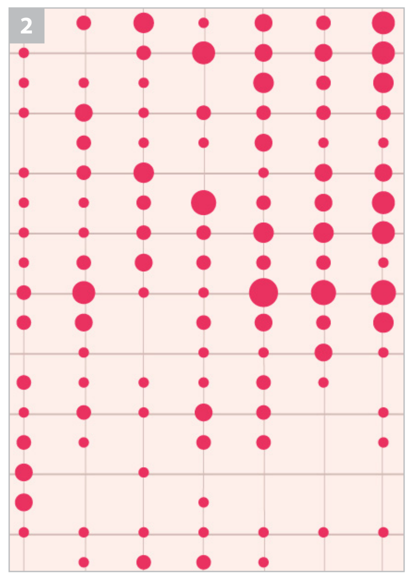


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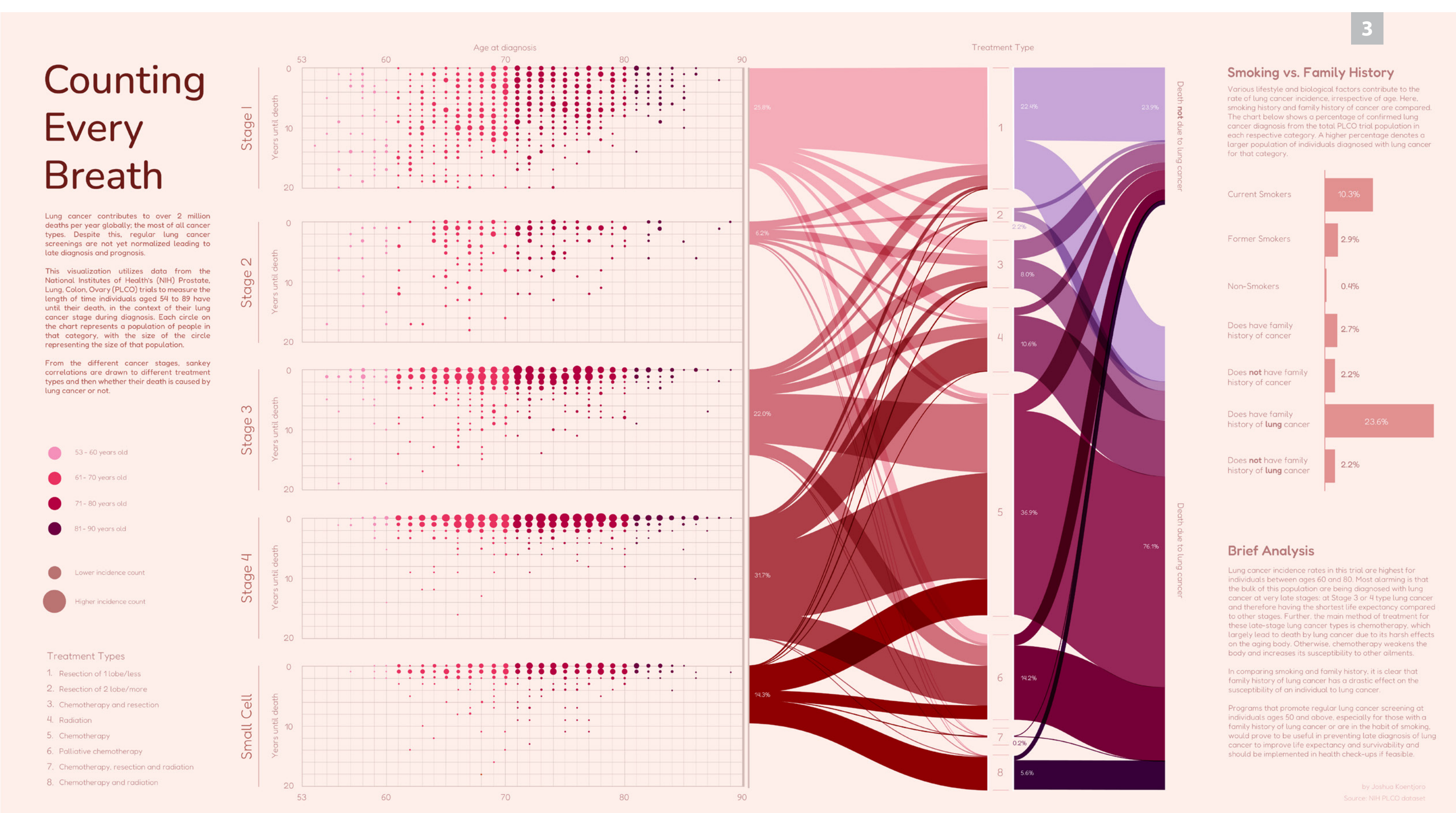

Interactive Game Design

Existing content on ecological succession typically exists as text-heavy documents. TreeSearch is an interactive, educational module for highschool students and aims to intuitively teach ecological succession in the Canadian Boreal forest.

1. User flow. Intended for educational purposes, TreeSearch is designed with a linear path progressing through different stages segmented with a learning evaluation in between. At the end of TreeSearch, a larger evaluation will challenge users on concepts taught from all four stages.

2. Production process. Within the team project, I took on a project management and Unity developer roles. All of TreeSearch's interactivities are programmed using a combination of C# and Javascript in combination with Unity's native game development features.

3. Final interactive. TreeSearch allows the user to explore a plot of land as an intern park ranger whose task is to document various species after a forest fire. As the user progresses, they are taken through the stages of secondary ecological succession.

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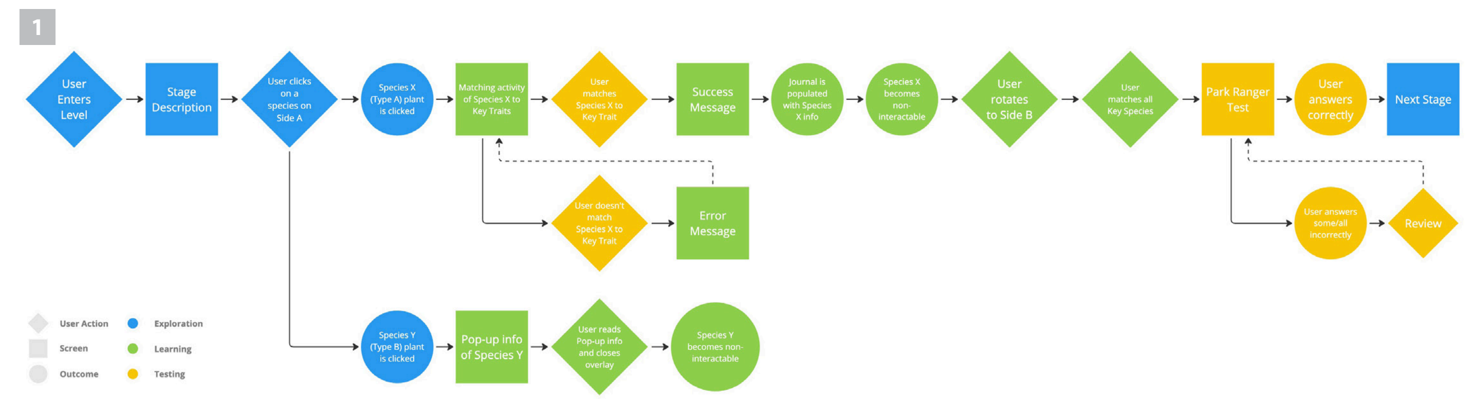

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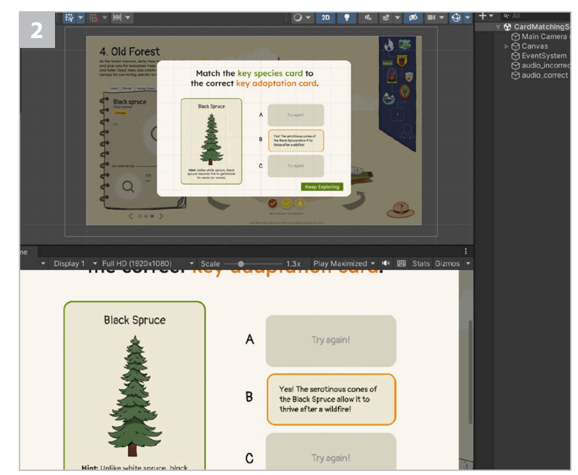

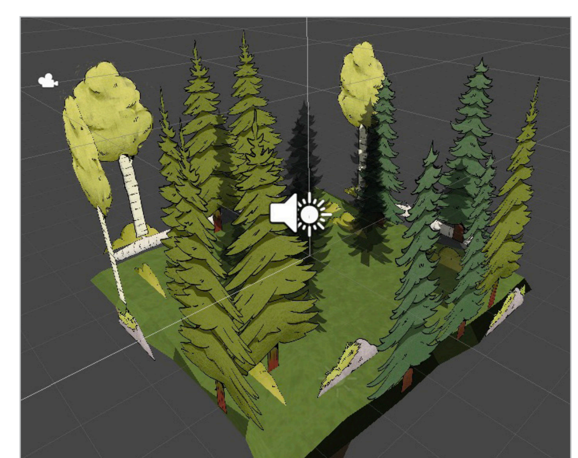

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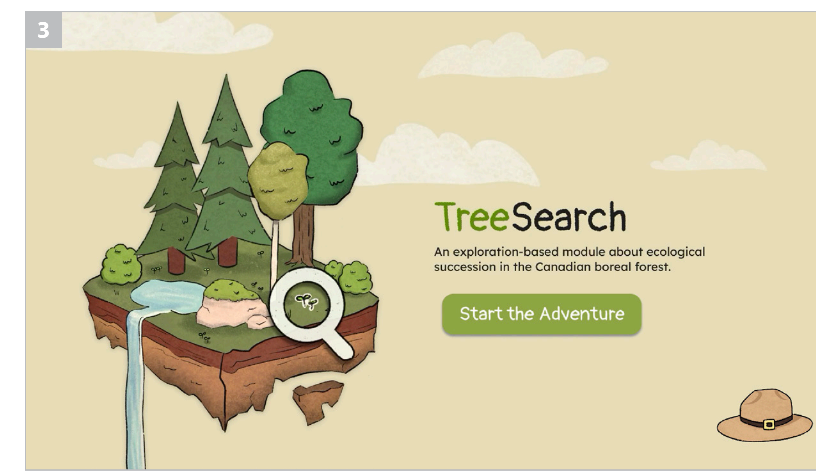

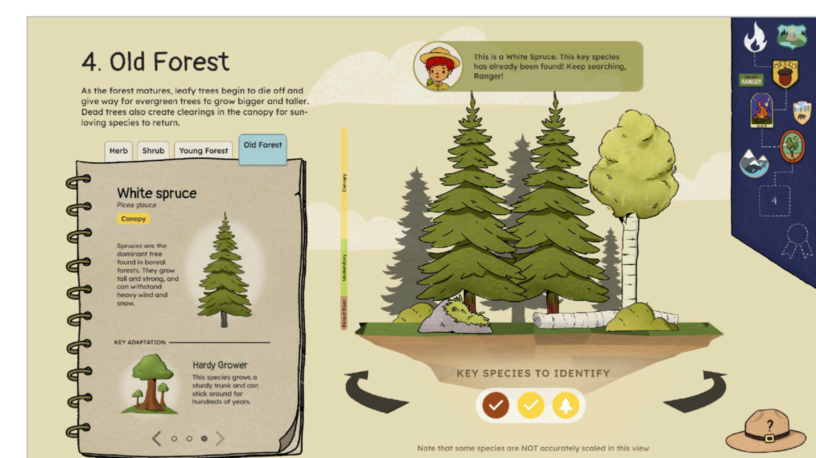

MindfulMap

Mental health hospitals in Toronto have independent systems that create challenges during intercommunication. MindfulMap is an interactive dashboard for mental health clinicians and hospital managers in Toronto to navigate and find information about other hospitals efficiently.

1. Final interactive. MindfulMap in action. MindfulMap is built as an independent app and intended to be accessible through a web browser.

2. UX design. We created user personas that allowed us to consolidate our target audiences during the design and production processes.

3. UI design. A user flow diagram of MindfulMap. We optimized the flow to enable the user to quickly toggle between the Map and Details Views with all of the query functions displayed as accessories that will edit the main Views.

4. Prototype. A prototype created using Tableau will be utilized as a beta version that contains real, editable data. As hospitals continue to change their information, MindfulMap's data can be updated periodically to provide users with the most accurate version.

5. Final interactive. A prototype created using Figma shows off the ideal design of MindfulMap and allows the user to explore all the intended interactivities designed for MindfulMap. Users are able to refine their queries using a combination of filters and map functions.

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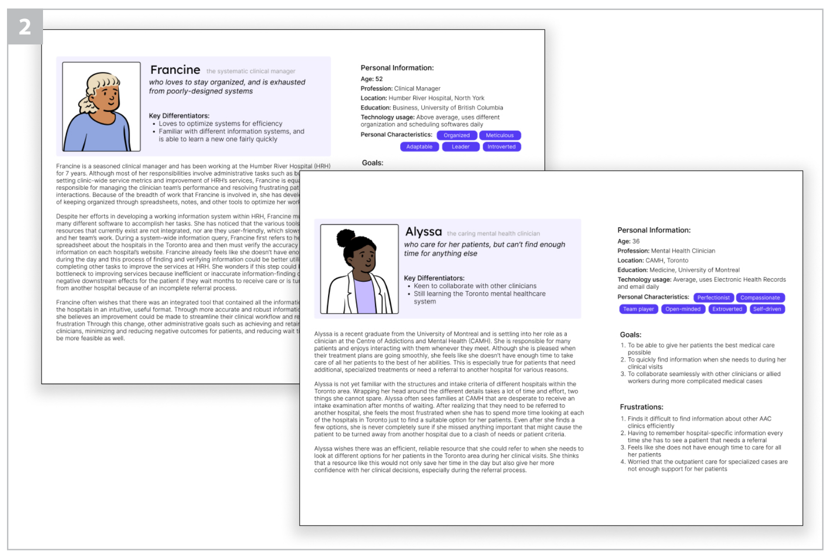

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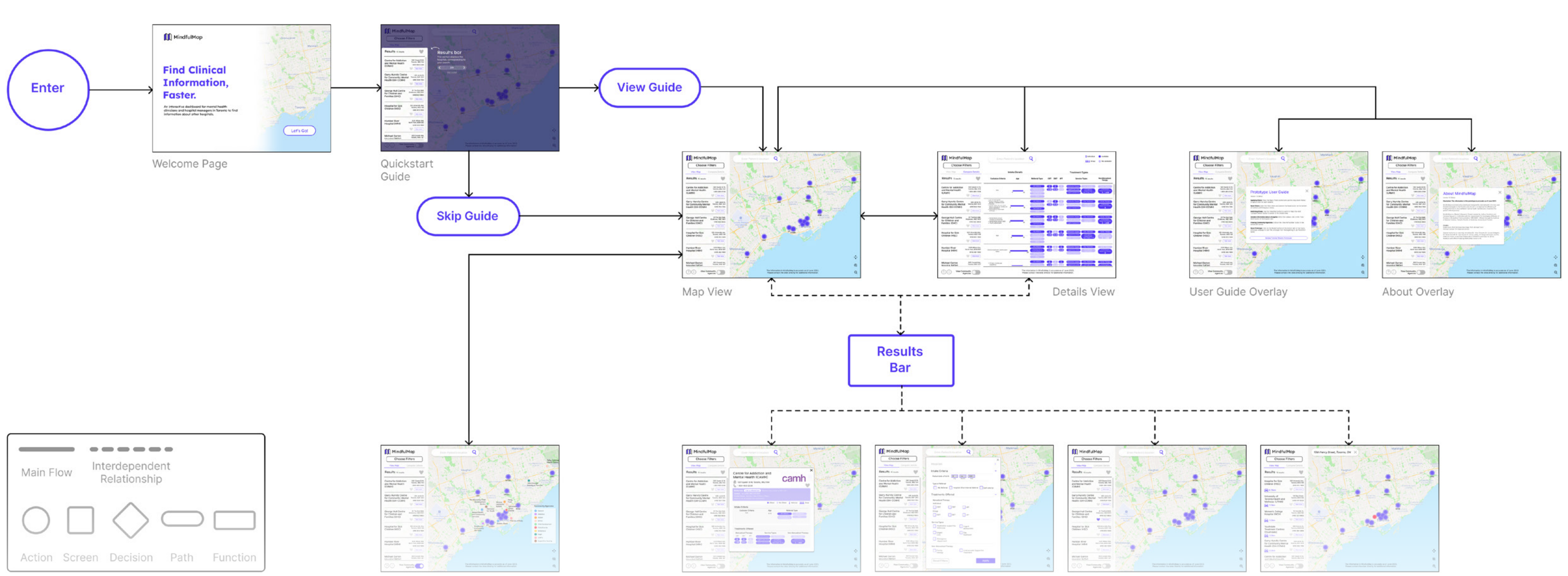

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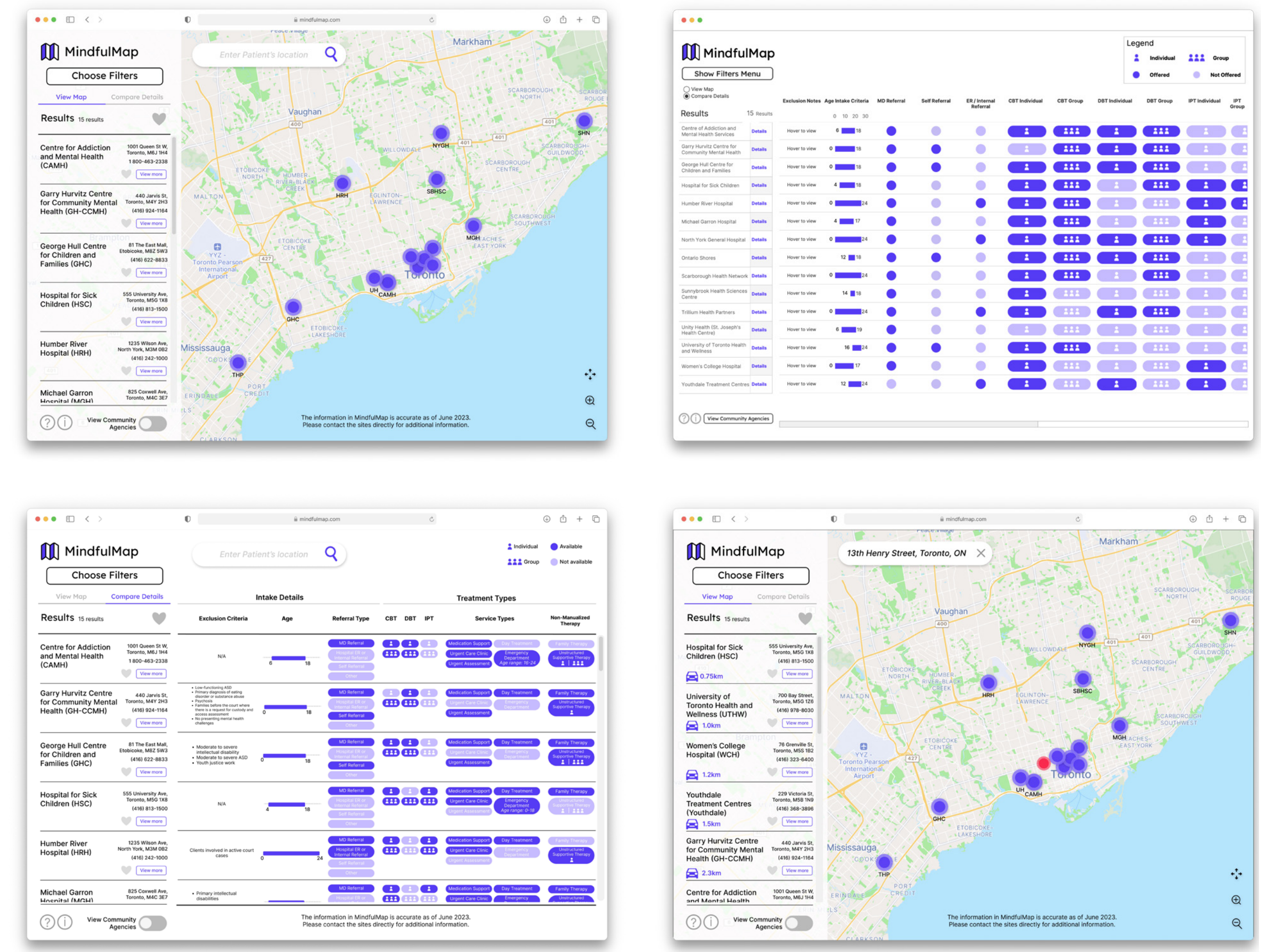

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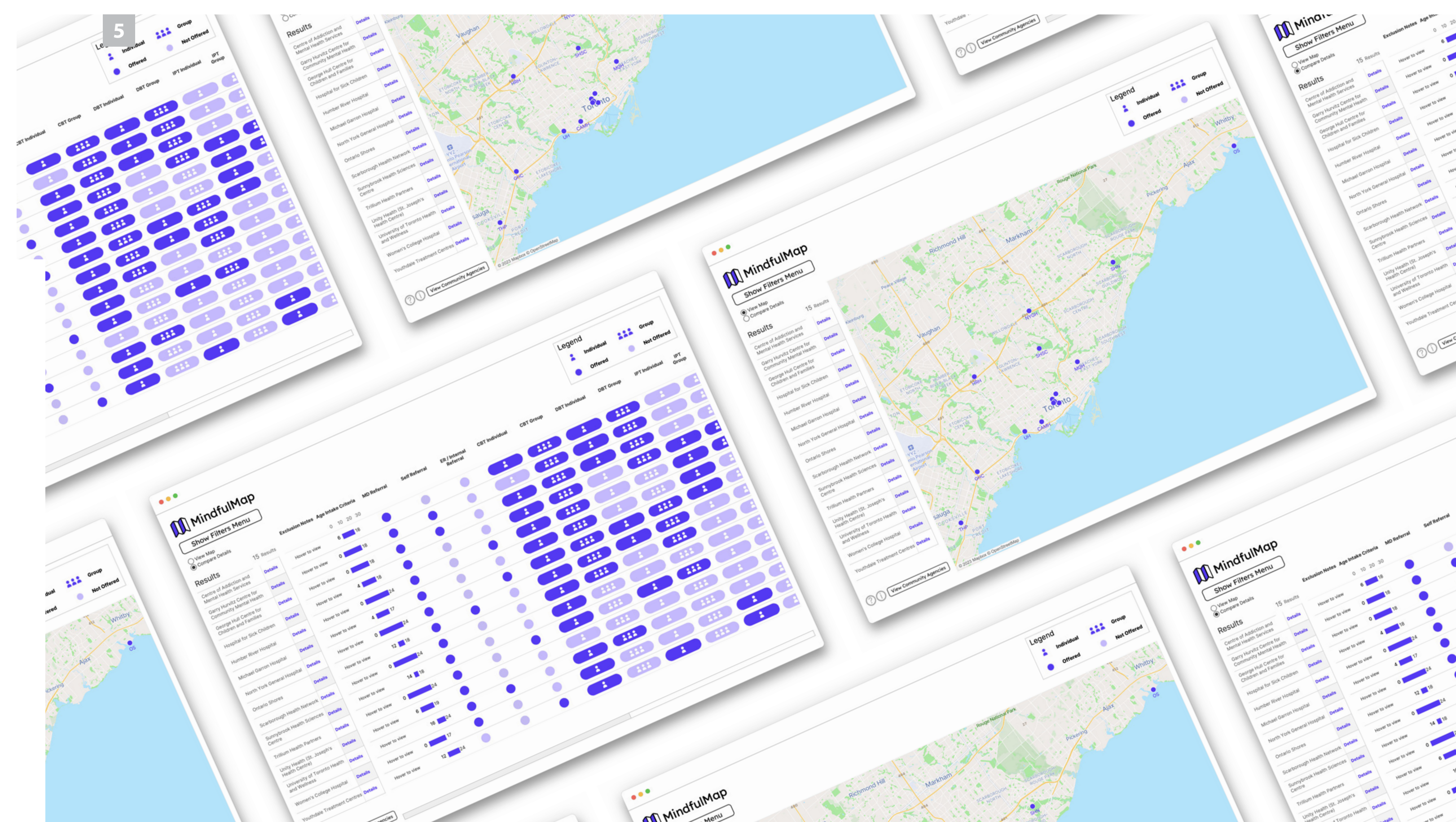

Lilith Lawrence

When people seek healthcare information, they are often in a time of need, and deserve to feel both listened to and cared for. I believe that this should be true at all times during their healthcare journey, including the time during which they engage with patient education materials. It is my goal as a visual communicator to provide not only clarity, but also compassion to people who could very well be living through the most trying time of their lives.

Neuroanatomical Illustration

Fibres from CNV and CNII often travel together in the same nerve. This subway-map-style diagram organizes where these fibres travel together and what kind of information they are carrying.

1. Final illustration. Robust anatomical study of the nerves reveal that their pathways through the skull take a complex three-dimensional form. It became clear that showing the realistic pathway of the nerve in addition to information about the nerve fibres would be out of scope for this project.

2. Final draft. The scope of the project was adjusted to focus on the compelling subway-map-style depiction of the two cranial nerves, and to save time. The final piece works best as a study aid for students to review their knowledge.

3. Sketch. A rough sketch showing the early ideation of the project. This piece began life as a comprehensive breakdown of the pathways of the two nerves, where they travel together, and important anatomical landmarks.

Previous spread. A still from my Master's Research Project.

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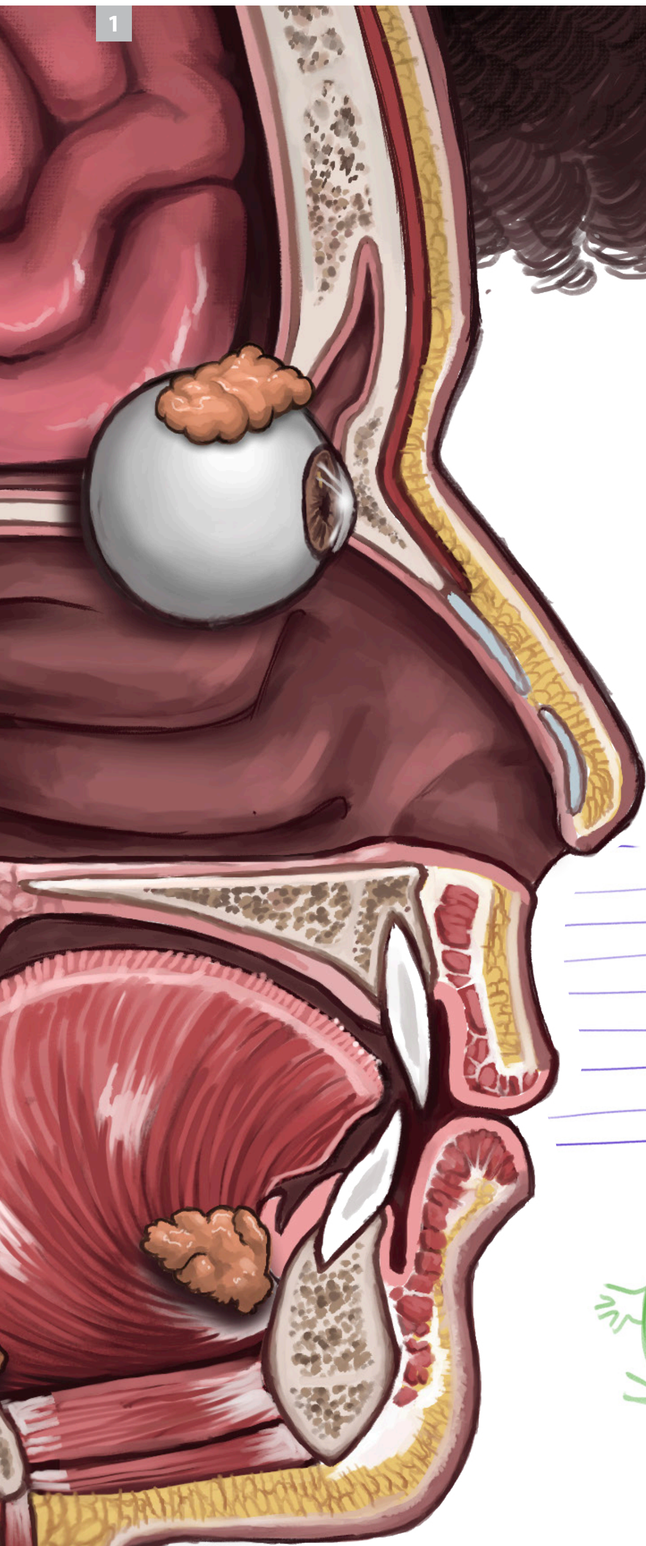

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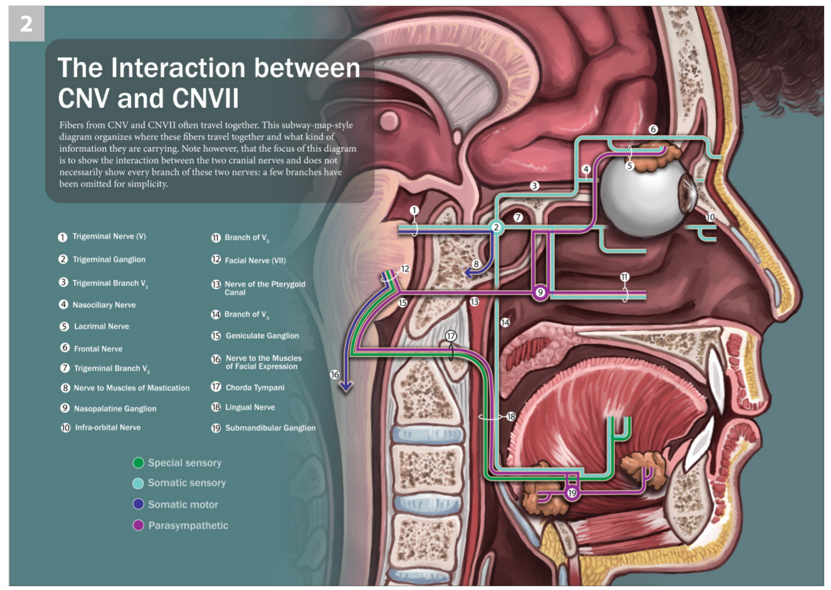

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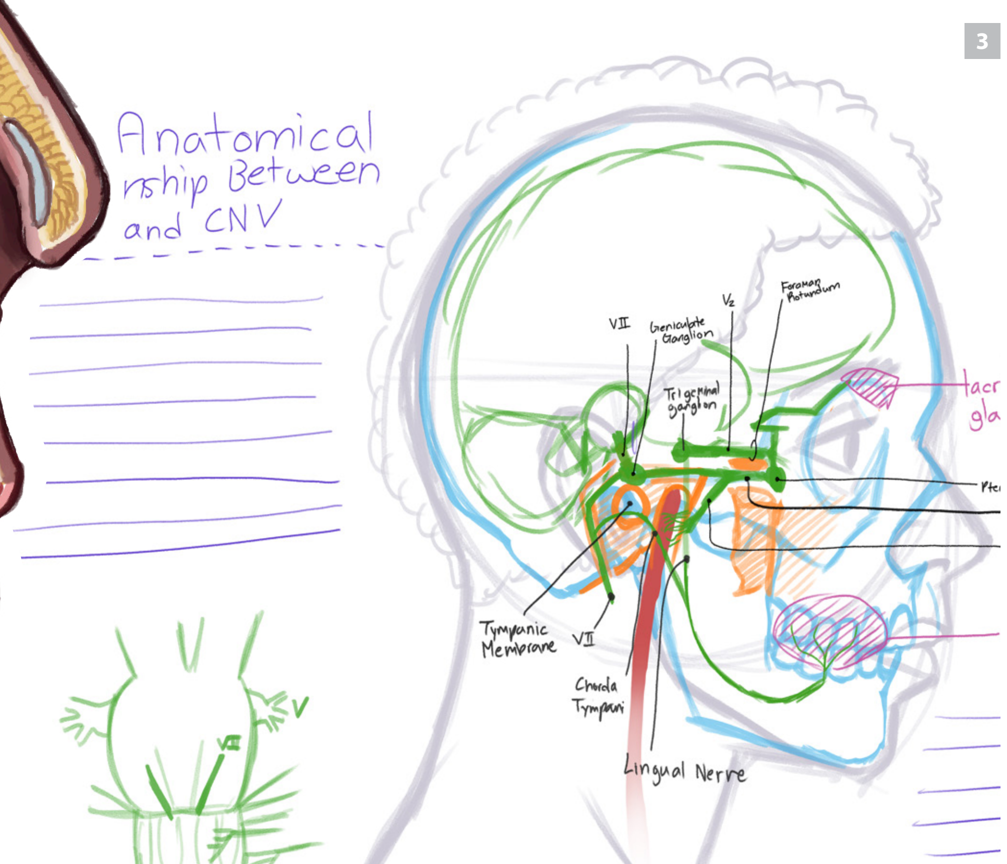

Neuroanatomical Illustration

A self portrait with an anatomical twist! This project reveals the anatomy of the brain and surrounding skull in the context of my own face in order to add a personal element to the study of anatomy, which is often impersonal.

1. Sketch. The build-up of sketches that were composited to create the early frame-work for the final painting.

2. Final illustration. The final painting. This piece uses a strong application of colour and digital painting technique to add character and life to both the self portrait and underlying anatomy.

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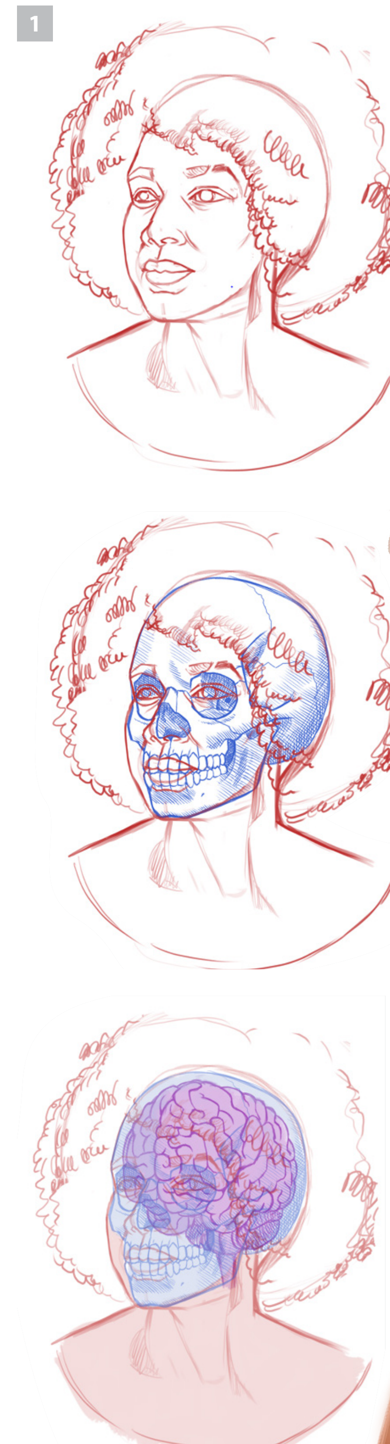

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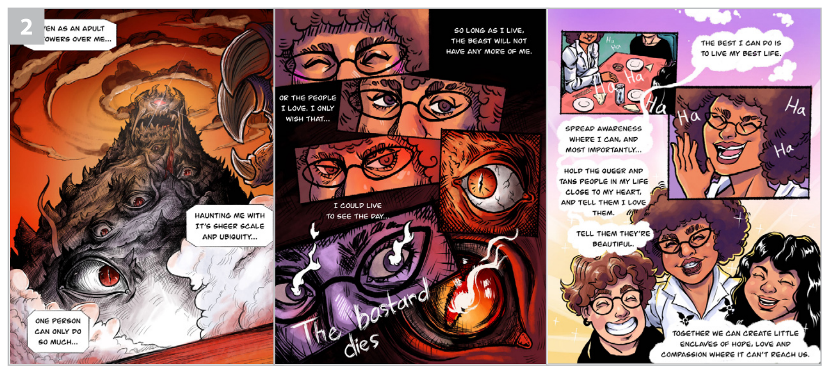
Graphic Medicine

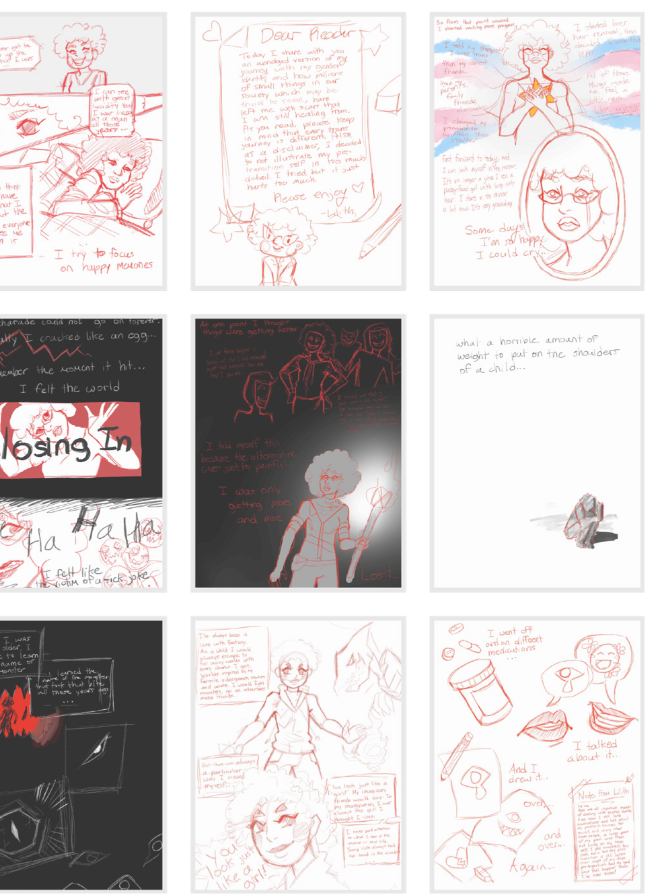
Every trans person faces a goliath, made from the stigma, prejudice and discrimination that society places on their shoulders. With metaphor and monsters, I disseminate the tale of how that goliath broke me, and how I put myself back together.



1. Sketch. The final layout of the comic features a rough pencil sketch in red, breaking down the composition of each scene, including what visual elements will be used and where the text will be placed. At this stage, I made final decisions about what imagery would work best.

2. Final draft. The final draft of the comic features a pen-and-ink style inspired with minimal washes of colour underneath to add emphasis and feeling to key emotional moments in the story.

3. Final illustration. The final page turn into the climax of the piece, wherein adult Lilith is old enough to fully appreciate the sheer magnitude of presence and influence that anti-trans prejudice has in our society. In this page, I aim to capture the sheer amount of horror and dread that I, and many trans people, feel in their hearts.



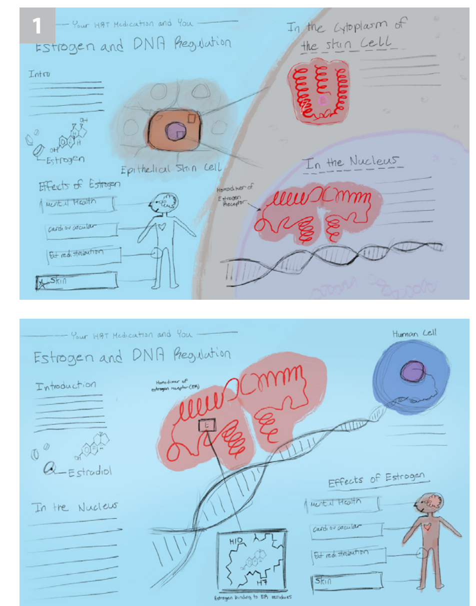
Molecular Visualization

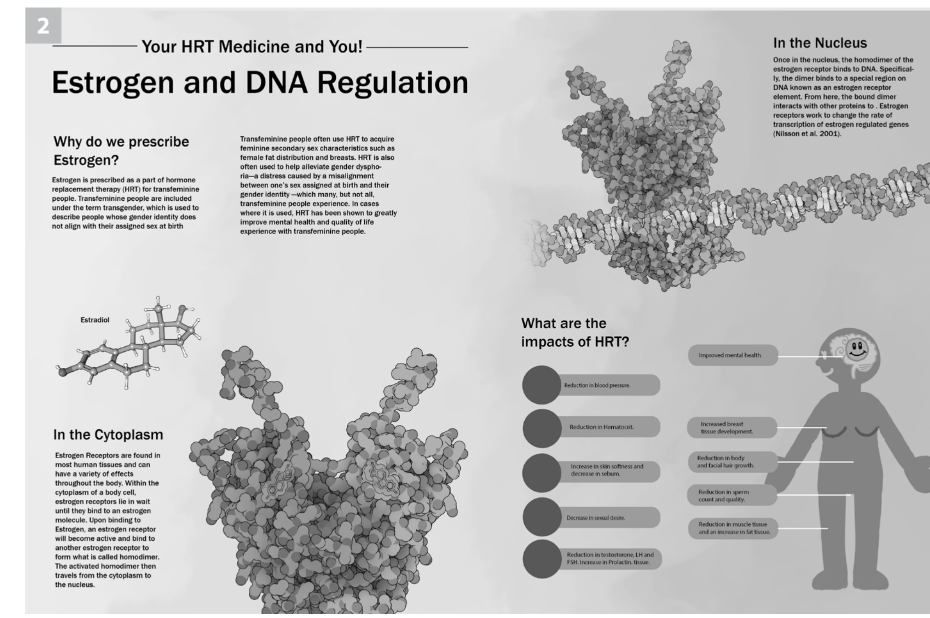
Public knowledge of transition for transgender people is limited. This two-page spread focuses on estrogen's role in DNA regulation to generate interest around its usage in hormone replacement therapy (HRT) for transfeminine people.

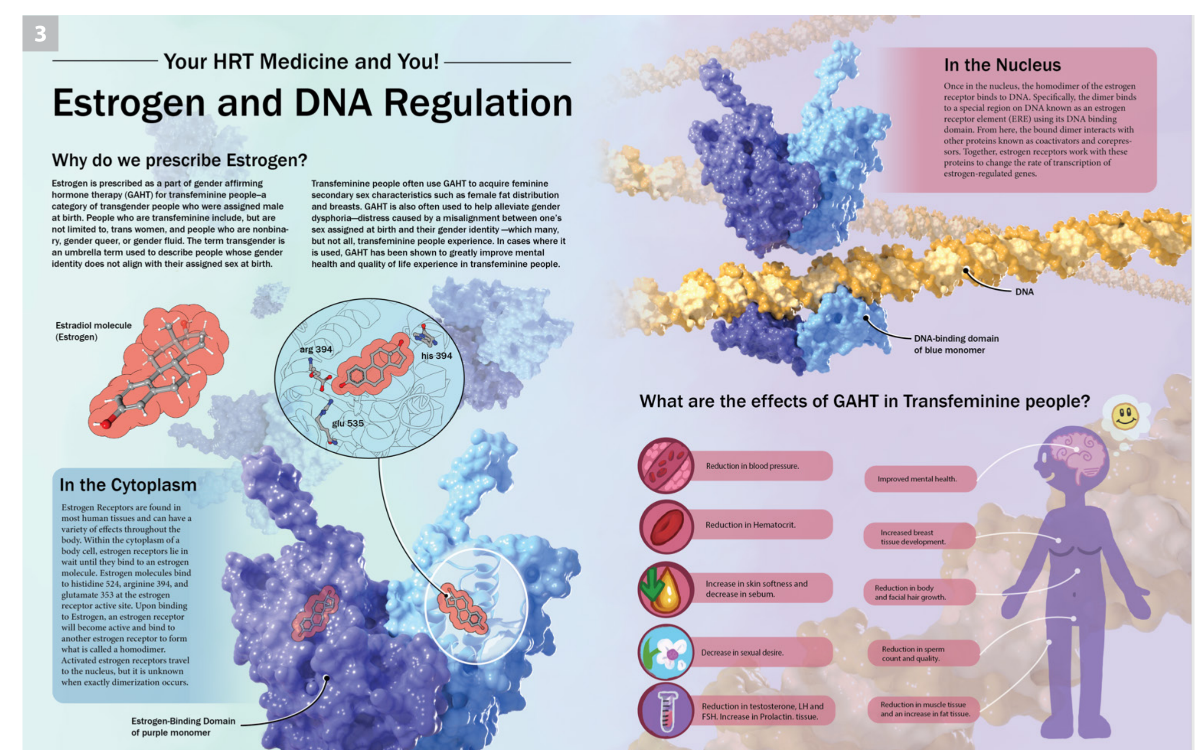
1. Sketch. Early sketches used to brainstorm the design and imagery of the piece as well as its overall focus. Four thumbnail sketches were drafted and only one was chosen.

2. Production process. The chosen thumbnail was worked up so that I could get an idea of what the final composition would look like with all the elements in place.

3. Final draft. The position of design elements, text and illustration were refined to complement the final renders of the molecules, rendered in Maya. Additional touches such as background molecules with depth of field helped to create a more immersive and complete final project, while also directing the eye and making the overall composition more dynamic and interesting.







A Week with NAVIGATE

NAVIGATE is a new manualized program that has had recent success in helping young adults with psychosis enjoy a better quality of life. This 2D patient education animation uses charming sounds, colours, and characters to introduce prospective young adult patients to the NAVIGATE program.

1. Sketch. 1a,b. Early concept art of the animation showing elements in the animation's introductory cinematic, including the charismatic blue jay and a shot of downtown Toronto.

2. Sketch. Early concept art using plant care as a metaphor for the NAVIGATE program. This concept was well liked by the patient advisory group.

3. Production process. This animation features a total of 12 original character designs, which all started out as rough sketches. Sketches were later finalized in Illustrator, and adjusted so that they would better suit the animation process.

4. Production process. Rough storyboards for the animatic were drawn in order to help decide on the use of visuals and narration as the narrative unfolds in a linear fashion. These storyboards were then combined into an animatic in order to define the pacing of the animation. The motion of the camera and objects onscreen were also defined.

5. Final animation. The final animation entirely consist of motion graphics with assets designed in illustrator and animated in After Effects. Intentionally fun and dynamic character animation was used to help maintain viewer attention, while helping to give the patient audience a sense of comfort.

1a

1b

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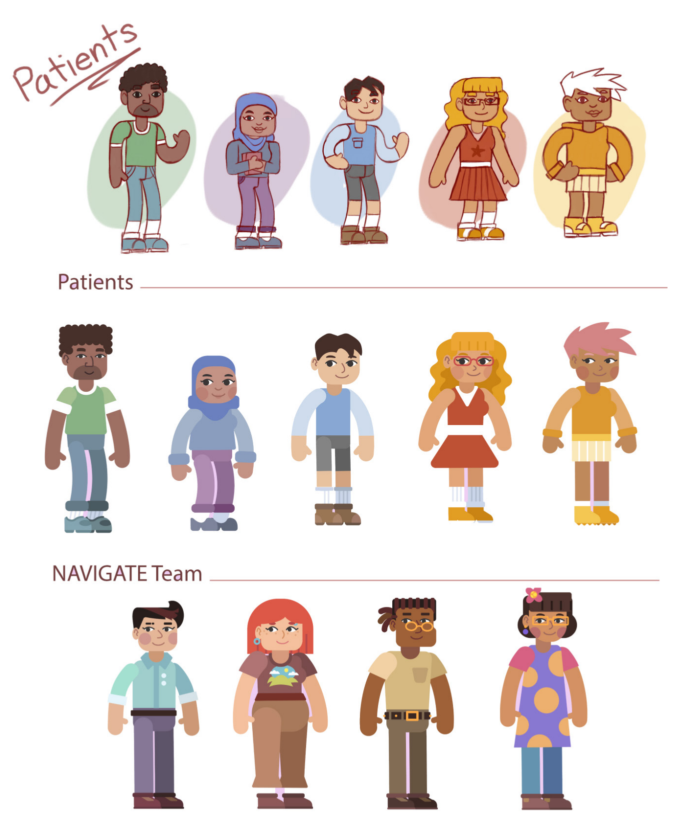

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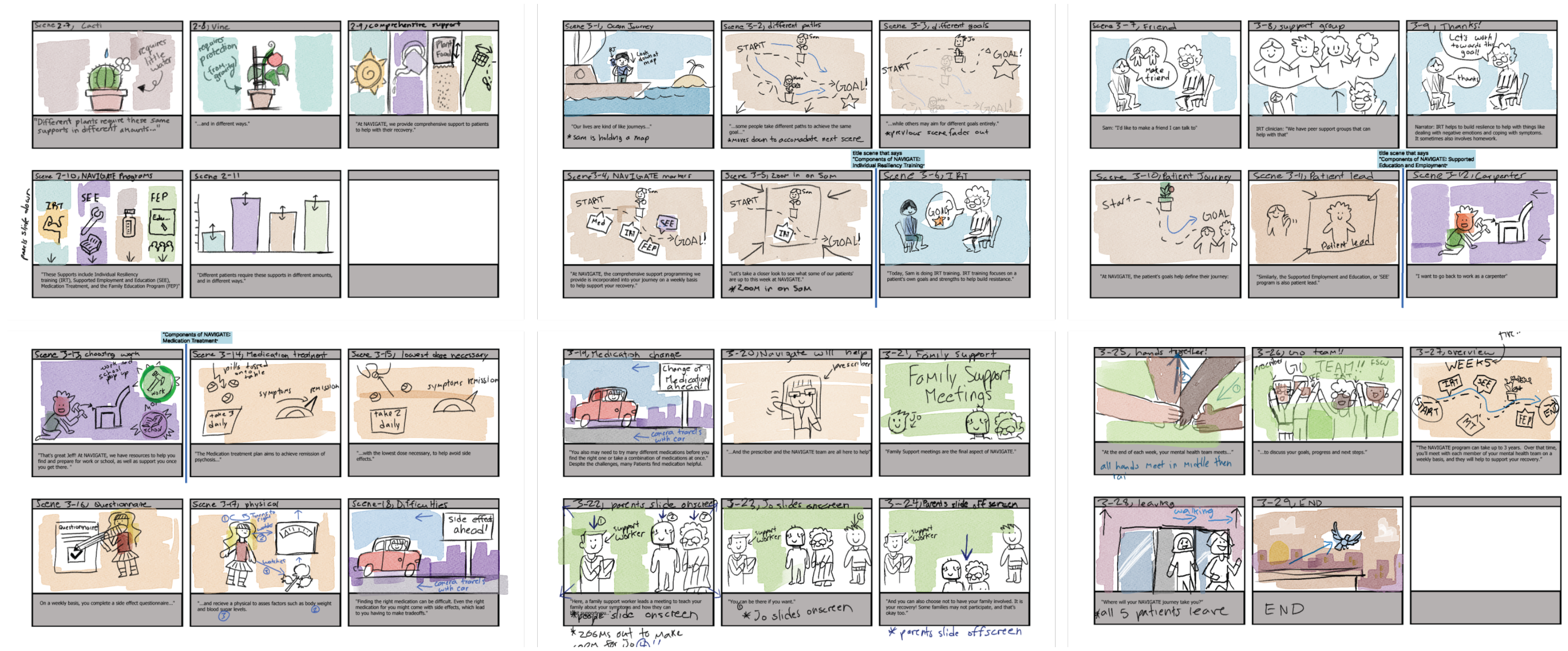

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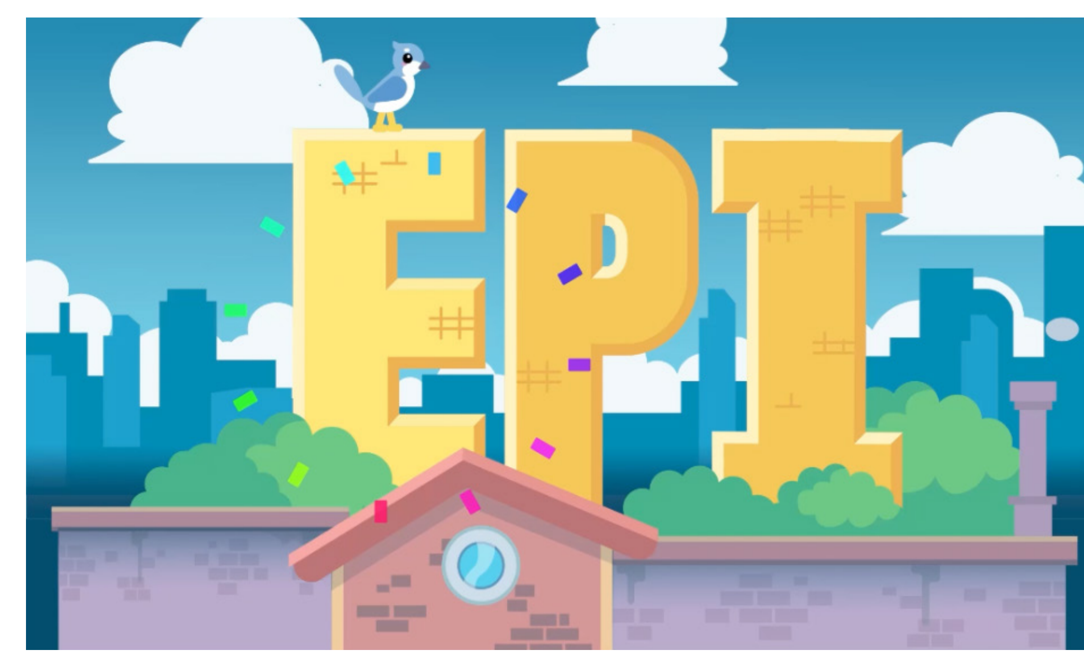

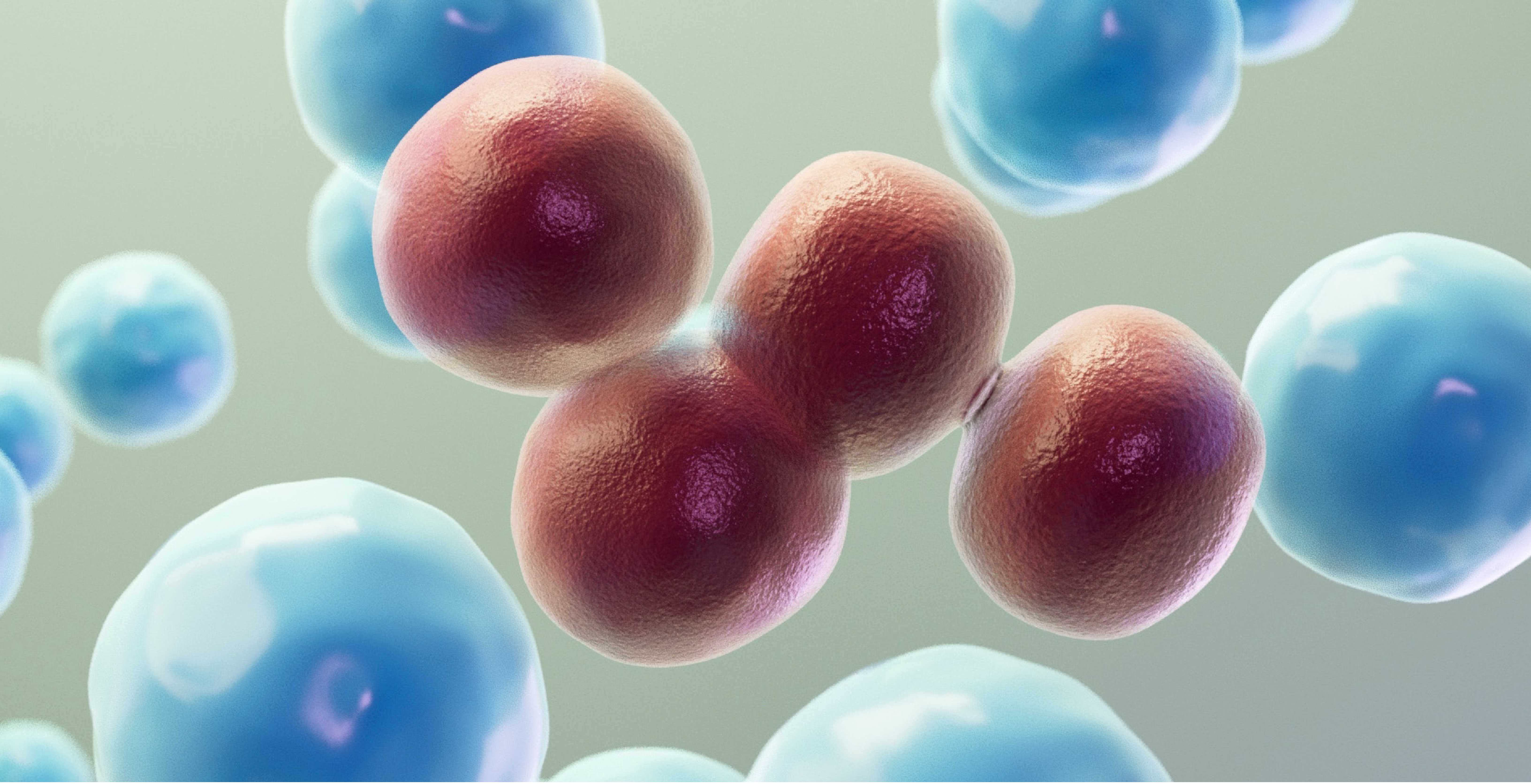

Xinyi Li

As a designer and creative problem-solver, I love crafting innovative solutions to complex communication challenges. My time at BMC pushed me to think critically about how to best design for diverse audiences, and taught me that science resonates differently when it is told through a good story. I strive to use intentional design and visual storytelling to foster clarity and drive informed decision-making across all levels of the healthcare system.

Information Visualization

The Monarch is one of the most recognizable species of butterfly, and a symbol of conservation and nature. This information graphic intends to educate a general audience about monarch migration and and inspire action for conservation efforts.

1. Sketch. Early ideation sketches were used to compile research and organize the information into a cohesive and compelling narrative.

2. Production process. After distilling my initial research, I created a rough draft that eventually evolved into a comprehensive layout for the infographic.

3. Final illustration. A close-up of the final rendered illustration of two monarch butterflies perched on a milkweed flower.

4. Final illustration. The final information graphic includes a geographical map that visually depicts the multigenerational and seasonal nature of monarch migration. The illustrations highlight important biological information, and the icons on the lower left guide the audience towards resources to contribute to conservation efforts.

5. Production process. Step-by-step illustrations that reveal my process of creating the hero illustration of the monarch butterflies.

6. Final illustration. Illustrations of the larva, chrysalis, and mature monarch.

Previous spread. A frame from my Master's Research Project animation on CAR-T cell therapy.

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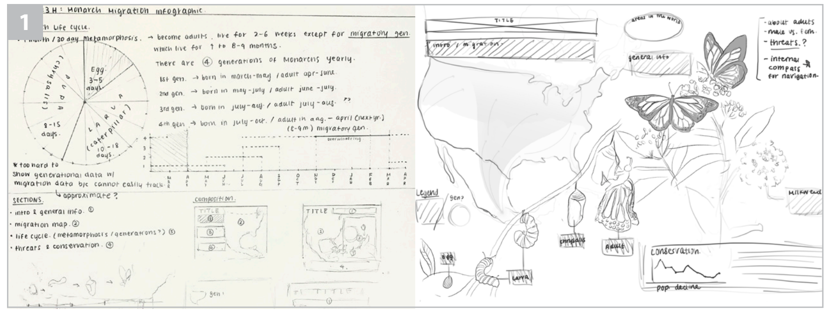

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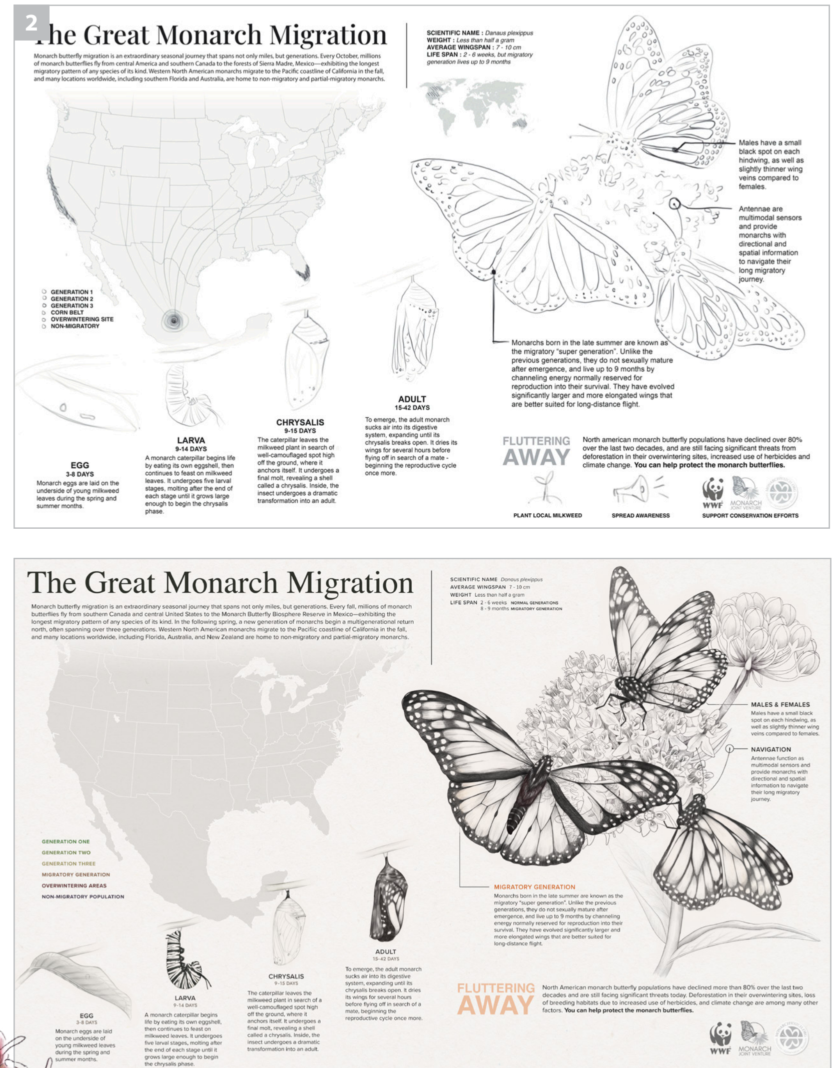

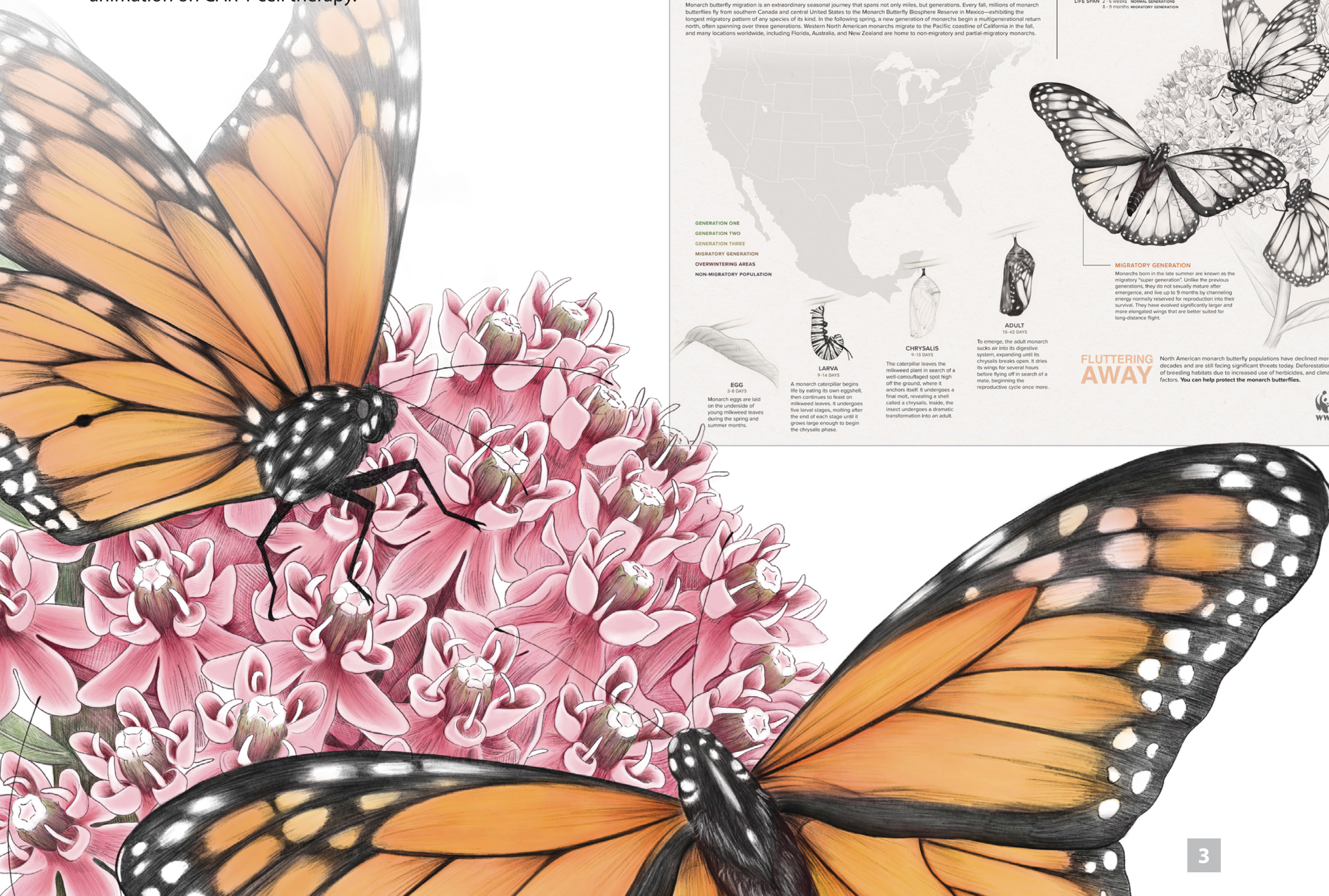

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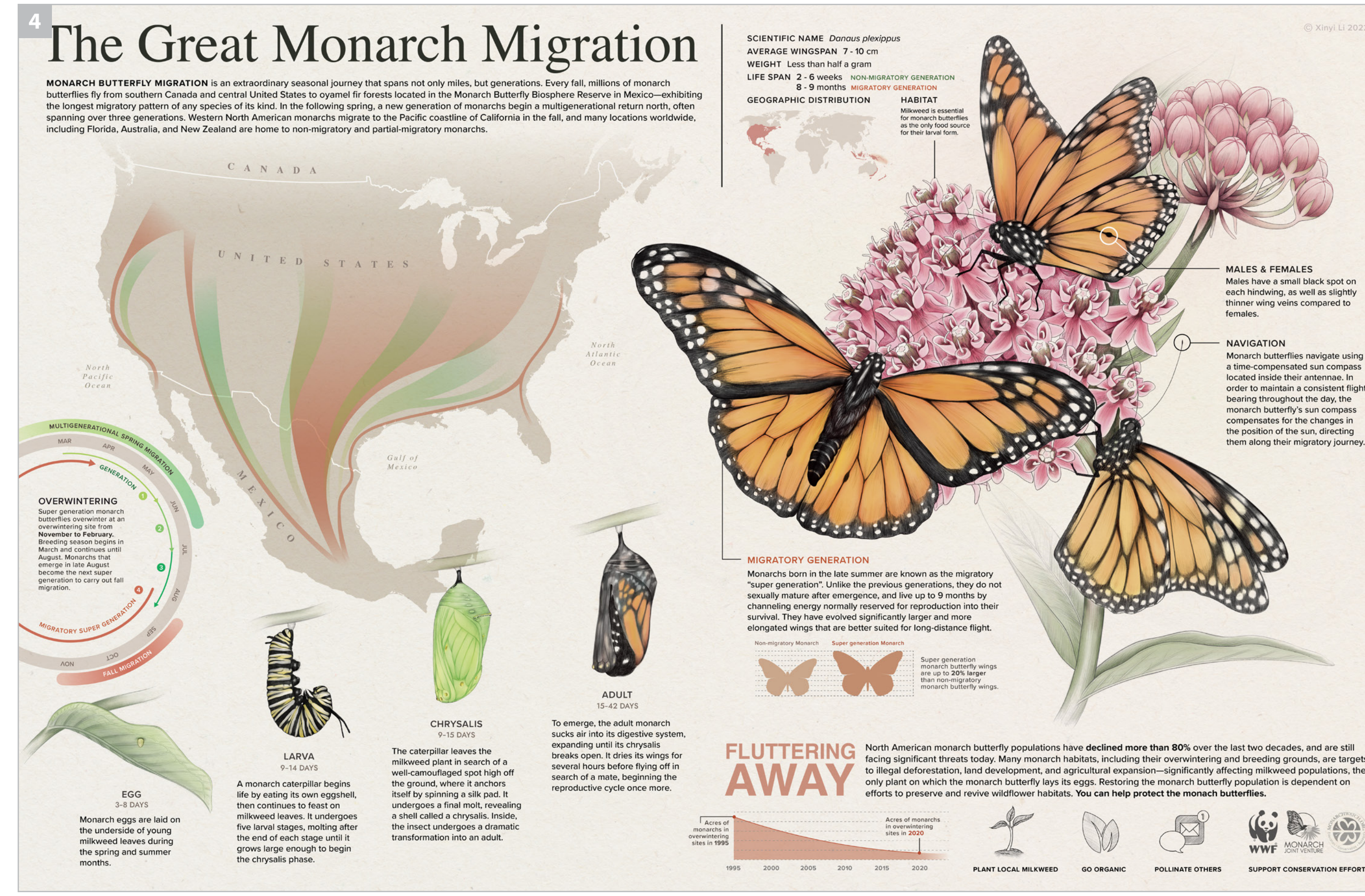

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Molecular Illustration

Chimeric antigen receptor (CAR)-T cell therapy is a novel immunotherapy used to treat hematologic cancers such as leukemia. This journal spread intends to educate a general audience on how CARs are able to target and destroy cancer cells.

1. Sketch. I explored a variety of different layouts to ensure that visual elements were represented at the correct scale and were utilized effectively to aid storytelling.

2. Production process. The chimeric antigen receptor (CAR) was constructed using data from Protein Data Bank, and processed in VMD and Chimera. I brought the final models into Maya for lighting and rendering.

3. Final illustration. Close-ups of the CAR protein interacting with CD19 and ZAP70. I chose contrasting colours for each protein to ensure that they stood out from one another.

4. Final illustration. The final molecular visualization guides the audience through the various steps in the CAR-T cell therapy process.

5. Final illustration. Cross-sectional render of a CAR protein on the phospholipid membrane of a CAR-T cell.

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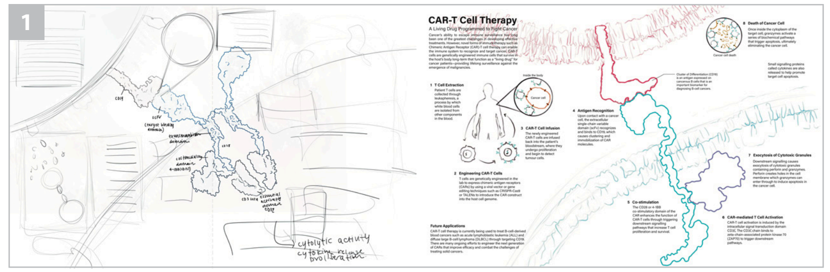

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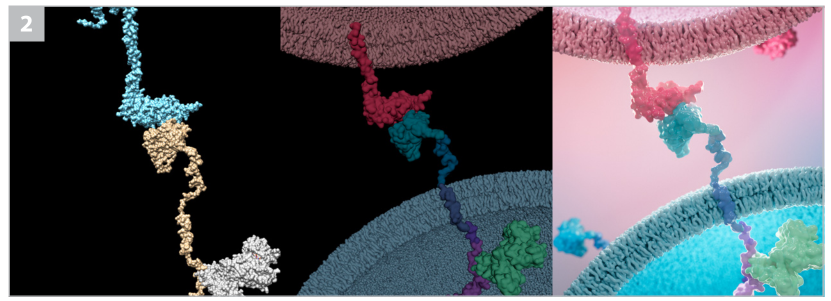

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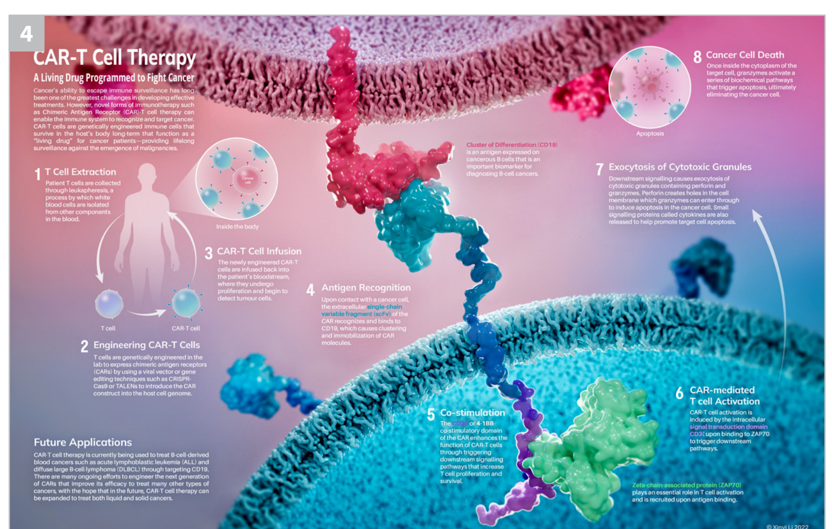

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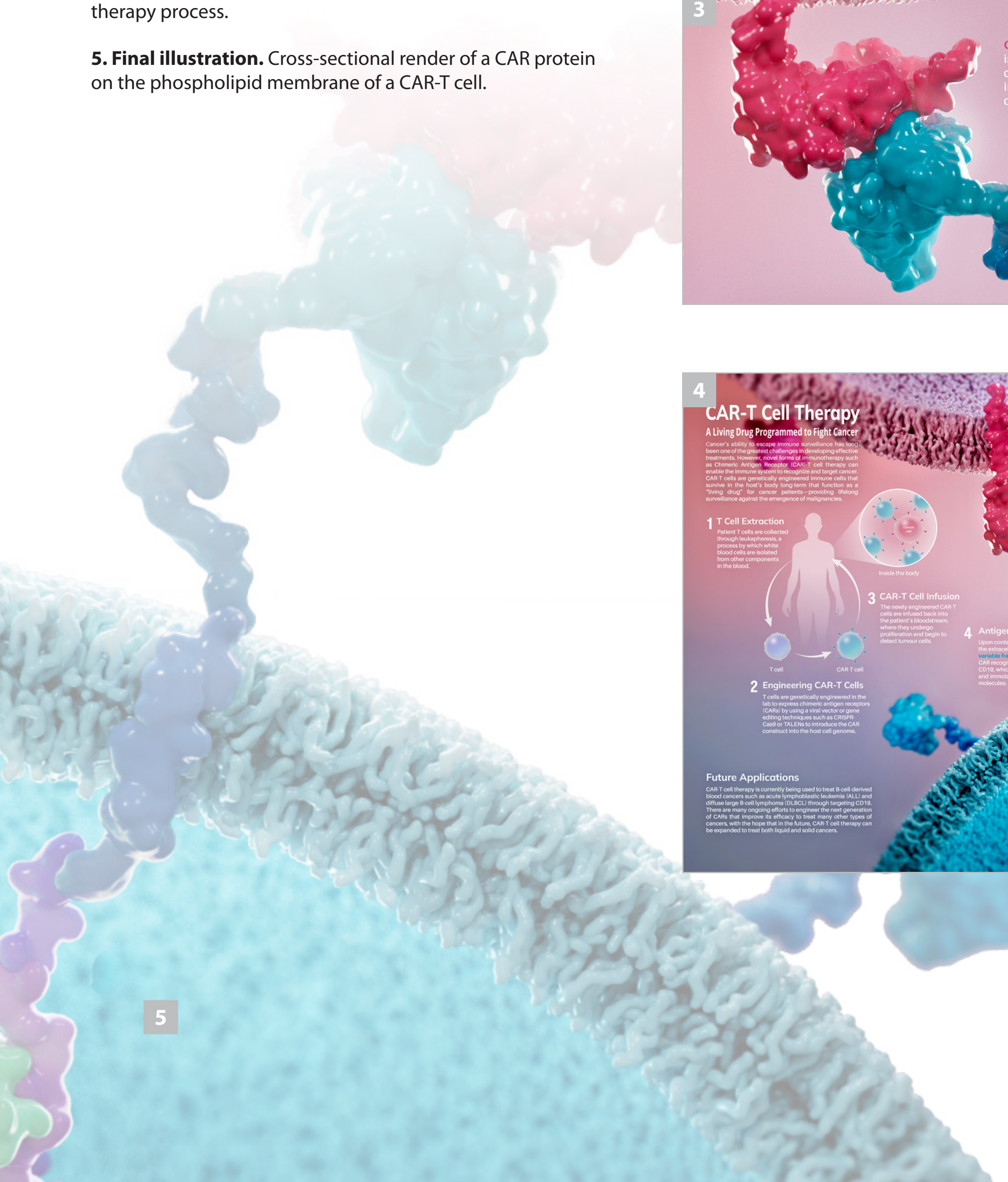

Data Visualization

The World Happiness Report is a yearly report on self-reported life satisfaction in over 140 countries. This project visualizes data from the 2022 and 2021 reports to investigate what exactly determines the world's happiest and unhappiest countries.

1. Production process. The initial form of the bubble graph was created in Tableau, where I experimented with different ways to represent data variables.

2. Final illustration. Close-up of the final data visualization. Each country's population is represented as the size of the black circle, and the coloured halo represents each country's healthy life expectancy as well as the amount of social support.

3. Final illustration. The final data visualization compares the happiness score of over 140 different countries, influenced by several variables such as GDP per capita, life expectancy, and freedom to make life choices.

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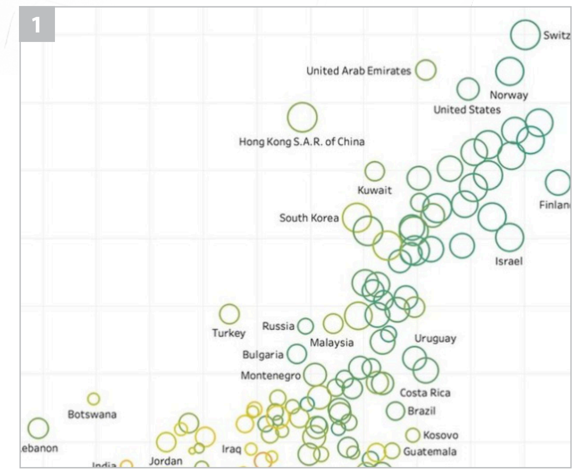

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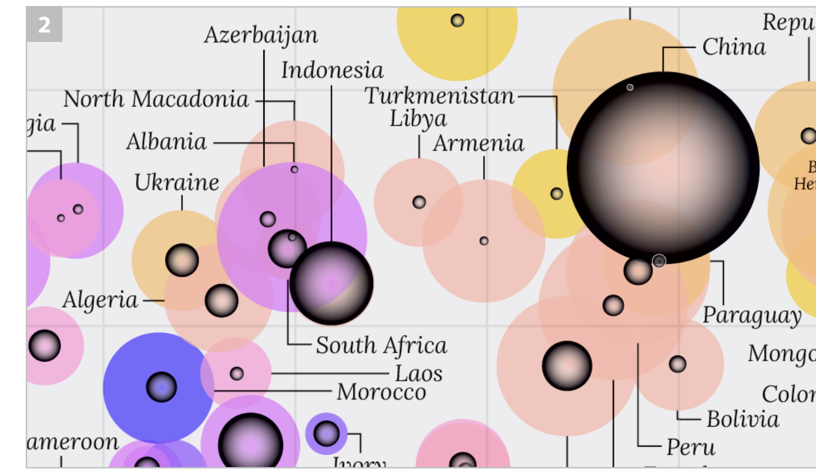

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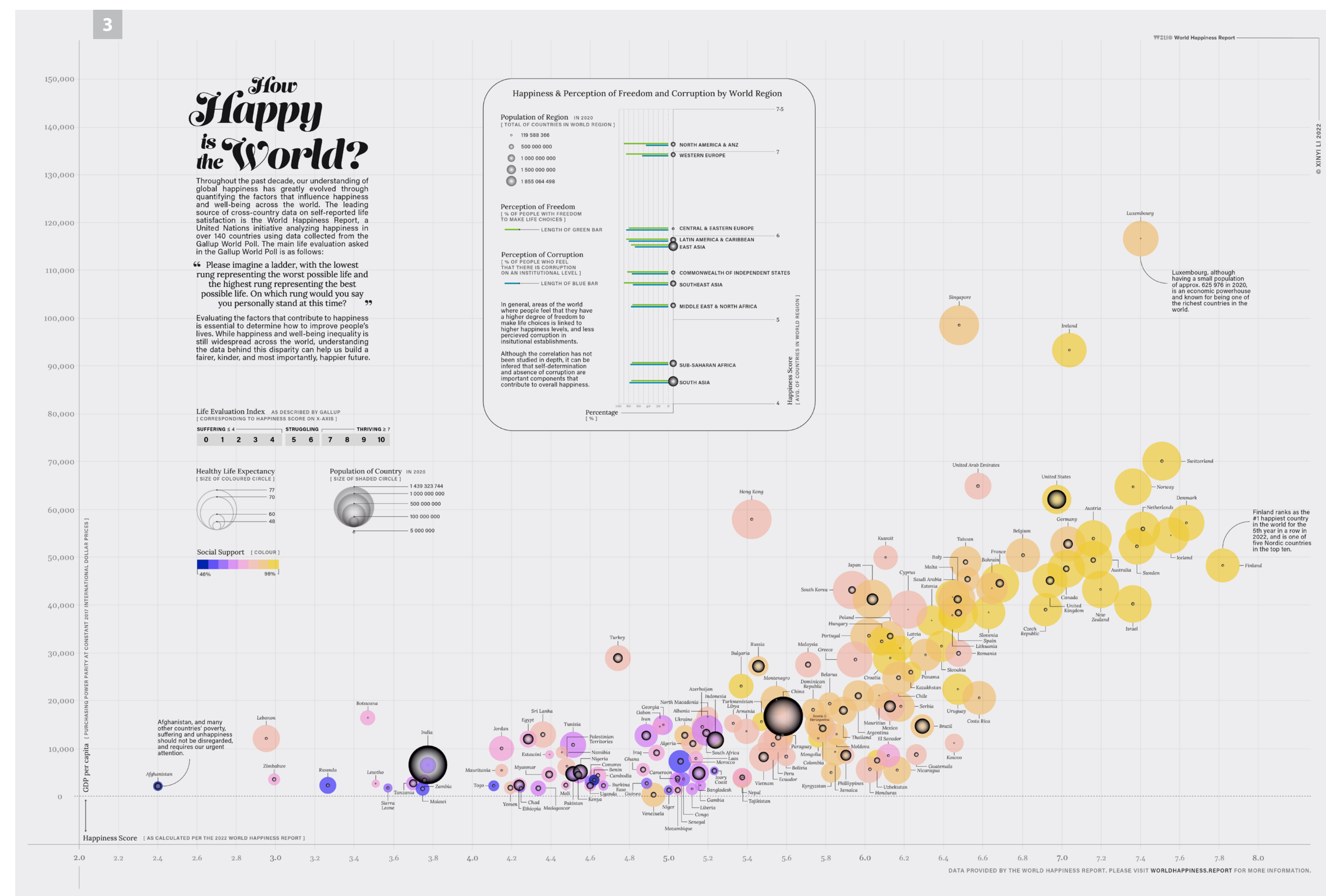


Beyond Chemotherapy: CAR-T Cell Therapy and the New Era of Oncology

Chimeric antigen receptor (CAR)-T cell therapy is a novel and highly personalized form of immunotherapy. This 3D animation aims to promote public awareness and understanding of CAR-T cell therapy and how it is transforming the current standard of cancer care at Princess Margaret Cancer Centre.

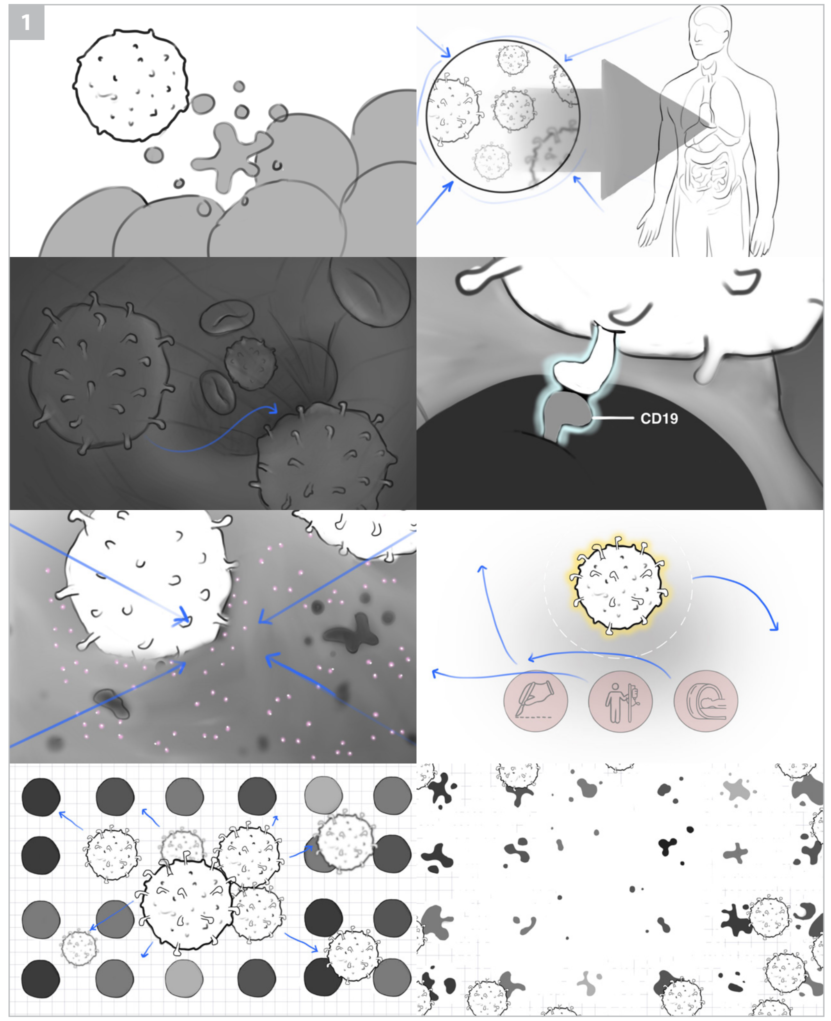
1. Storyboard. Early storyboard sketches, which were my first attempt at solidifying how the story would be told visually. One challenge in particular was simplifying the complexity of the CAR-T cell therapy process into easy-to-digest visuals for a public audience.

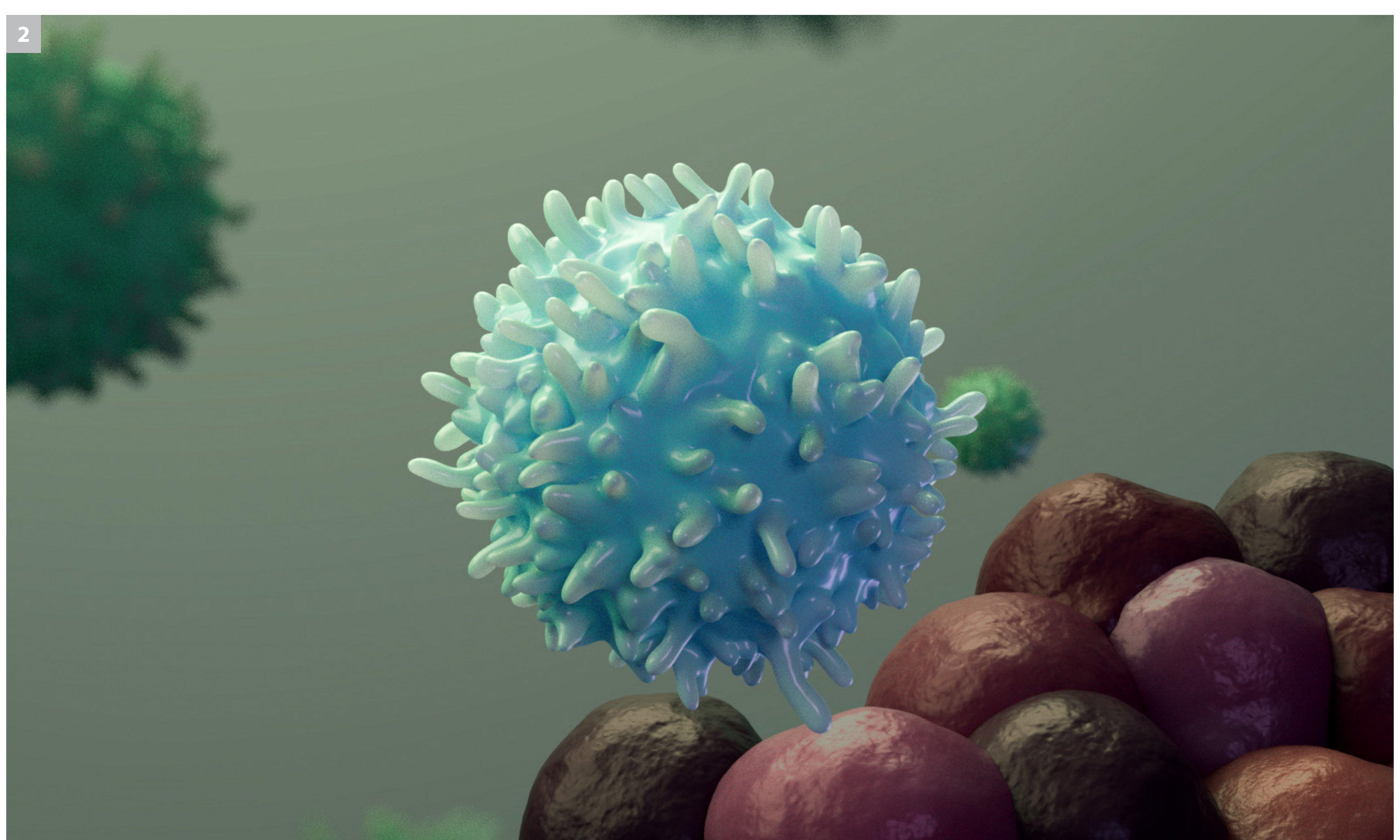
2. Final animation. A frame from the final animation, visualizing the concept of enhancing T cells to target cancer cells that have been able to escape immune surveillance.

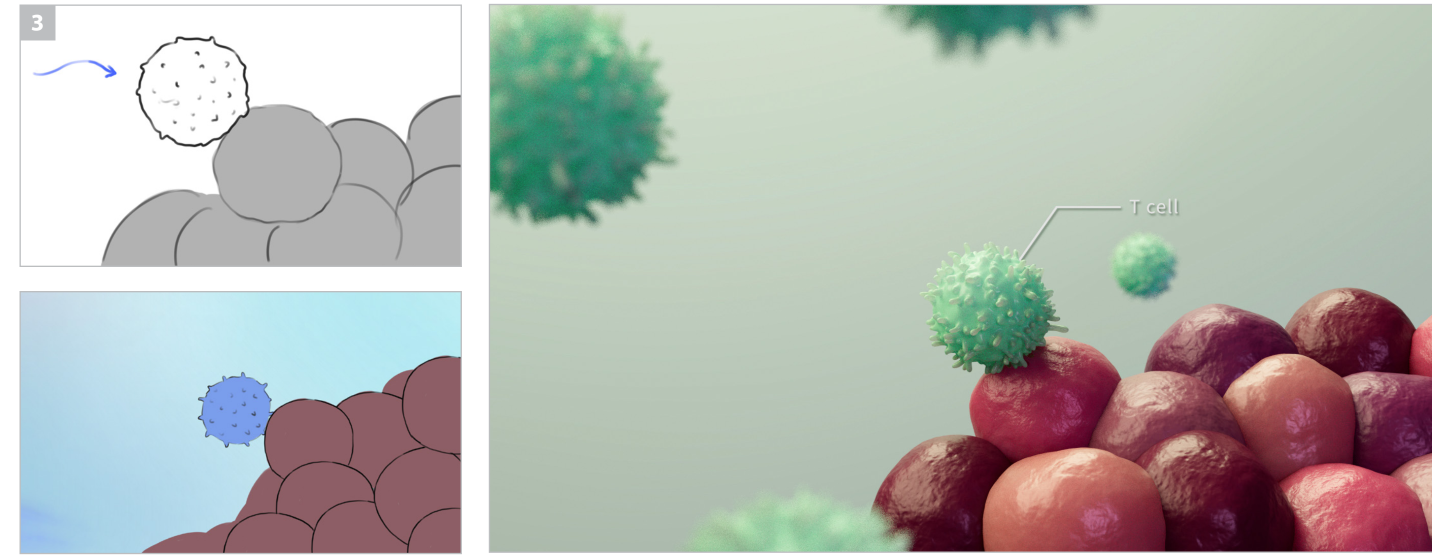
3. Production process. Images showing the production process from rough to refined storyboard to the final composited frame of a T cell interacting with a tumor cell.

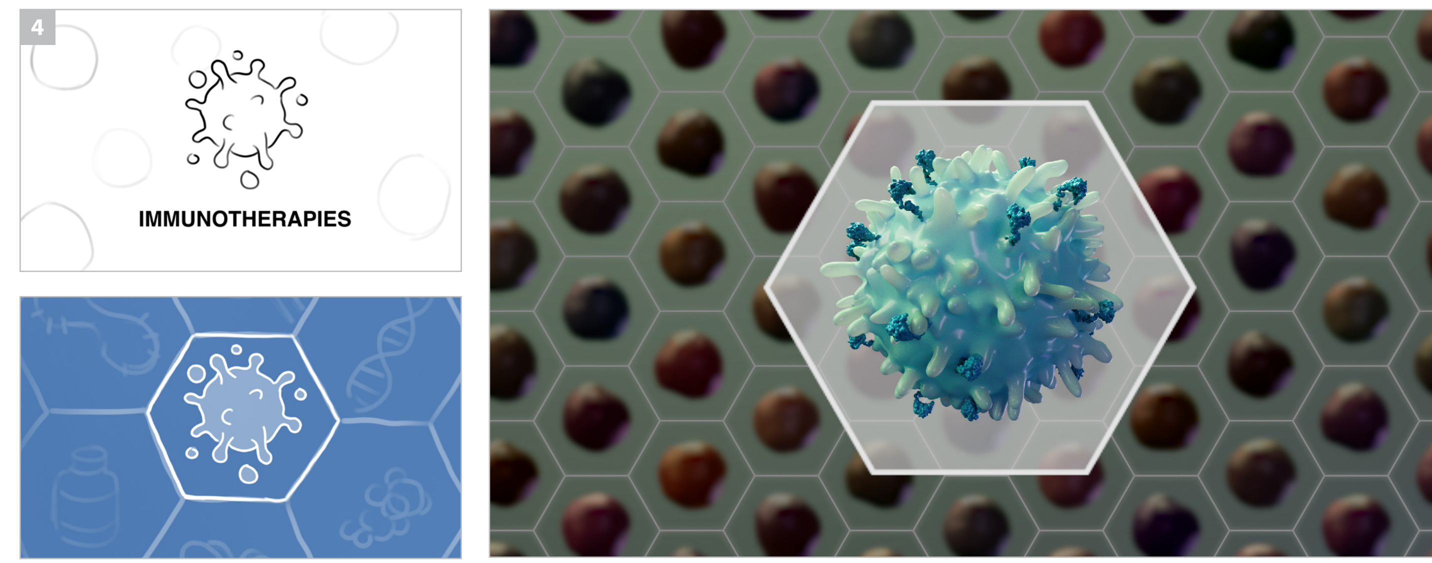
4. Production process. Images of the production process where I employed a hexagon motif to visually explain that each individual patient's cancer is unique, and thus therapies also need to be tailored to match the specific needs of each patient.

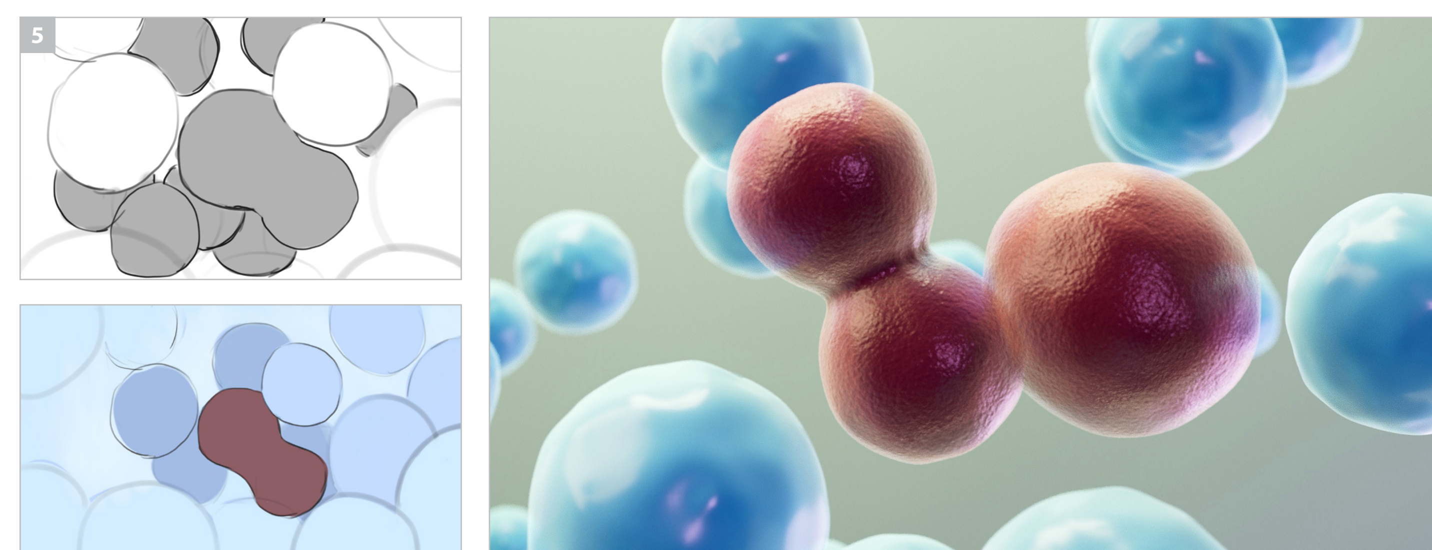
5. Production process. The evolution from storyboard to final frame of the opening shot of my animation, showing how healthy cells can quickly transform into cancer from a genetic mutation in a single cell.

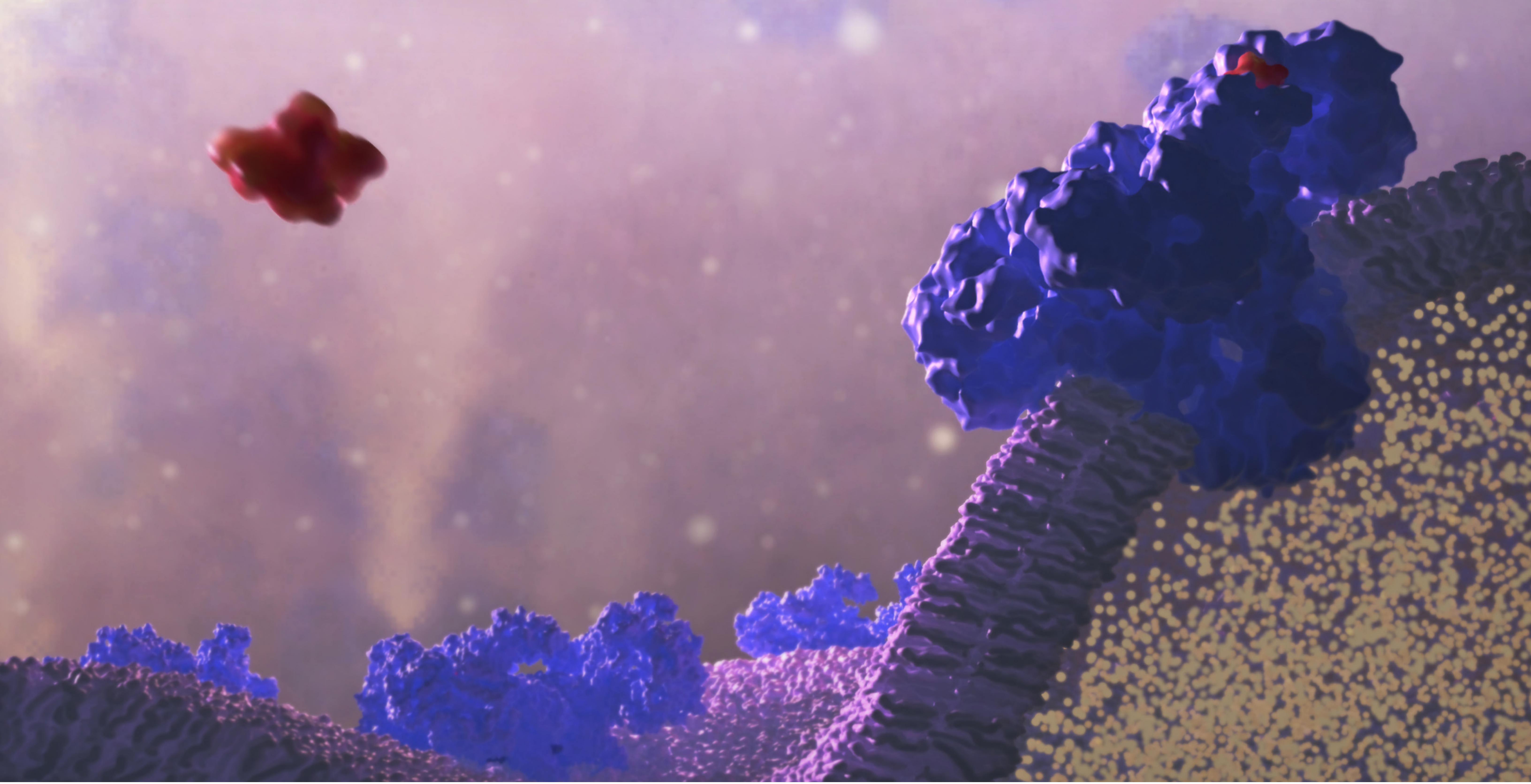












Anais Lupu

I believe that the way information is communicated holds influence over how the audience receives and perceives the message, and this, in turn, has the potential to steer an individual's course of action and drive broader societal changes. To ensure the messages I convey make a lasting impact, I explore a variety of mediums and incorporate ones that are most suited to the audience's needs and communication goals.

Anatomical Illustration

Anatomical illustrations created using real data and tissue study to improve accuracy and add realism to the illustrations.

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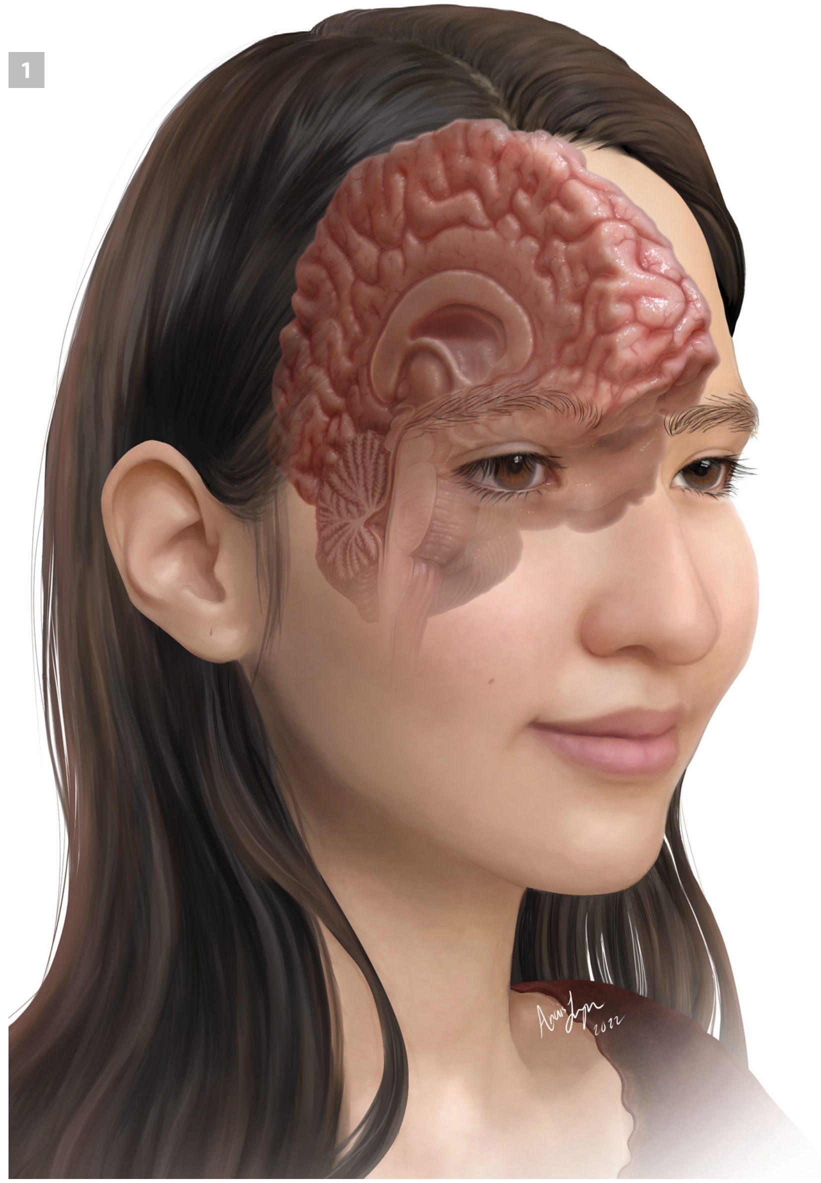

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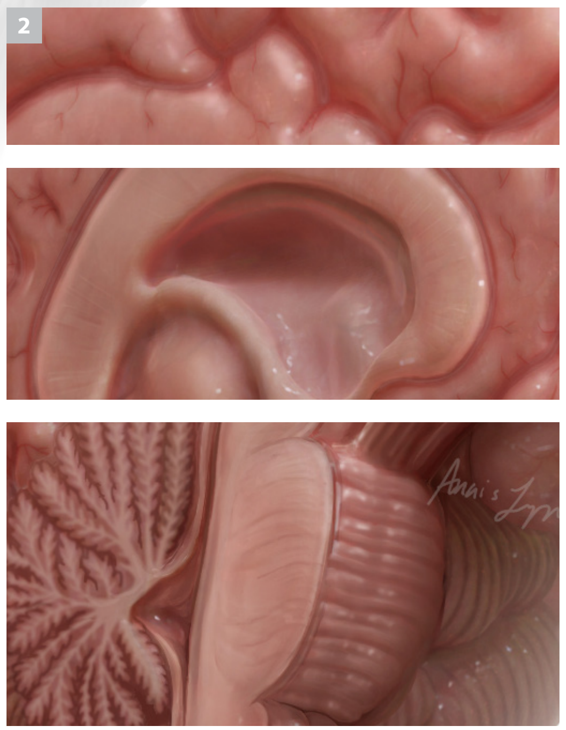

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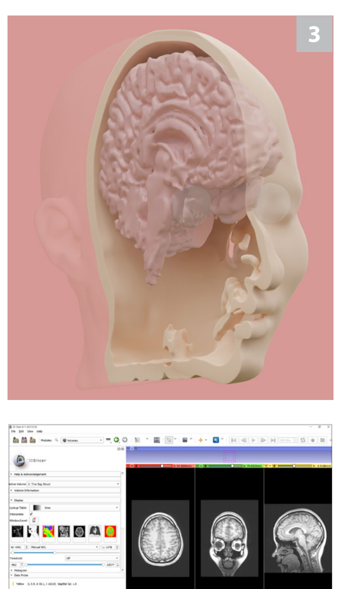


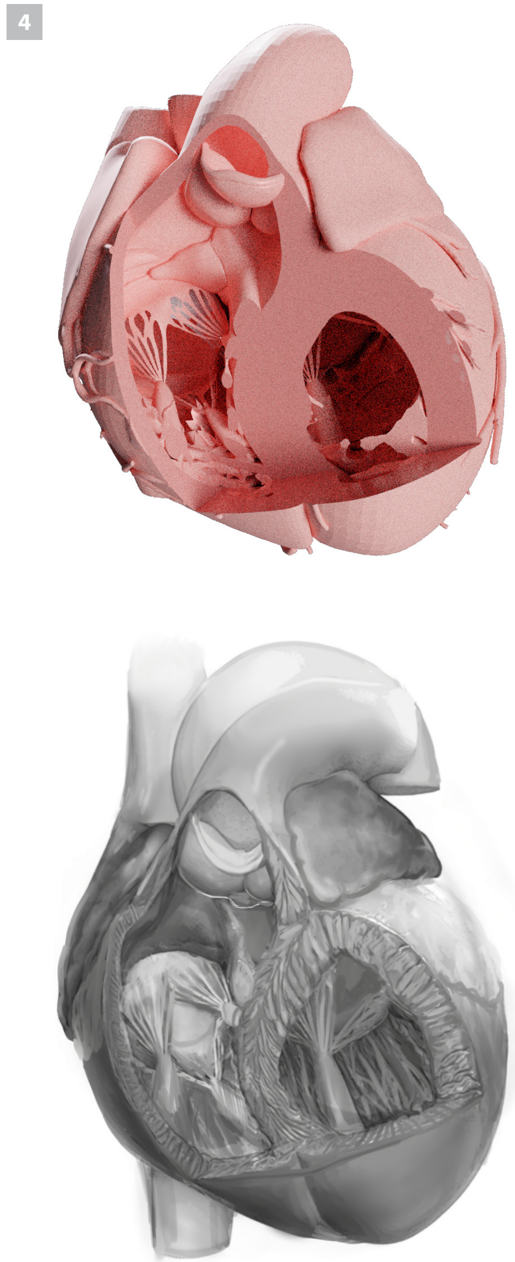
1. Final illustration. Neuroportrait based on real MRI data, showcasing midsagittal cut of the brain.

2. Final illustration. Aided by a tissue study using sheep brain, I painted the details onto the 3D render of the brain.

3. Production process. The brain used for this piece is my own MRI data. I used 3D Slicer, a free open-source software for segmentation, to isolate and extract a 3D object of my brain. I also exported out my head as another 3D object. I then positioned the 3D objects to align with the photo reference of my face.

Previous spread. A still from my Master's Research Project.

4



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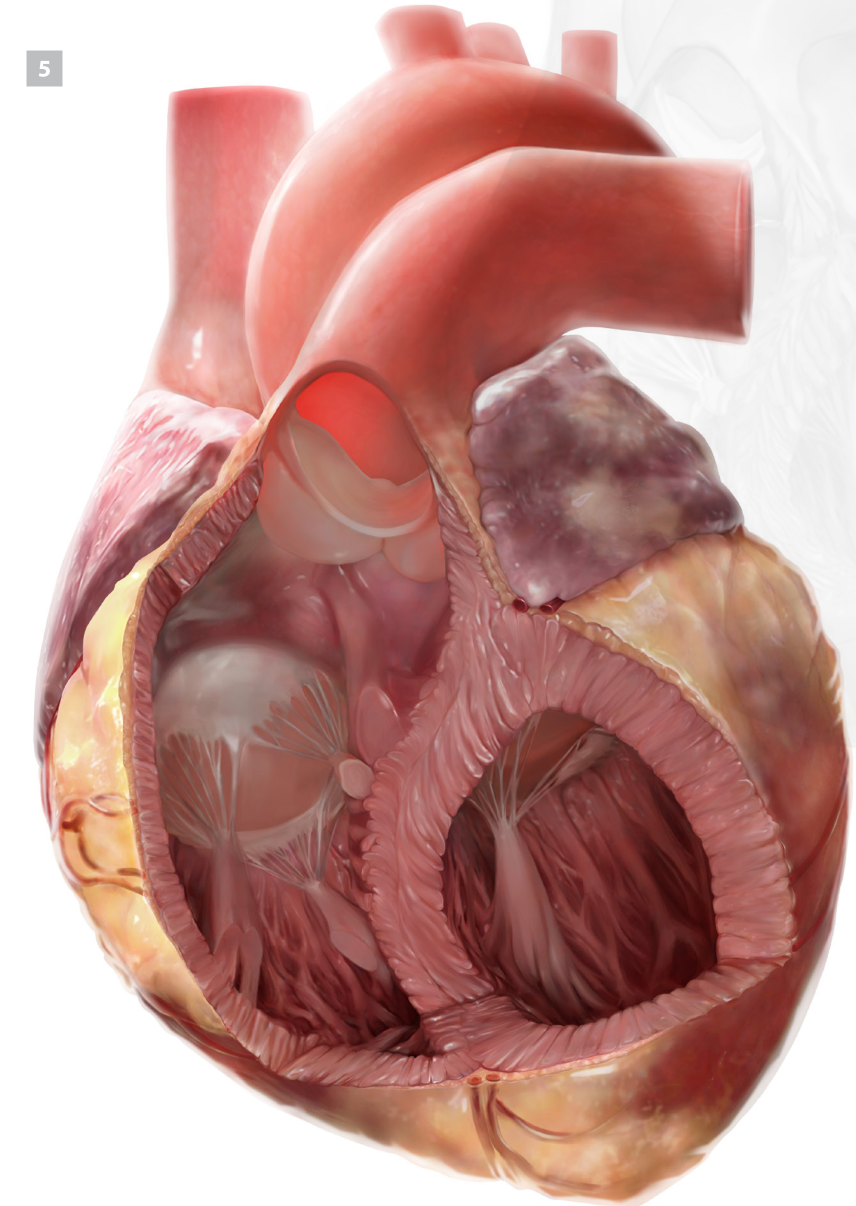

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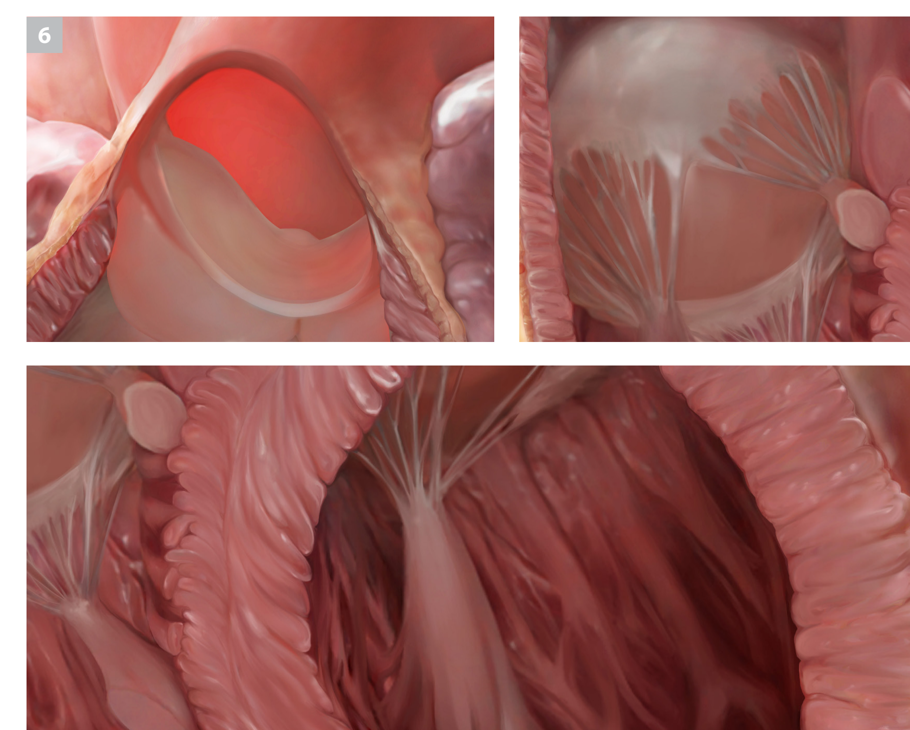

4. Sketch. Top: 3D heart model from Anatomography, a database maintained by the DBCLS non-profit research institute located at the University of Tokyo. Bottom: greyscale sketch based on the 3D render of the heart model.

5. Final illustration. Gross anatomy showing oblique cross-sectional view of the heart.

6. Final illustration. Close-up view. A combination of tissue studies using pig's hearts and open-heart surgical videos were used as a reference for the colour and the texture of various tissue components.

Molecular Visualization

The astrocyte is a type of non-neuronal cell that is starting to gain traction in the neuroscience world as more and more evidence emerges supporting its capacity to modulate neuronal activity. For this molecular visualization piece, I choose to focus on the newly discovered inositol-1,4,5-trisphosphate (IP3) receptor which drives the intracellular activity of astrocytes.

1. Sketch. The sketch phase.

2. 3D modelling. The 3D model and scene.

3. Production process. The 3D render phase.

4. Final illustration. The final piece with text added. This illustration could work as both a poster and a double-spread magazine layout.

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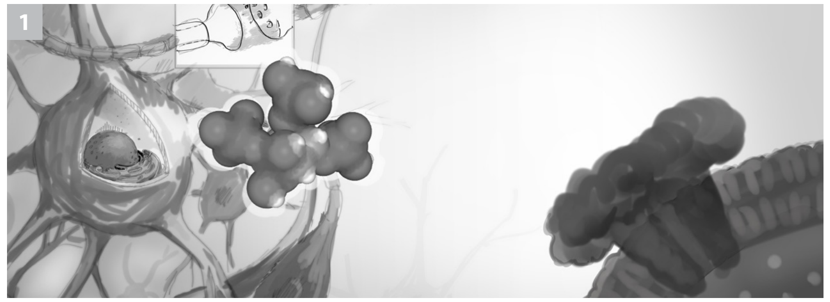

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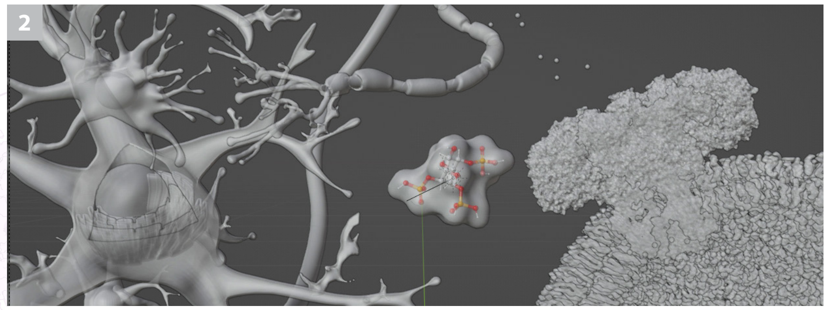

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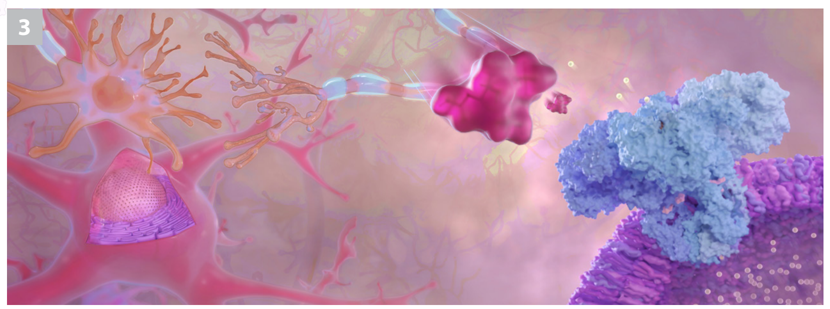

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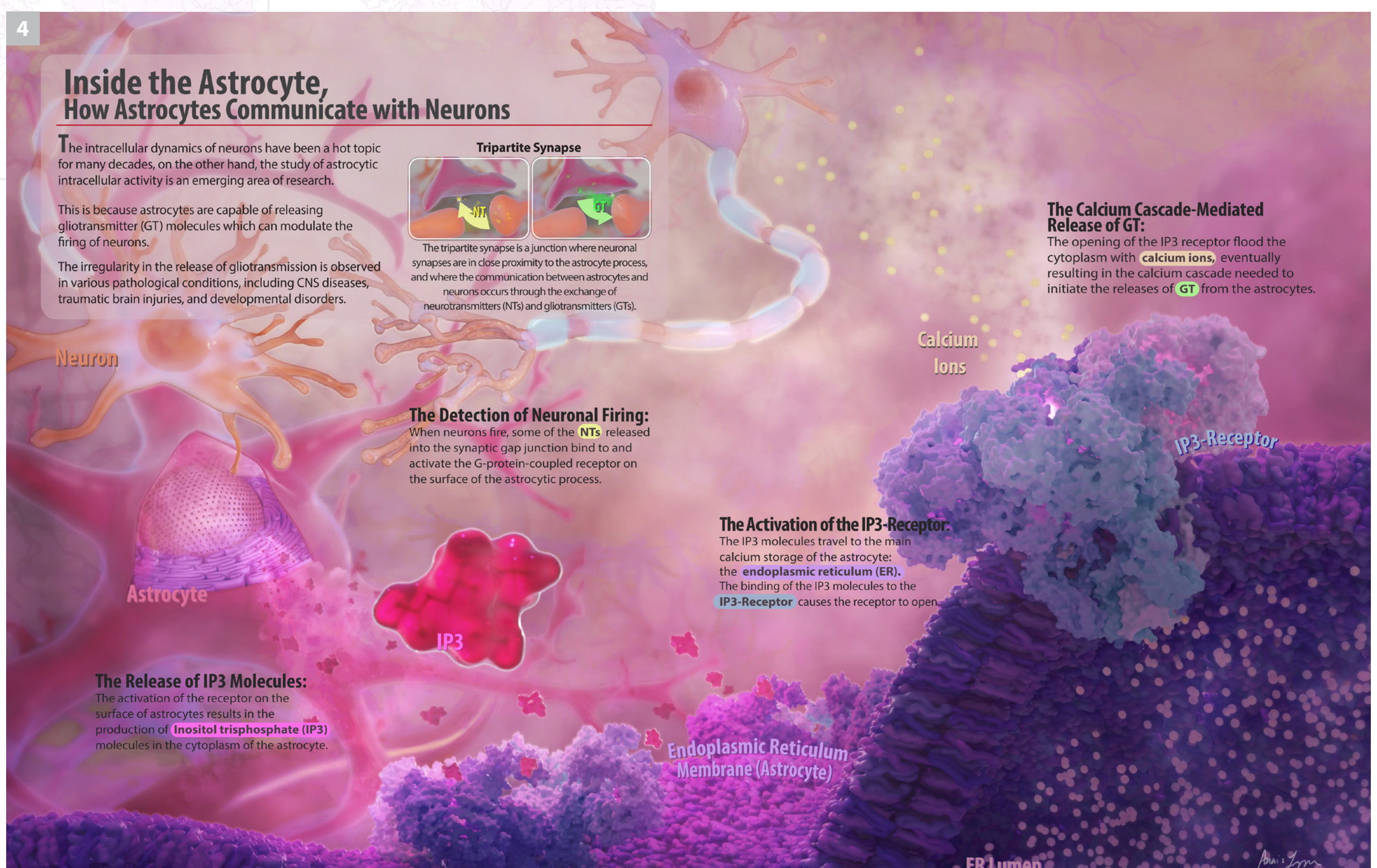

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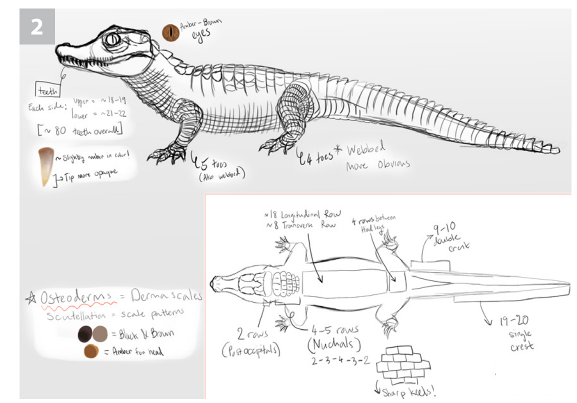

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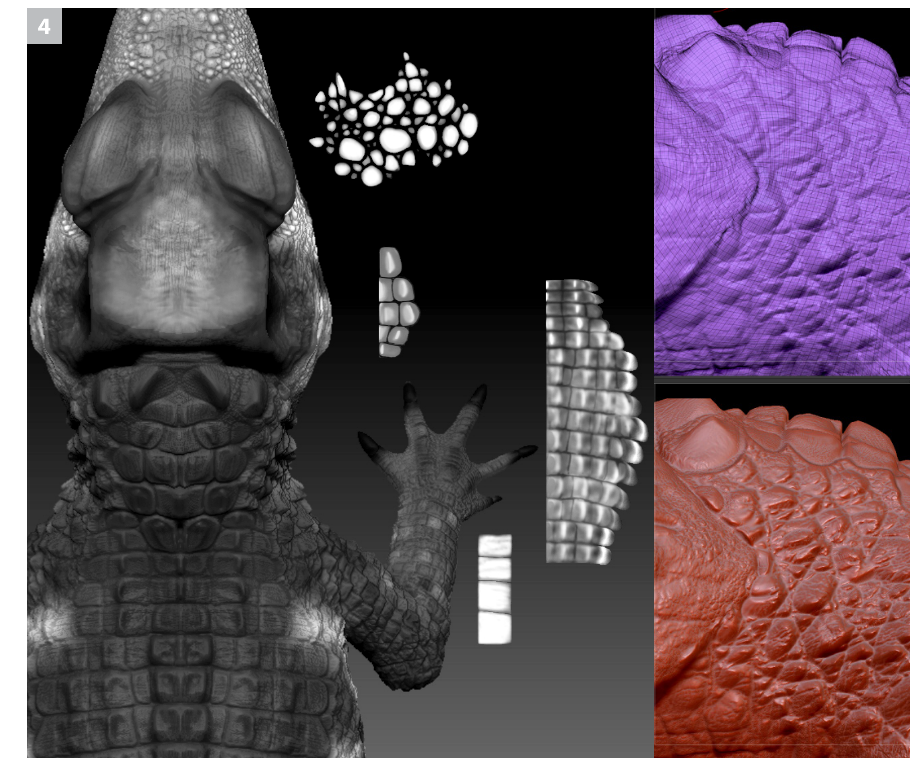


3D Modelling

The Cuvier's dwarf caiman, scientifically known as *Paleosuchus palpebrosus*, is the smallest true crocodilian, and an exception to my phobia of crocodiles and alligators. This sculpting process of this piece allowed me to explore Pixologic ZBrush in depth and got me started on the 3D modelling workflow.

1. Final illustration. Final render with the sculpted caiman in a 3D environment.

2. Sketch. Background research on the distinct characteristics of this species. I paid special attention to the dorsal scute organization.

3. Sketch. Colour sketch of the caiman. I wanted the final piece to convey a similar mood to this sketch: as if the viewer is hiding in the tall grass by the water, quietly observing this creature in their natural habitat.

4. Production process. I learned how to make my own custom brush so that I could control the scale placement and consistency throughout the piece. I also played around with using a displacement map to keep my polygon count low.

Neuron-Astrocyte Circuits of the Brain

My MRP is a four-minute animation intended to engage and educate the general public about the fascinating world of astrocytes. I employed a thought-provoking analogy that likens the brain to a computer's central processing unit (CPU), shedding light on the intricate interaction between neurons and astrocytes.

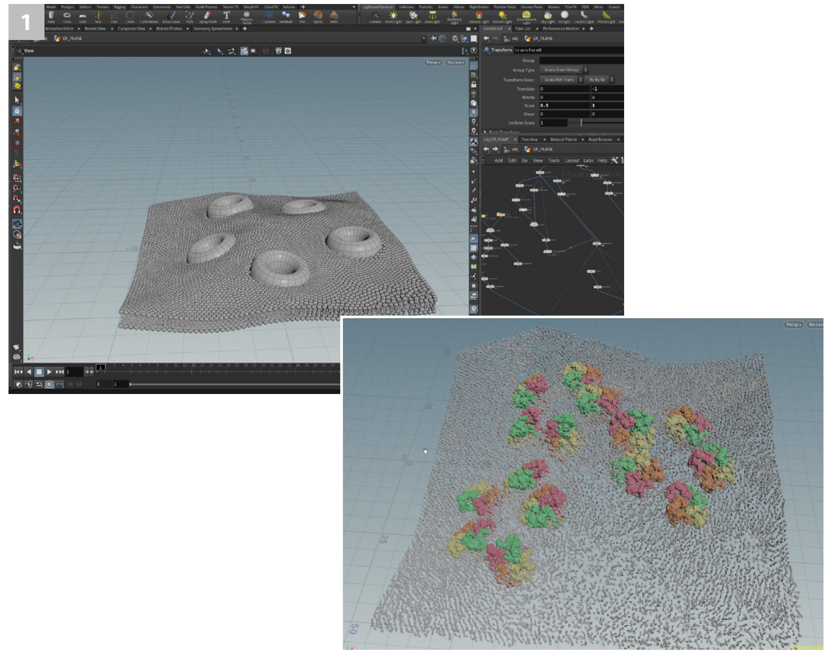
1. 3D modelling. I conducted experiments within SideFX Houdini to create part of the subcellular scene in the animation. Top: I designed a procedural membrane patch to represent the endoplasmic reticulum membrane, embedding IP3 receptors in patterns consistent with current research findings. In this viewport screen capture, you can observe test geometry populating a section of the membrane. I employed these low-polygon models for testing various simulations and constructions. Bottom: The following viewport screen capture displays the actual geometry replacing the test geometry. Please note that the lipid density here is significantly lower than in the final render view.

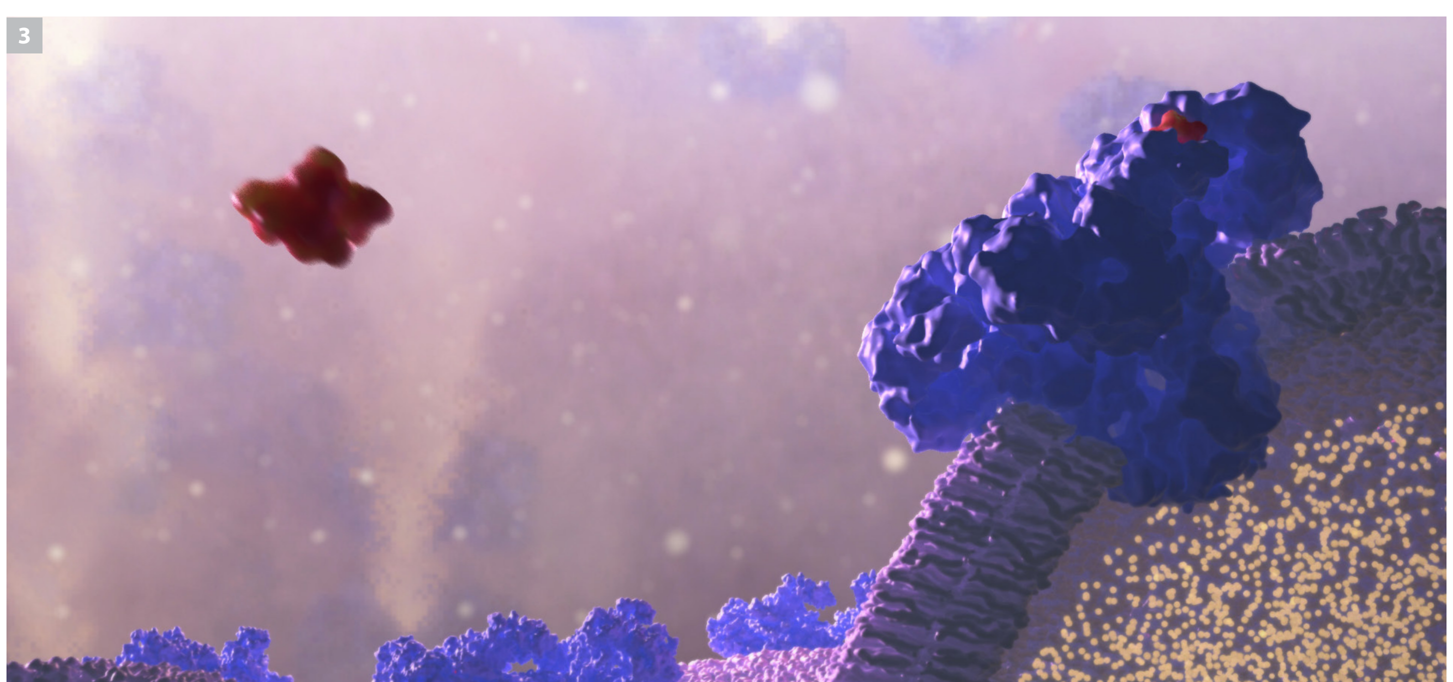
2. Final animation. The membrane patch as used in the final animation.

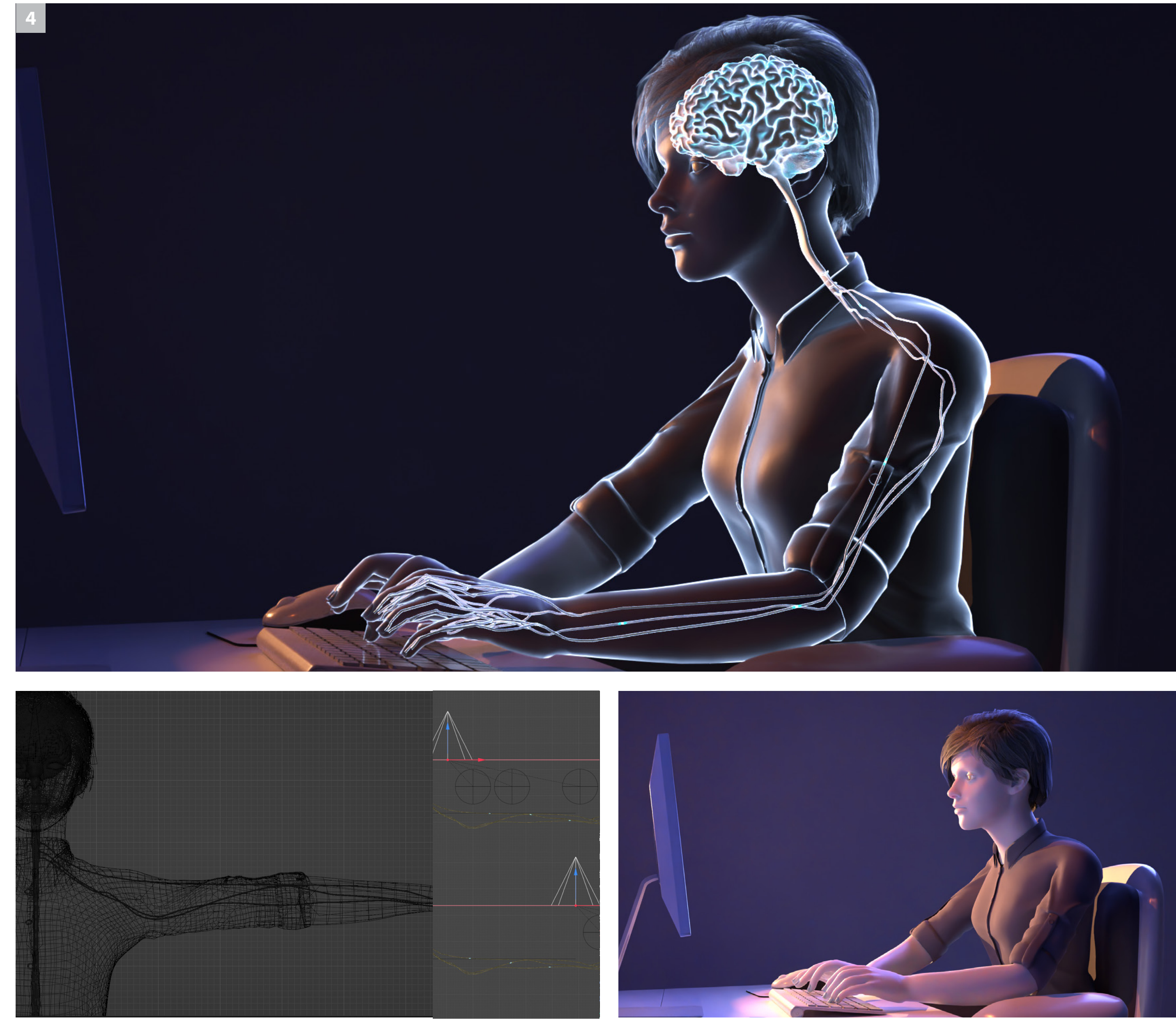
3. Final animation. This scene depicts the opening of IP3 receptor due to the binding of IP3 molecule to the receptor. This animation is made possible by Houdini's ability to interpret Protein Data Bank (PDB) files, enabling a high-fidelity portrayal of protein conformational changes by aligning atoms across various conformational stages.

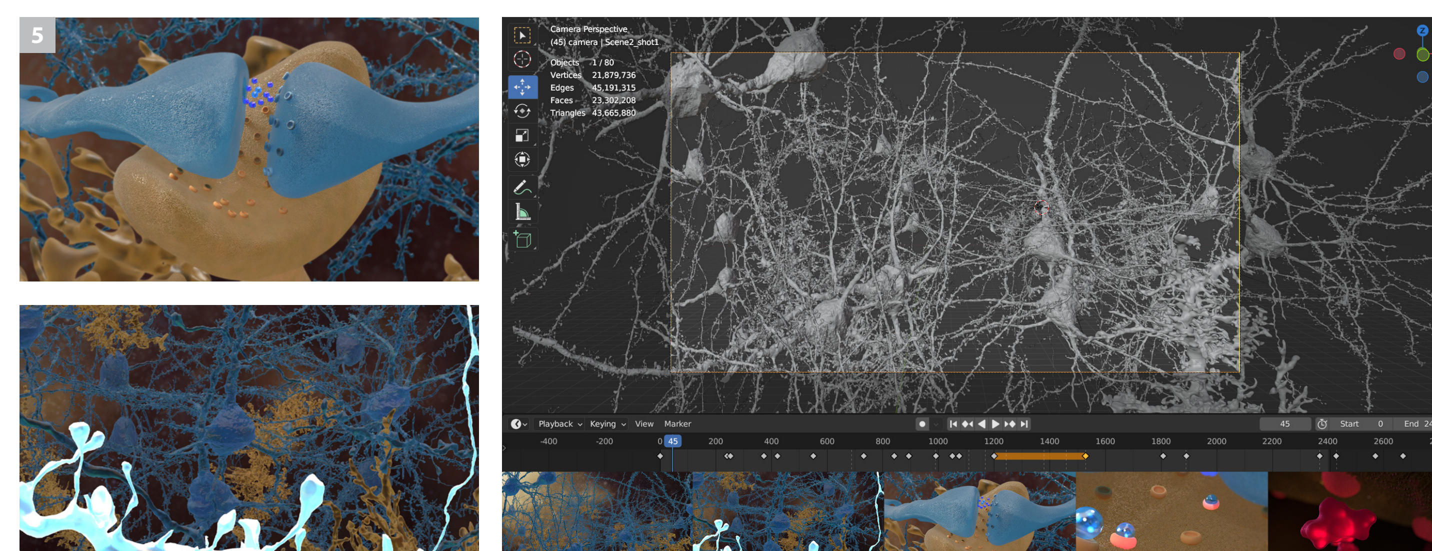
4. Production process. Rig showcase of the objects used for the opening scene of the animation. The light ball (used to represent electrical signal) that runs down from the spinal cord to the fingertips is paired to the rig in the resting T-pose, allowing for consistent light movement during the typing animation.

5. Production process. One long shot, from cellular landscape to subcellular scale.









Christina Ly

My passion for beautiful designs and compelling stories has driven me to incorporate them both into healthcare and science. I have always been committed to innovative ideas and solutions that aim to improve healthcare experiences, all in pursuit of a clearer future.

Neuroanatomical Illustration

In the pursuit of learning neuroanatomy, our initial project involved artistically superimposing a brain onto a self portrait.

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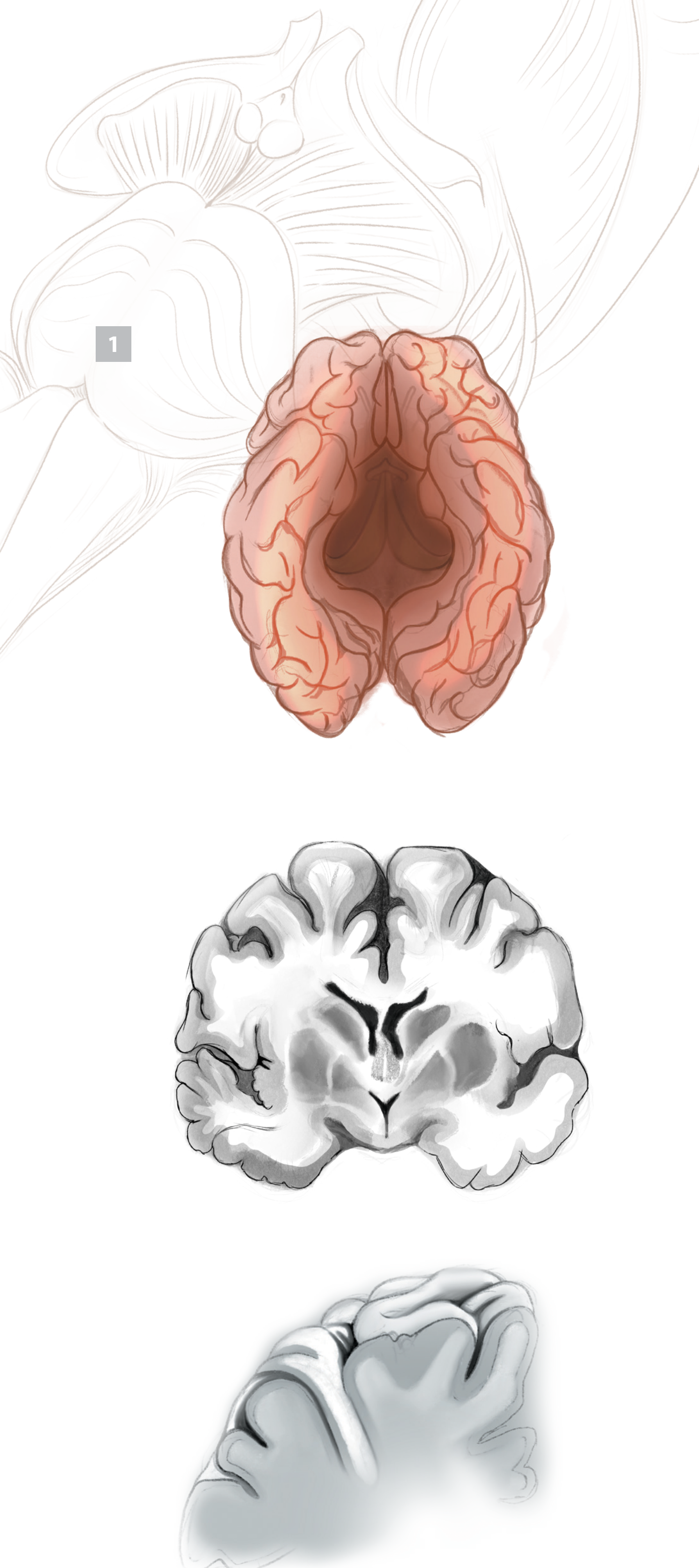

1. Study. Various studies done at Grant's Museum.

2. Production process. Initially, I focused on accurately portraying the brain's position without the cranium. However, I eventually concluded that incorporating the skull would aid in better orientation for both myself and the viewer.

3. Final illustration. The completed portrait showcases the cranium, featuring the frontal bone removed at its coronal and squamous sutures. Additionally, the atlas and axis vertebrae were incorporated to provide guidance for positioning the brain accurately.

Previous spread. A still from my Master's Research Project.

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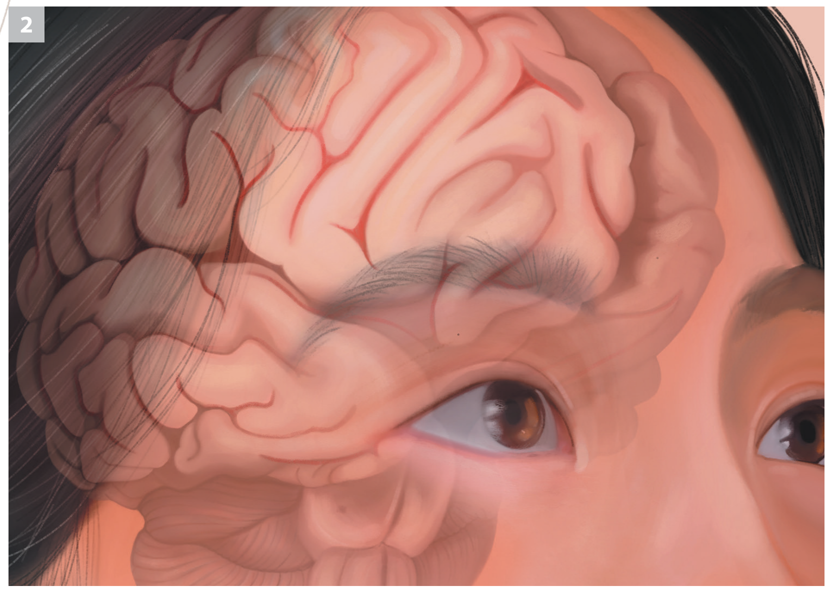

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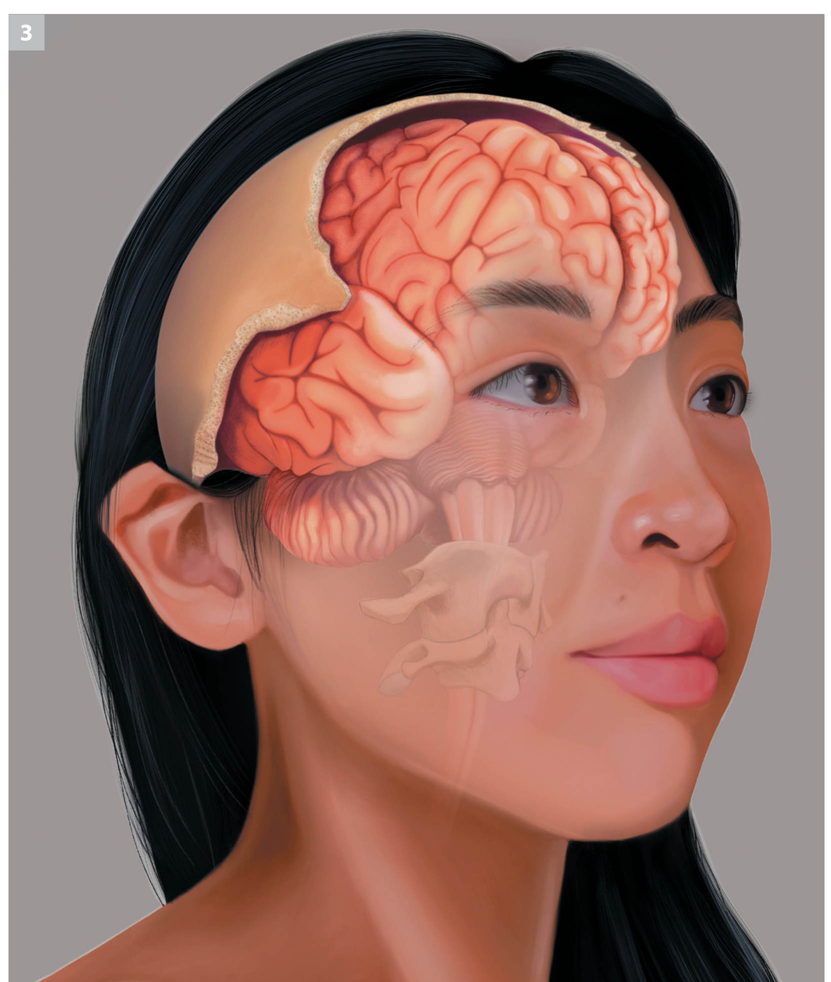

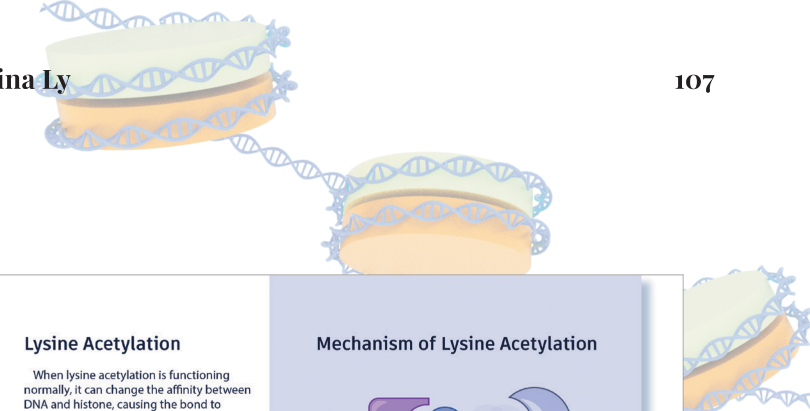

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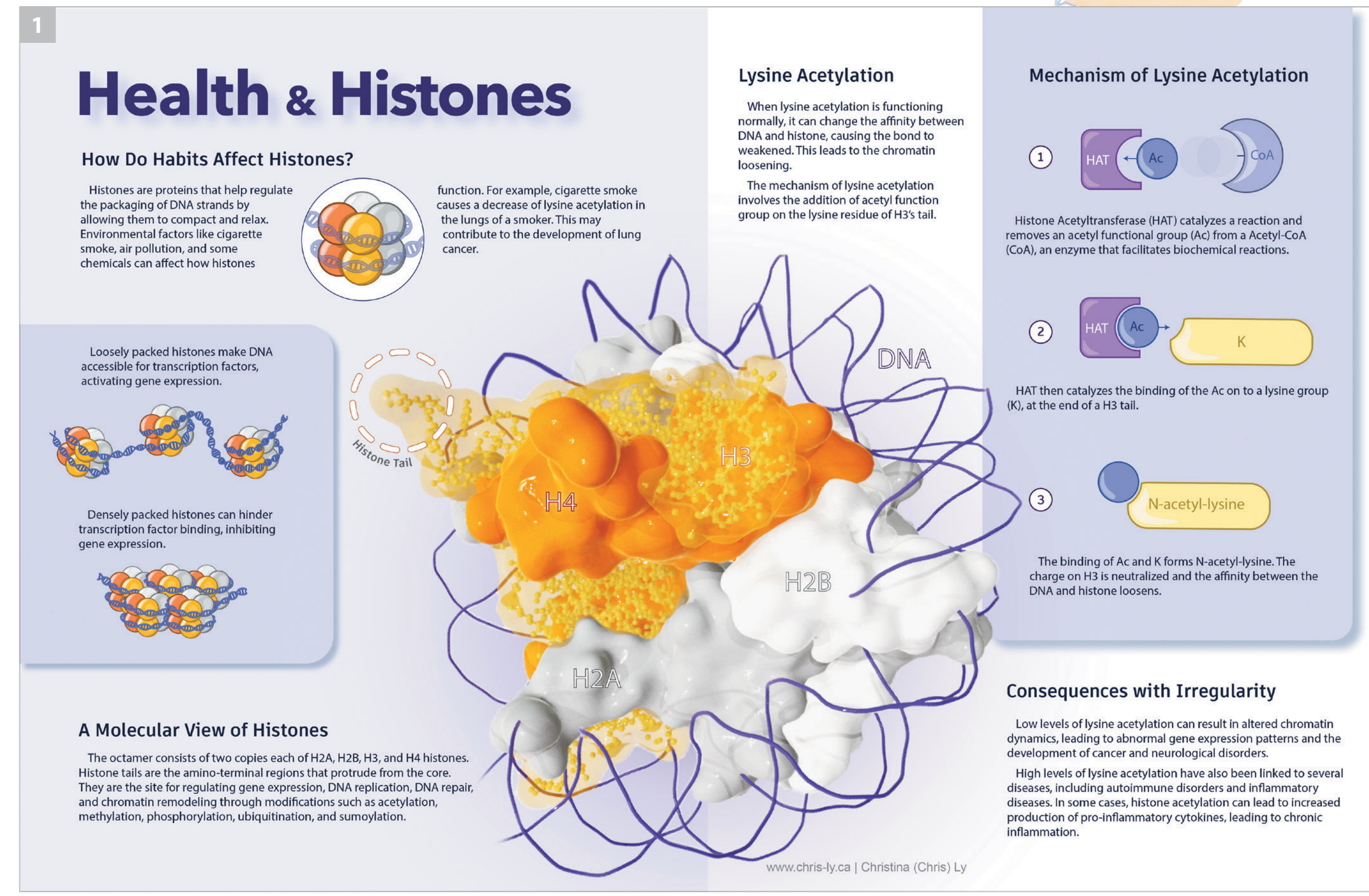

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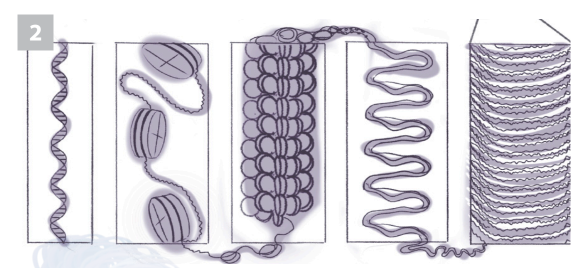

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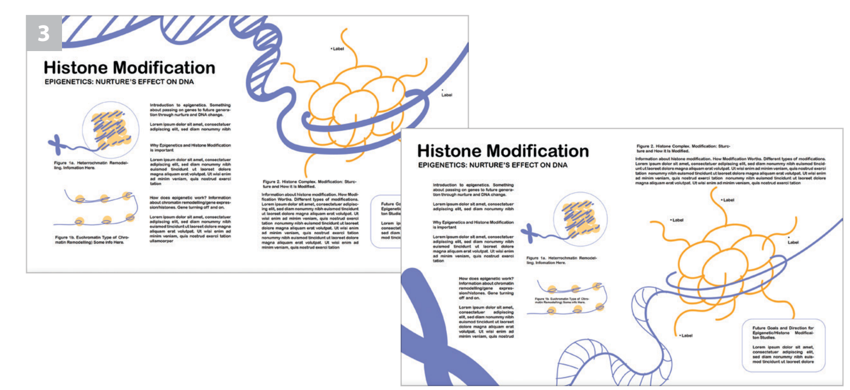

Molecular Visualization

Did you know that our environment can directly influence our DNA, shaping it in significant ways? My health and histone infographic offers a glimpse into the realm of histones and how the environment can alter their behaviour.

1. Final illustration. This is the second version of my final project. In this iteration, I emphasize elucidating the nature of histones, their visual characteristics, and the influence of their functionality—specifically lysine acetylation—on the shape of our DNA

2. Production process. In the initial draft, I designed a highly-simplified model illustrating histones with DNA wrapped around them, known as a nucleosome.

3. Production process. After planning the intended cut and viewpoint of the eye, I created a rendering using a monochromatic palette in greys and then colourized it in Photoshop.

Pathological Illustration

Titled "Malaria Under the Microscope", this illustration depicts the lifecycle of the malaria parasite.

1. Study. Project initiation included generating a liver environment sketch, focusing on hepatocyte cells and illustrating the blood flow within them.

2. Study. Sketches of four cubes illustrating distinct stages of Malaria: skin entry, liver infiltration, blood invasion, and bone marrow invasion.

3. Sketch. Initial sketches for the final illustration portraying capillaries with parasites entering the bloodstream. The second figure highlights parasites entering hepatocytes.

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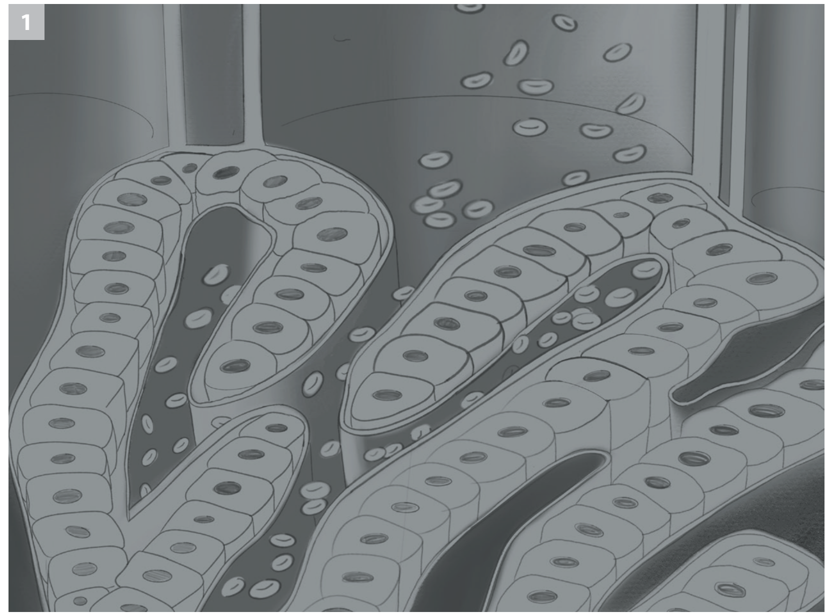

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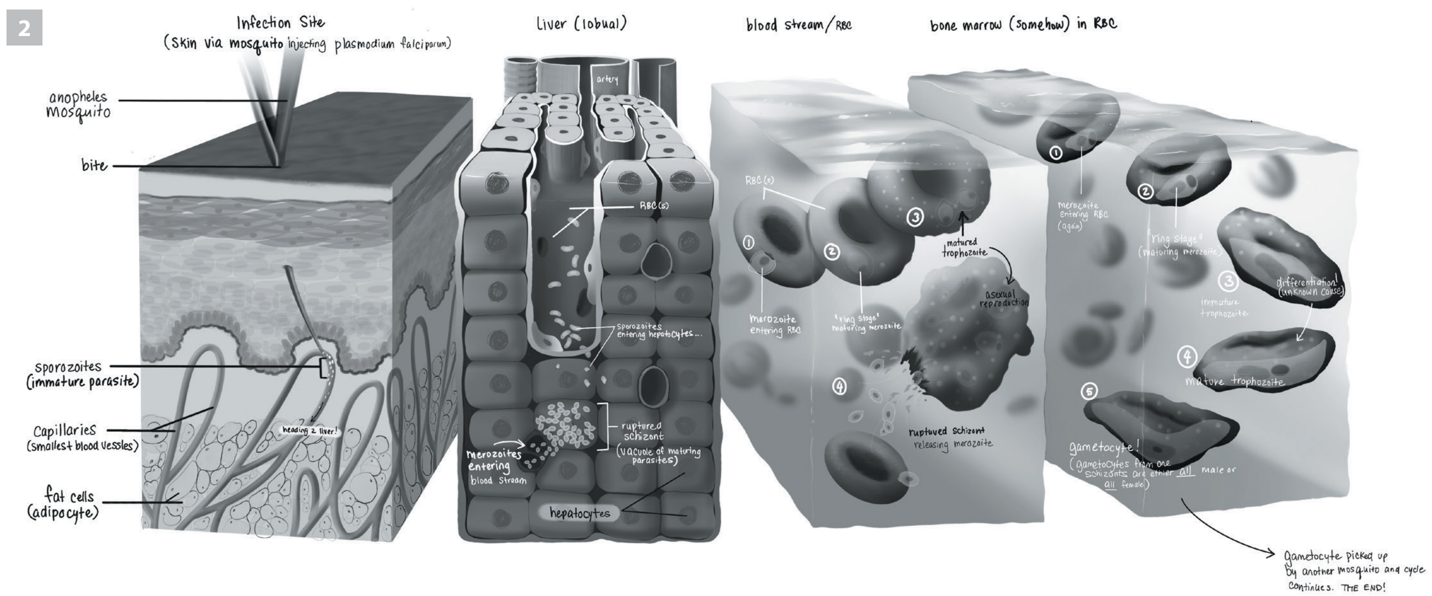

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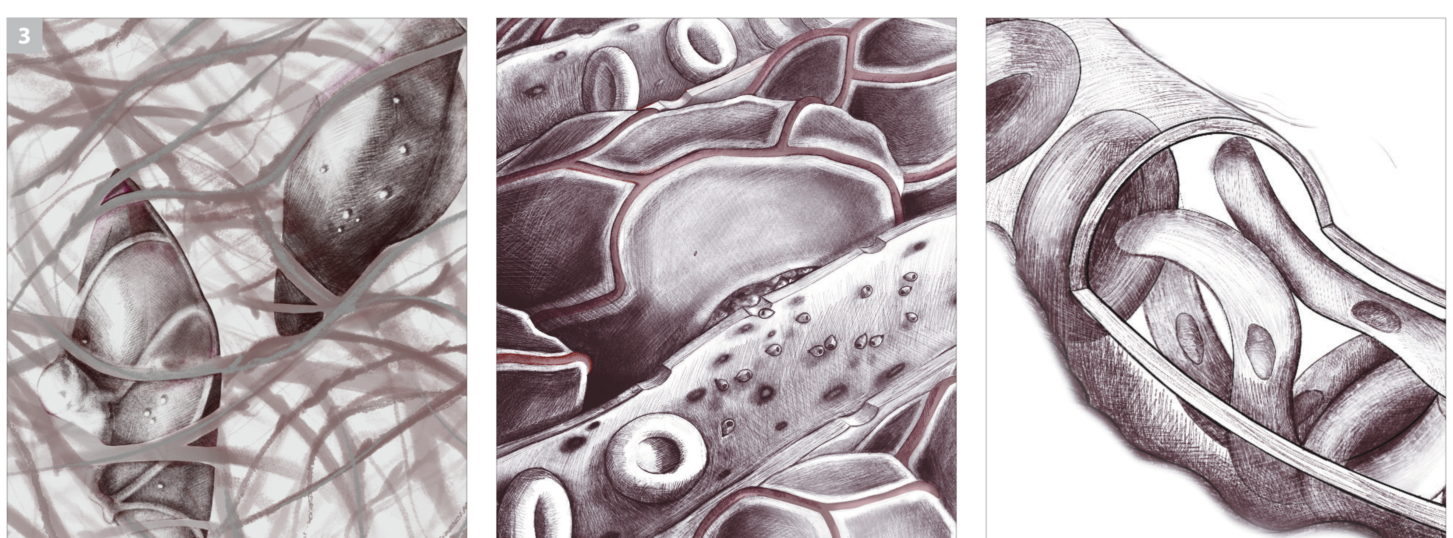


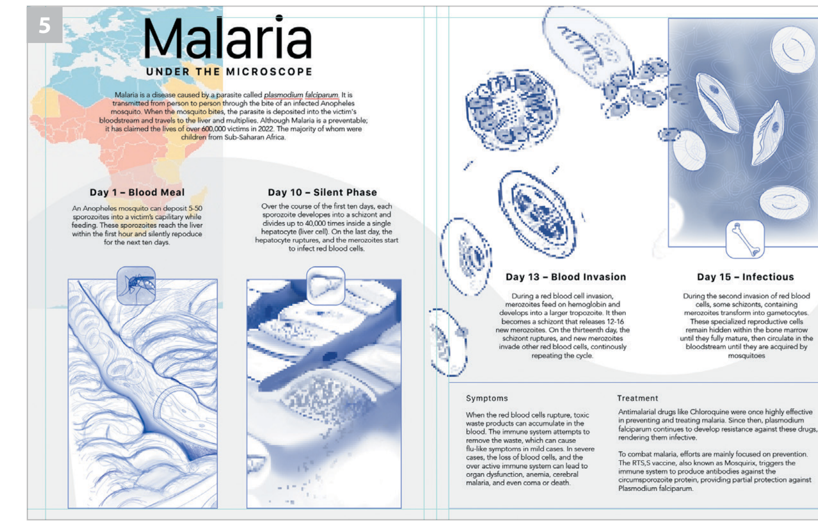
4. Study. Three different colour studies and layout variations of the final illustration.

5. Sketch. The first intital idea and sketch.

6. Final illustration. The illustration commences with a mosquito bite, tracing parasite movement, replication in red blood cells, and symptom onset, illustrating the 15-day progression of malaria in a chronological sequence.

4

5



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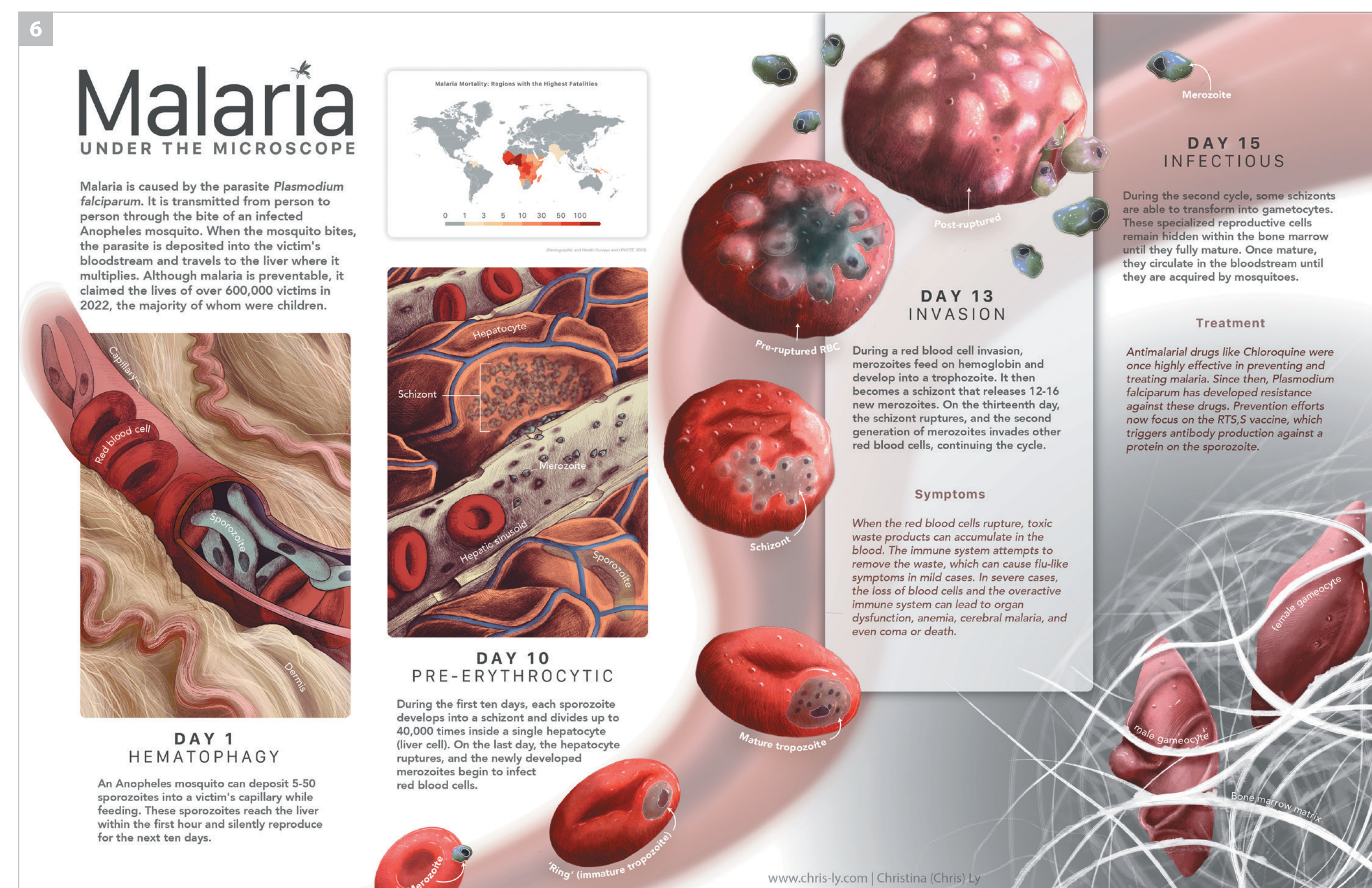


Breast Reconstruction: Exploring Your Options

An animation that takes a sensitive and considerate approach for patients facing a mastectomy. It utilizes a combination of 3D and 2D visuals, incorporating cartoons to help patients make informed decisions and feel more at ease during this challenging time.

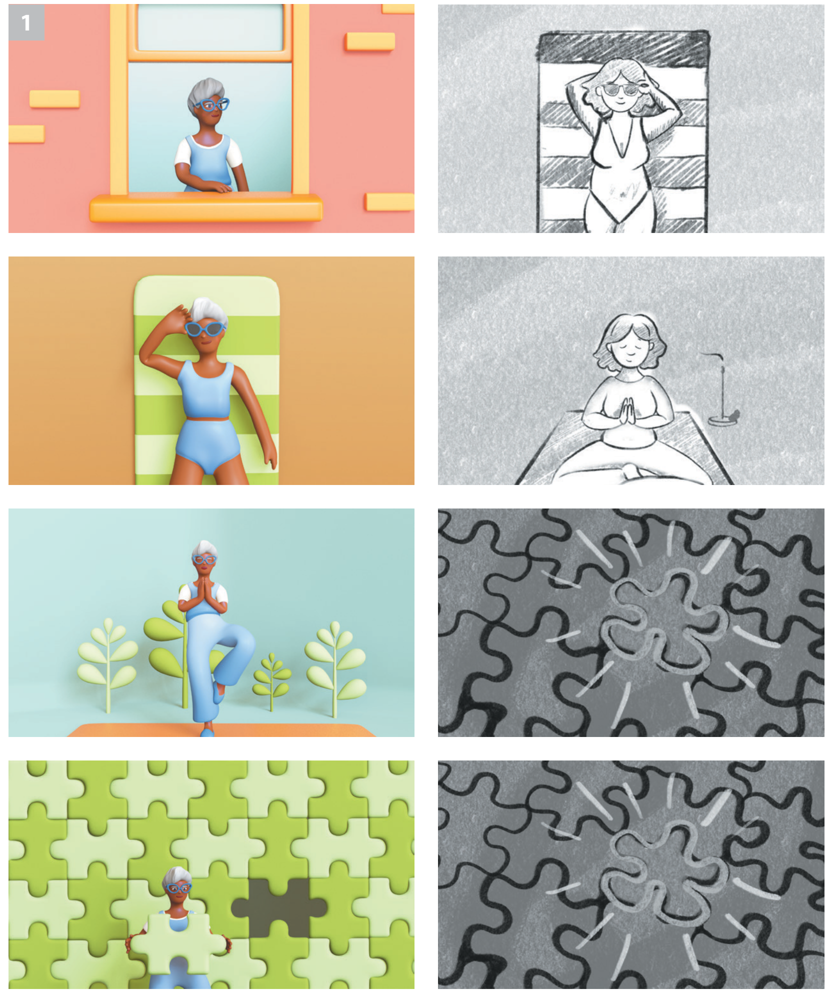
1. Production process. Left: Still frames from the final animation. Right: Storyboard sketches. The animation's introduction discusses the positive impact of breast reconstruction on confidence, mental health, and alignment with an individual's lifestyle.

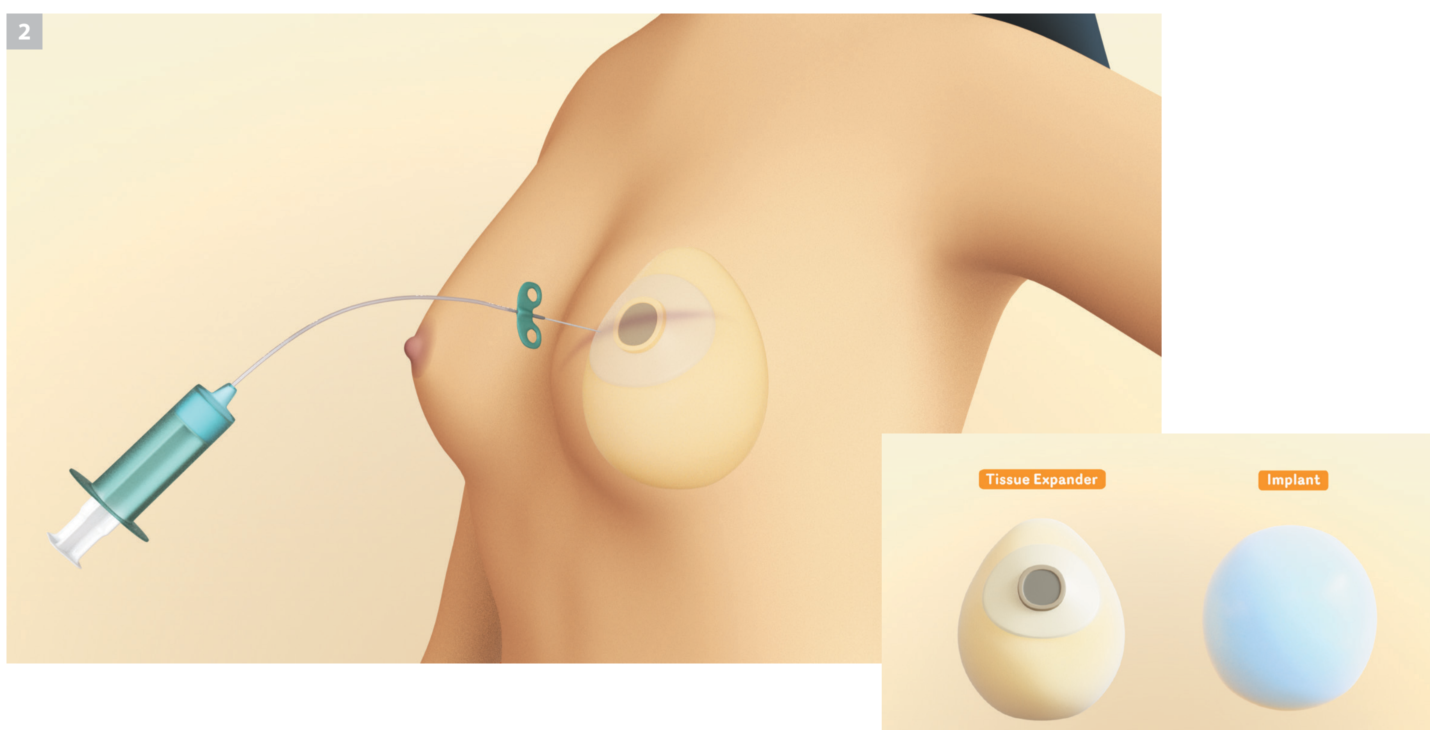
2. Final animation. Demonstration of a reconstruction option where a tissue expander is placed in the breast, gradually filled with saline to prepare for implant placement.

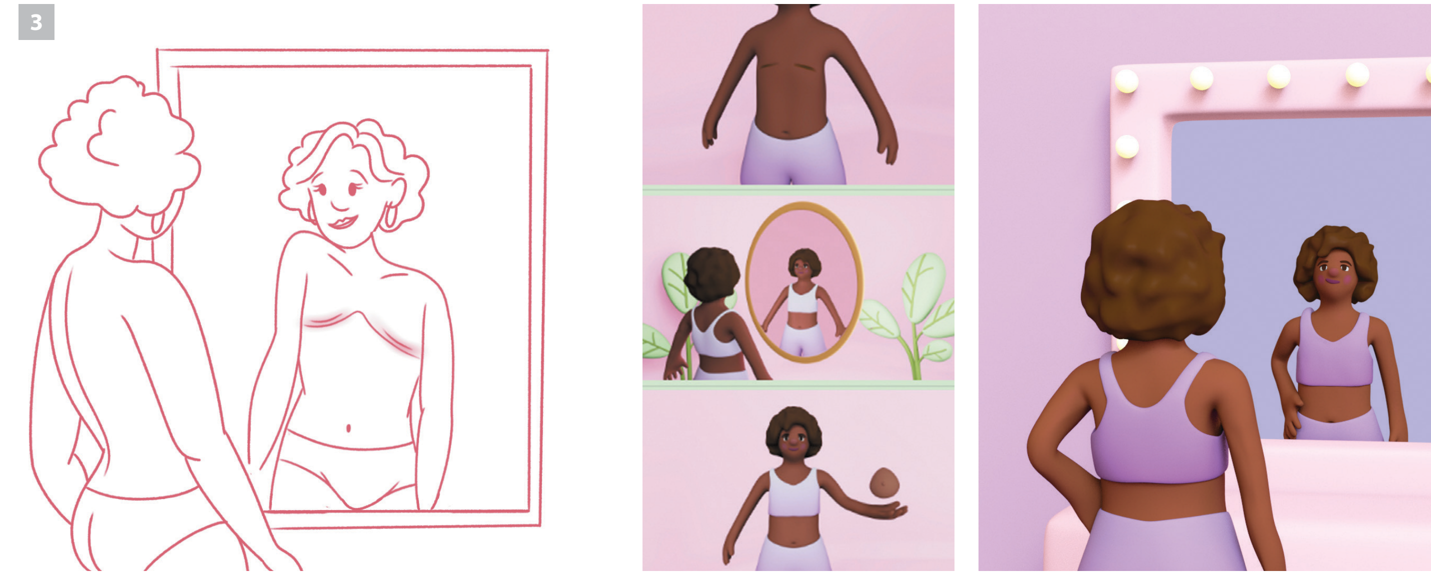
3. Storyboard. A visual representation of the production process. The sequence begins with the draft image, followed by the depiction and modelling of a set environment featuring plants and a simple mirror. The final version emphasizes enhancing the mirror's appearance, with the plants omitted.

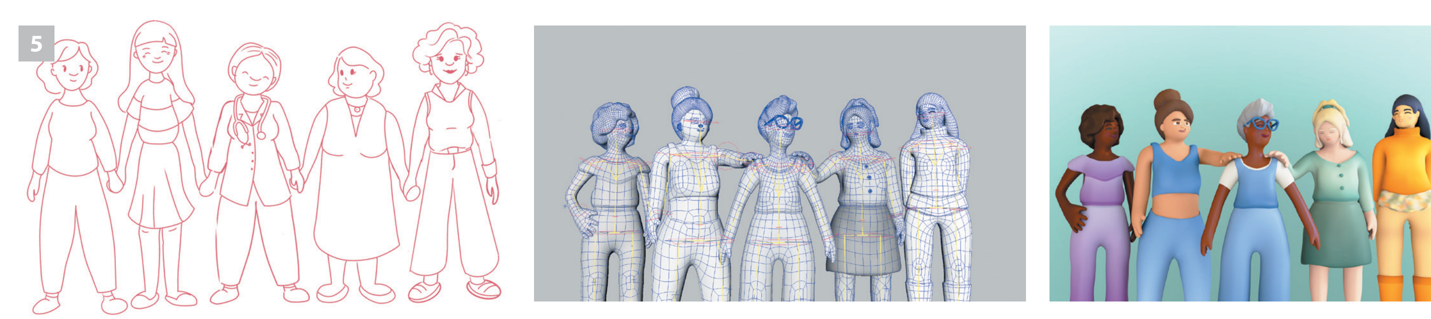
4. Final animation. A patient demonstrating the use of a prosthesis, an alternative to breast reconstruction.

5. Production process. The evolution of character design for each individual featured in the animation. The initial image presents a sketch, followed by a wireframe in the second, and the final image showcases the rendered character.









Stephen Nachtsheim

I am a passionate scientific and medical illustrator, animator, and designer. My journey through BMC has been a transformative experience, revealing my love for 3D modelling, animation, and game design. While collaborating within teams, I discovered my talent for tackling intricate technical and design hurdles, allowing my teammates to focus on their artistic vision. Although I possess my own artistic prowess, I found my niche in the realm of collaborative, team-based work.

Neuroanatomical Illustration

The amygdala plays a pivotal role in processing emotions and memory formation, yet its small almond-shaped nature allows its position in the brain to be overlooked. This project thrives to illuminate its position in the brain.

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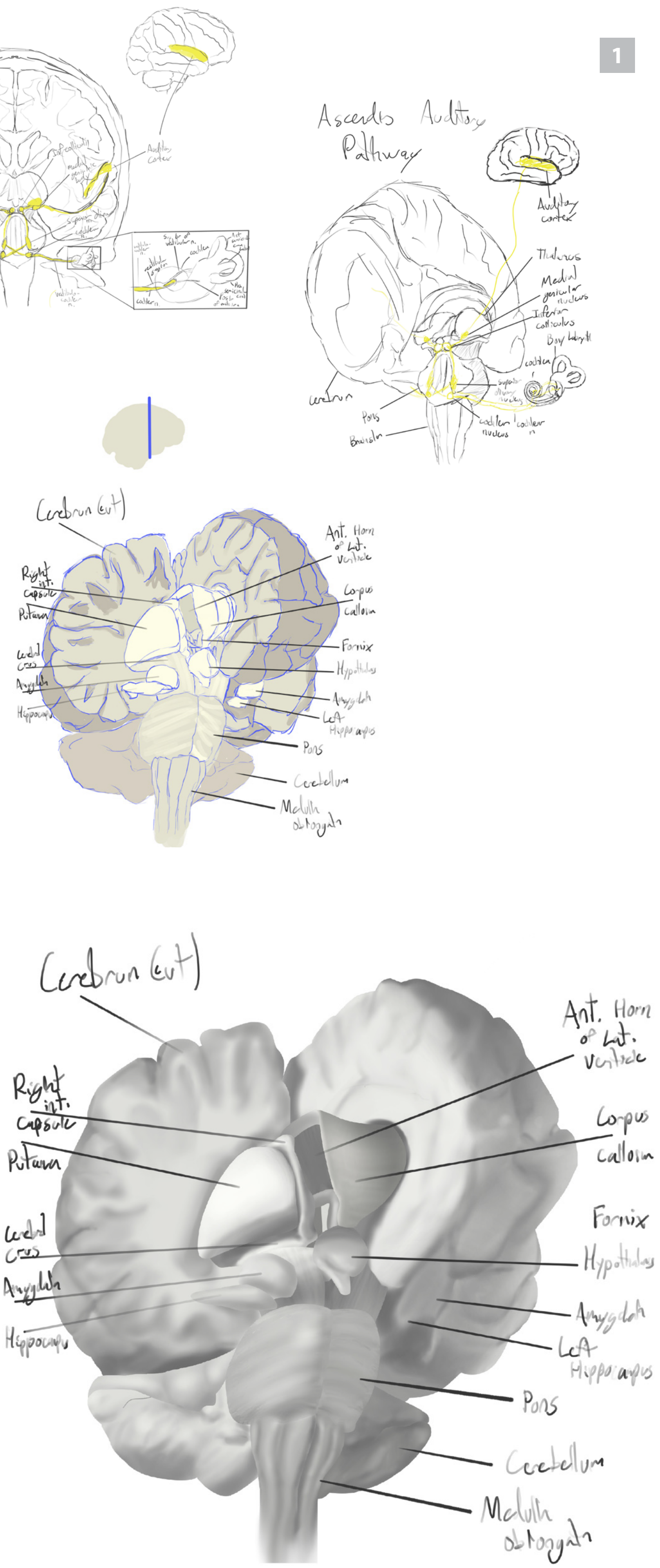

1. Sketch. These sketches explored other ideas that were potentially used to highlight under-visualized parts of the brain. A final black-and-white composite sketch was created to understand the final angle of the brain.

2. 3D modelling. A full brain model was downloaded from BodyParts3D. At this point, the model was trimmed down to reveal the amygdala and and I began to design the final view.

3. Final illustration. The final piece included painting over the 3D maquette of the brain shown in Figure 2. An orientation image was created to allow for the viewer to understand the perspective in the piece.

Previous spread. A grove snail, sculpted in ZBrush and rendered in Blender.

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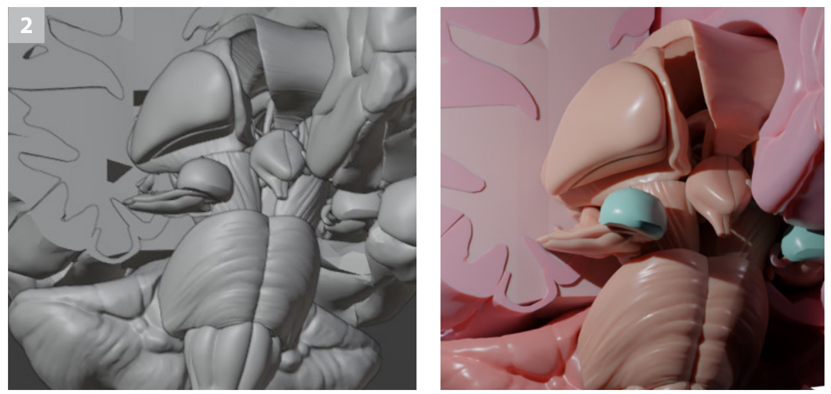

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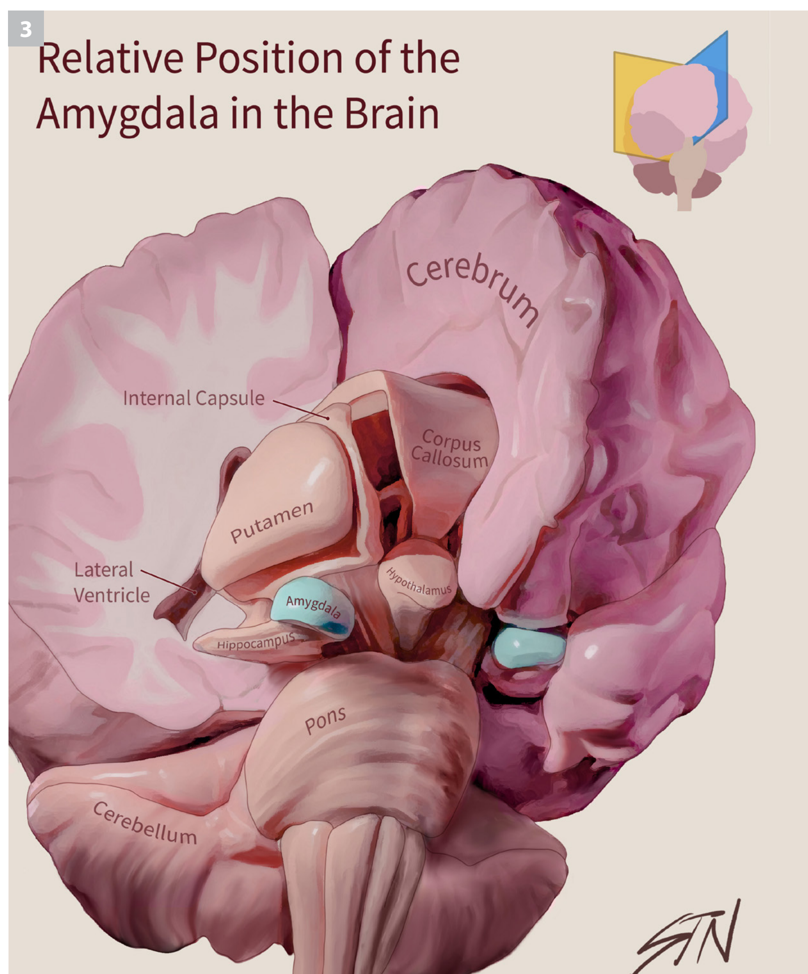

Editorial Illustration

Editorial covers serve as a visual gateway to the research and scientific topics covered in a publication. These covers aim to pique curiosity and draw potential readers to be invested in a topic.

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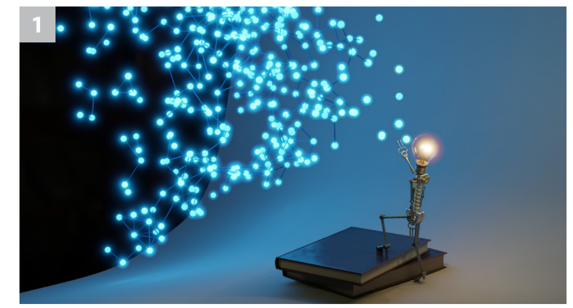

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1. Production process. A different view of the scene setup.

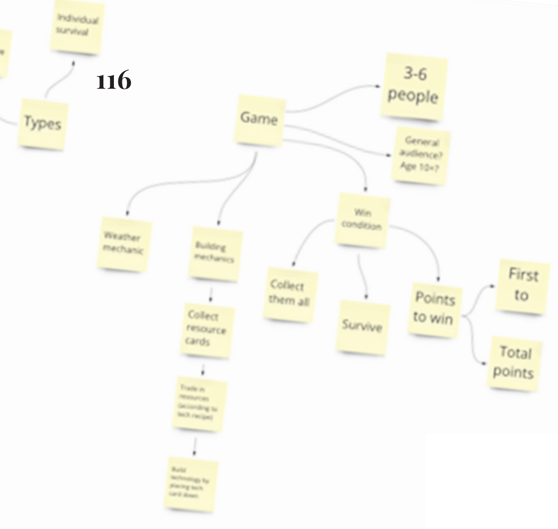
2. Final illustration. The final journal cover for the IMS Summer 2023 Publication, showing the use of AI in medicine.

3. Final illustration. The final journal cover for the Institute of Medical Science (IMS) Spring 2023 Publication, using soft teddy bears to focus in on children's health.

4. Production process. 4a. The flat 3D layout of the teddy bears in Blender. **4b.** Midjourney was used to quickly generate potential ideas for the final piece. **4c.** A different view of the scene setup.

3

4a 4b 4c



Interactive Game Design

Games have always been a passion of mine. These projects explore the ability for games to educate the public about important scientific topics. Each game involved a wonderful team and my role was mainly game design, testing, and technical support.

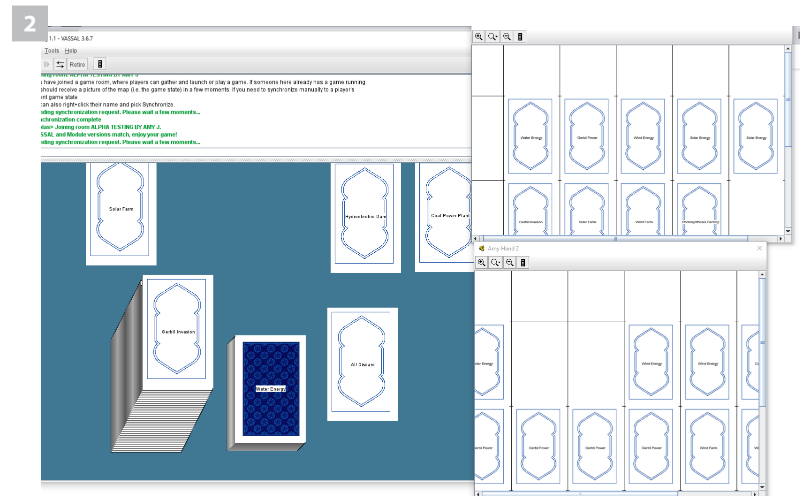
1. Notes. We defined the goals and styles of the games through brainstorming sessions.

2. Study. Due to the remote nature of the team, the online testing software, Vassal, was used to allow remote playtesting.

3. Prototype. The instructions were designed to be printed and folded, while presenting clear examples of gameplay.

1

2



3

4. Production process. In order to allow the art team to move forward, the game design team compiled a list of all art assets needed to make the project successful.

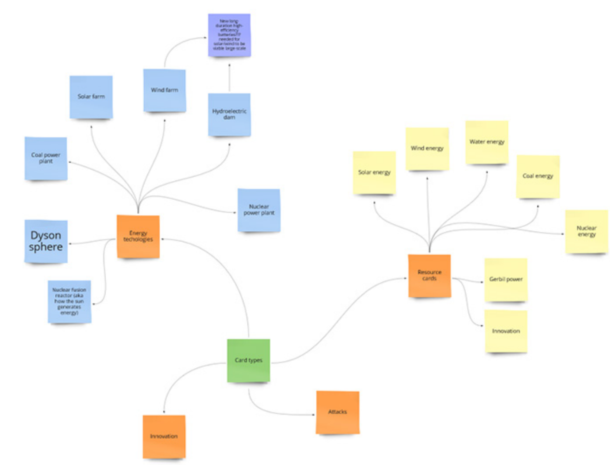
5. Production process. Moodboard for the game art.

6. Prototype. A paper prototype of Biome Blocks was created to allow for quality play testing before programming or asset development.

7. 3D modelling. The main character of Biome Blocks, a low-poly stegosaurus. **7a.** Model wireframe. **7b.** The model was designed to fit into the wonderous environment of the game.

4

Card name	Category	Colour	Icon	Energy Points	Resource cost							
											any	IV
Solar Energy	Resource			N/A								
Wind Energy				N/A								
Water Energy				N/A								
Nuclear Energy				N/A								
Coal Energy				N/A								
Gerbil Power				N/A								
Innovation	N/A			N/A								
Solar Farm				3	1					1		
Wind Farm				3		1				1		



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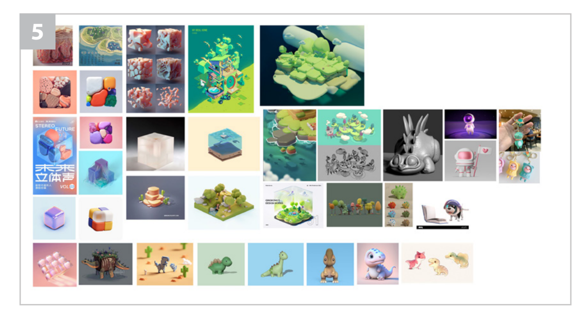

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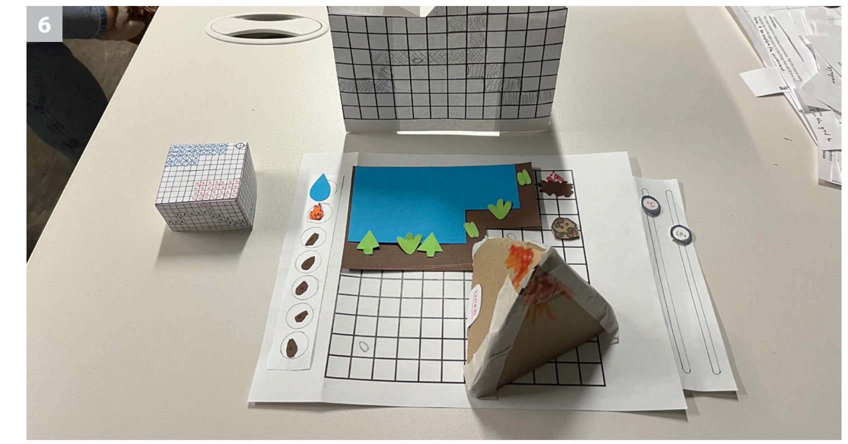

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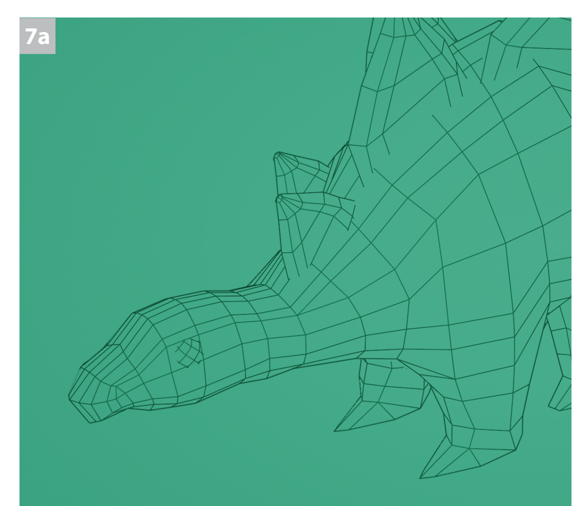


7b

Microbes in Mining

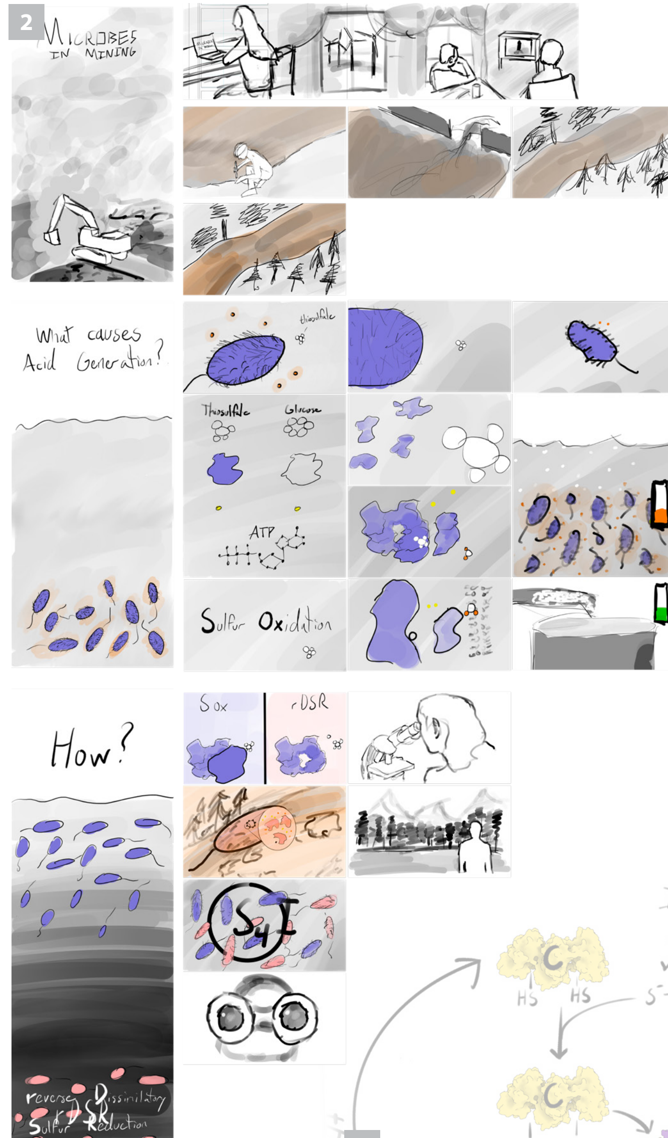
Microbes in Mining is an educational animation describing the biochemical processes of microbes and how they can damage the environment. It is targeted towards grade 12 science students, with Ontario distribution by the non-profit organization, Mining Matters.

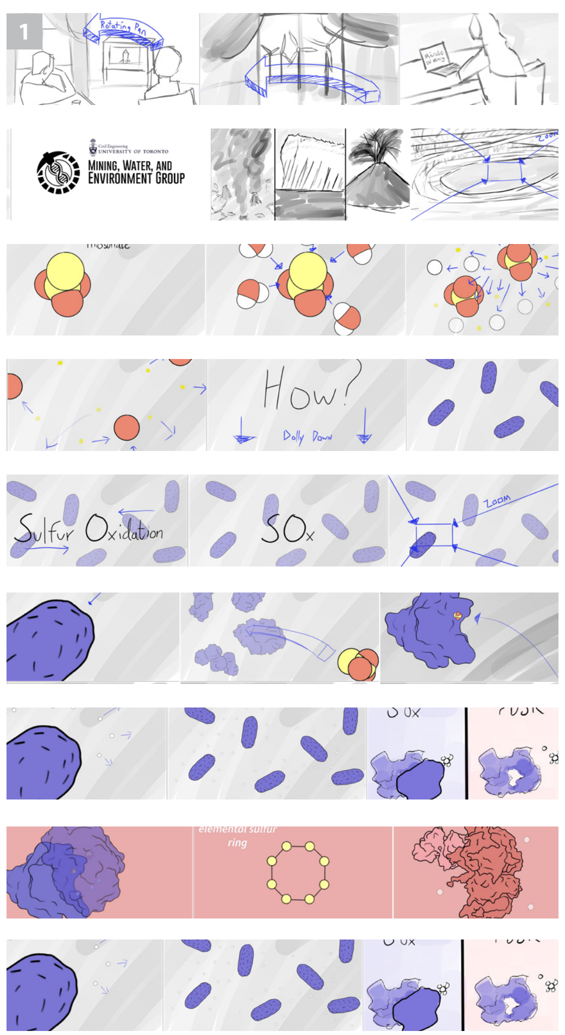
1. Storyboard. A rough storyboard was created to allow quick iterations on the project.

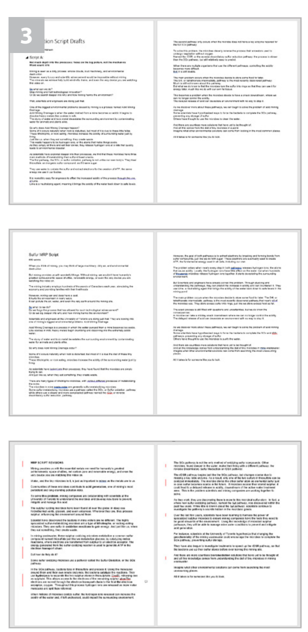
2. Storyboard. The project required many iterations to correctly hit the mark. This included more storyboards, multiple scripts, and even flat biochemical process diagrams.

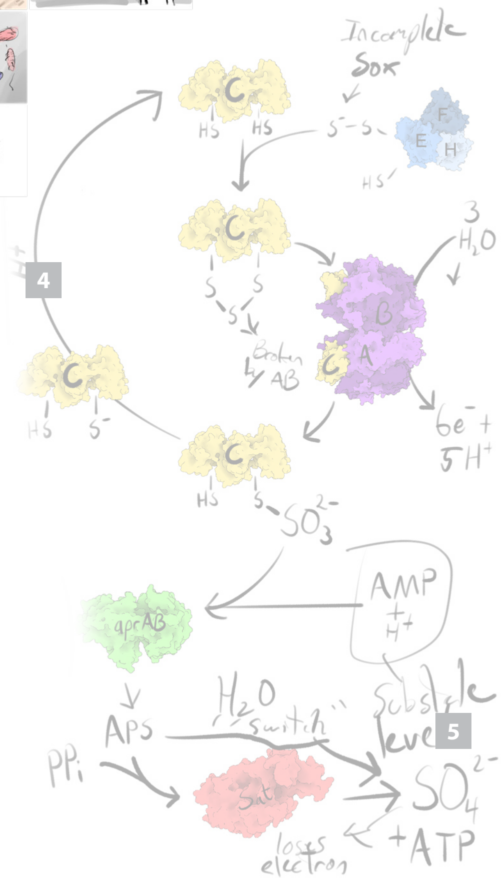
3. Notes. Multiple iterations of the animation script.

4. Notes. Notes on the molecular processes involved.





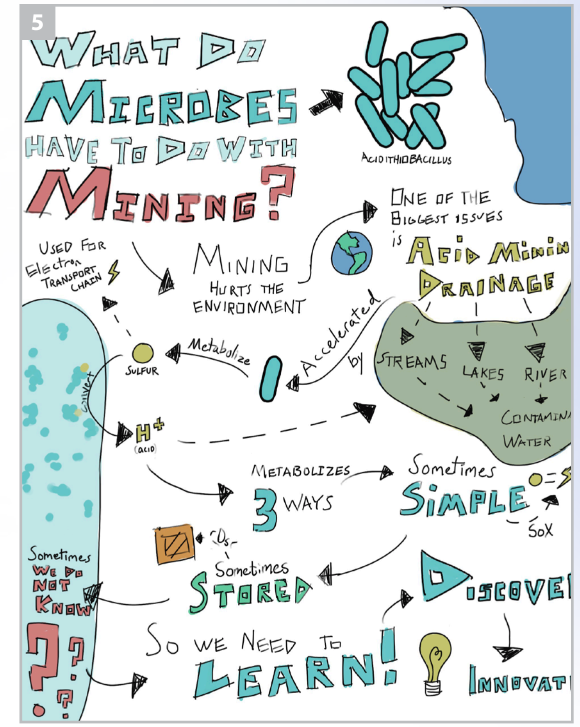


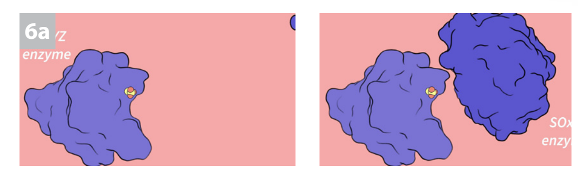


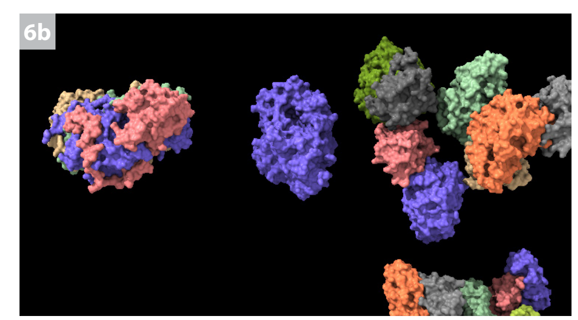
5 . Storyboard. In order to make sure the goal of the project was stated, a small visual brainstorming session was conducted and an overall story was created.

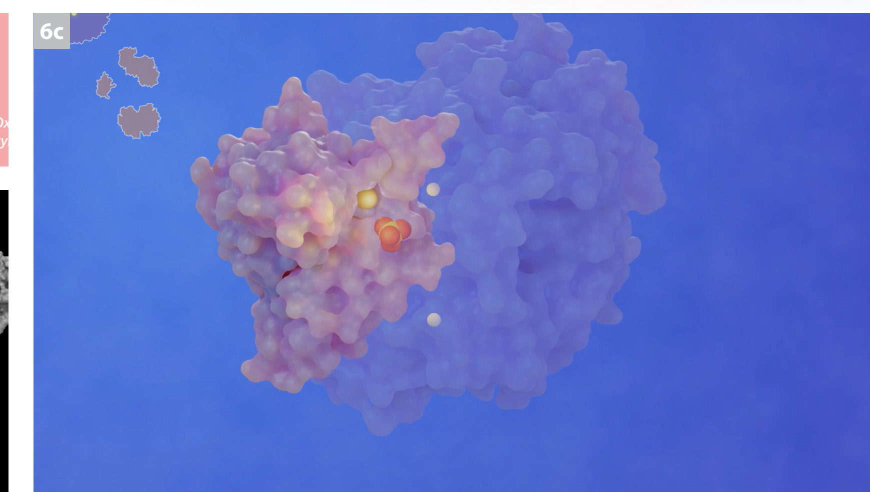
6. Production process. The enzymes were the main character of this piece, and many visual styles were explored to represent their structure. **6a.** Sketches of the enzymes interacting. **6b.** The final 3D models were extracted from the Protein Data Bank to ensure accuracy. **6c.** Still of the enzyme in the final animation.

7. Final animation. Still frames from the final animation showing character design.









Livia Nguyen

Driven by a fascination of sciences and the desire to design and create, I constantly find myself captivated by the world of visual science communication. Through my time in BMC, I discovered my passion for creating interactive experiences and educational video games — some of which are featured in this viewbook. As I continue on my journey, I hope to inspire curiosity and drive meaningful change, bringing scientific topics to life with my work.

Data Visualization

Near-Earth objects (NEOs) are an asteroid or comet which passes within 45 million km of the Earth's obit and can potentially pose a threat to our planet. This data visualization showcases the closest approaches to Earth by NEOs from April 2022 - 2023.

1. Sketch. At this stage, I thought about which features of the NEO's were the most important and how to show these variables on a single graph.

2. Production process. After compiling and cleaning the data obtained from NASA, I worked in Tableau to create a series of graphs.

3. Production process. A work-in progress shot of the very tedious job of putting together the piece in Illustrator. The exported graphs were combined and stylized using Illustrator's 3D functionality.

4. Final illustration. A close-up of the graph with one of the NEO's of interest (left). The legend that shows the NEO's orbital path (right).

5. Final illustration. The final visualization features a main graph that showcases various features of NEOs along with a series of legends to the right.

Previous spread. A freeform 3D sculpt of the orange clownfish (*Amphiprion percula*) placed within a sea anemone in an underwater environment.

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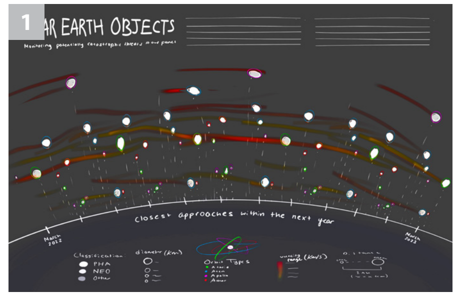

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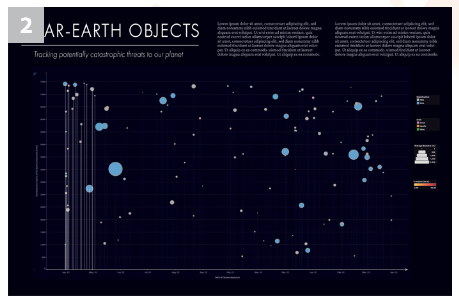

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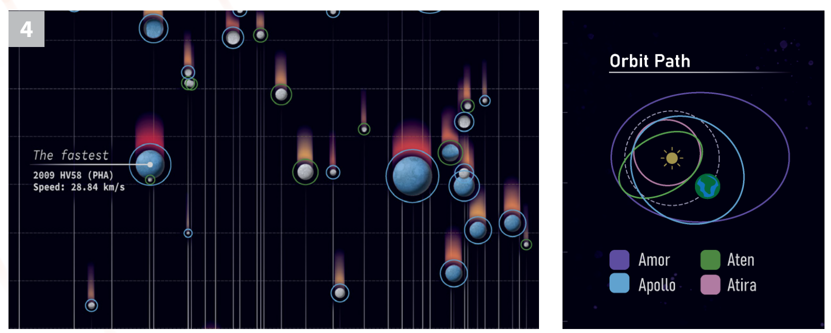

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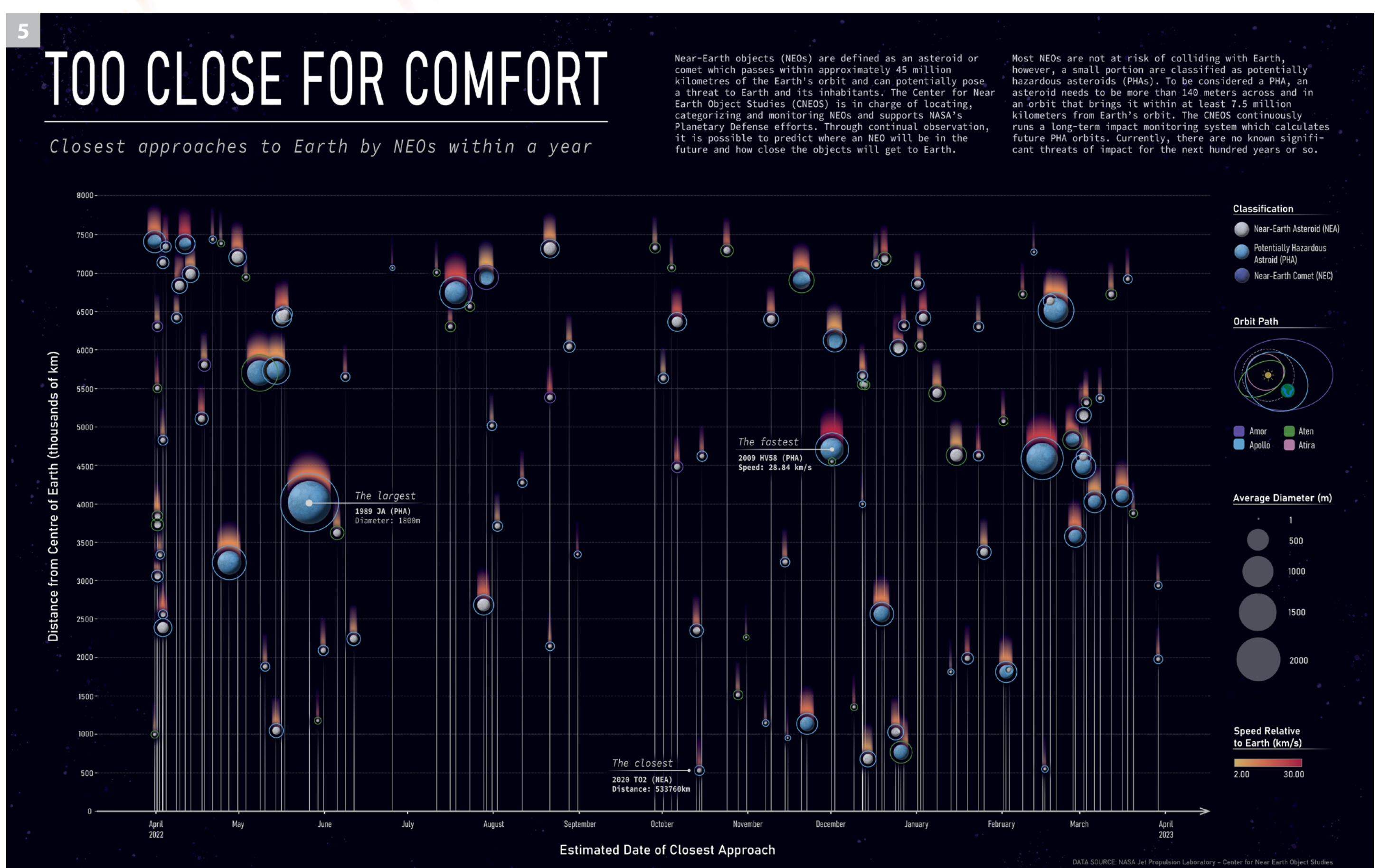

Interactive Game Design

TreeSearch is an point-and-click game designed to teach Grade 9 students about ecological succession in the Canadian boreal forest. For this group project, I was a lead for Unity development as well as UI/UX design.

1. Sketch. The final title screen of the game (left). A series of sketches I drew when ideating the design of the title screen (right).

2. Notes. A section of the game flow that users will progress through when playing one stage of the game. The three phases were designed to facilitate the exploration and retention of the educational material.

3. Prototype. This is a screenshot of the Unity interface I worked within to create a functional prototype of the 4th stage of the game. This was our first big project working with Unity and lots of learning had to be done within the two week time crunch. It was tiring but lots of fun! On the right is one of the scripts I coded in C# that updates the interactable journal when the user finds a new key species within the game.

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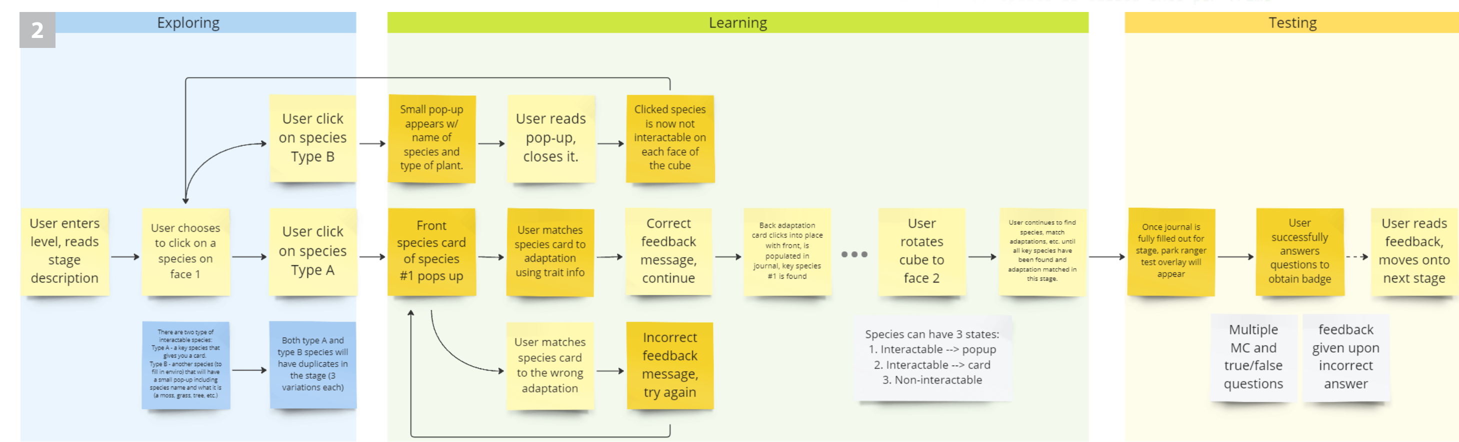

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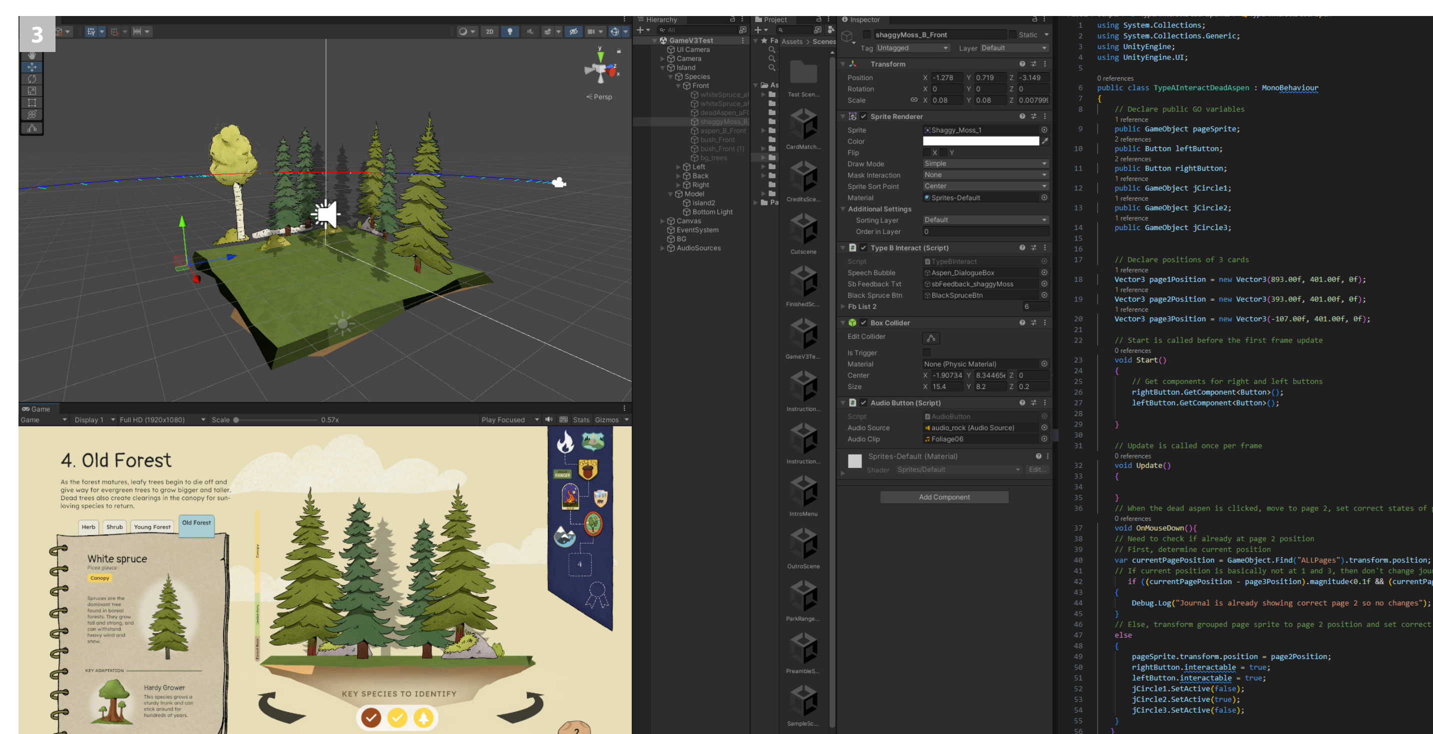

Molecular Visualization

This molecular visualization explores the process through which two enzymes found in a bacteria called *Ideonella sakaiensis* work together to break down polyethylene terephthalate (PET) plastics commonly found in clothing and food containers.

1. Sketch. One of the initial sketches that eventually lead to the final piece. It was difficult to balance the scale of the molecules within the piece and also find a cohesive colour scheme that allowed me to effectively colour-code all the elements in the scene.

2. 3D modelling. Using molecular data from the Protein Data Bank (PDB), I assembled and rendered the 3D scene of the enzymes in Maya. The cell membrane was created using a MASH network and features a composition accurate to what is found within *I. sakaiensis*.

3. Final illustration. The final piece naturally guides the viewer's eyes through following the flow of the colour-coded PET molecules as they are broken down.

4. Final illustration. Close-up of the final illustration.

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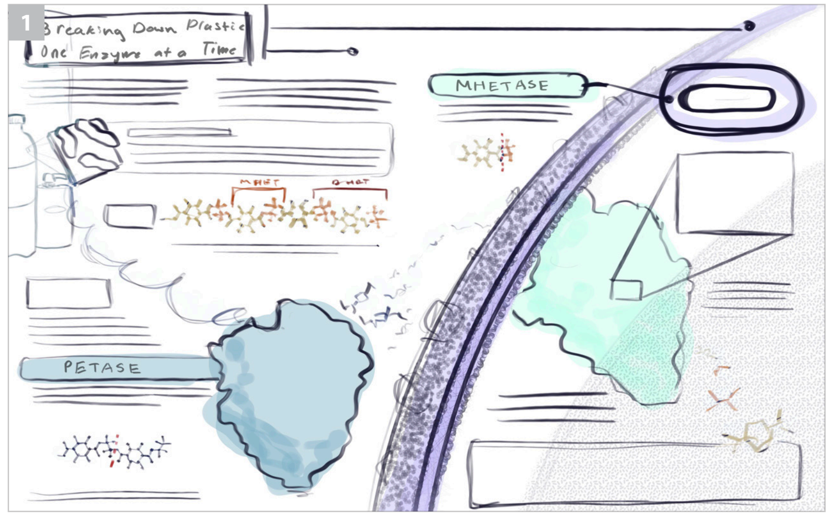

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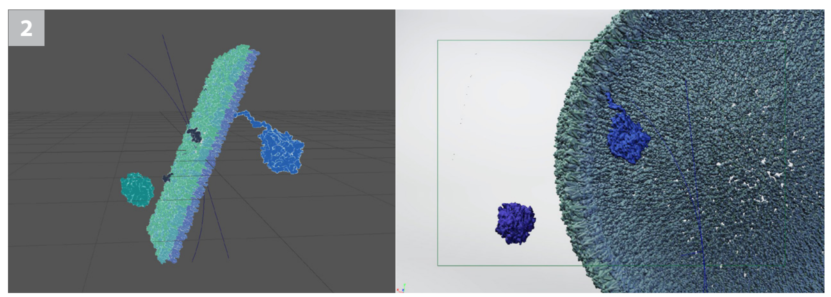

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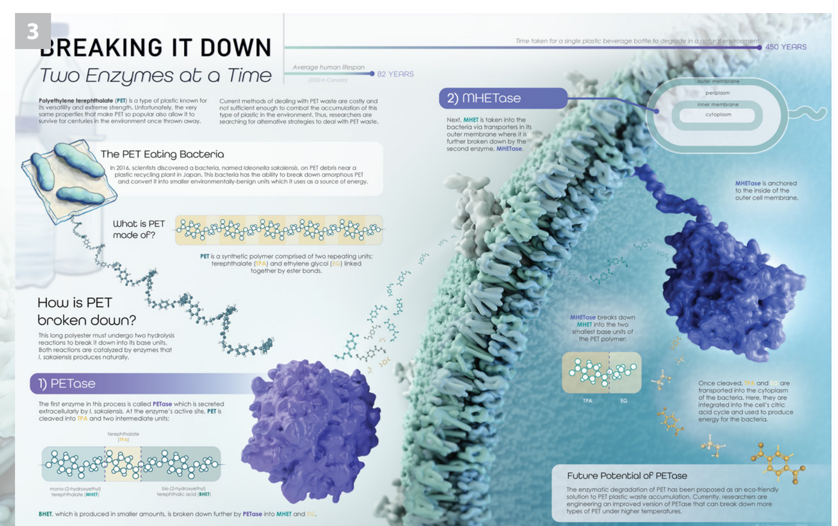

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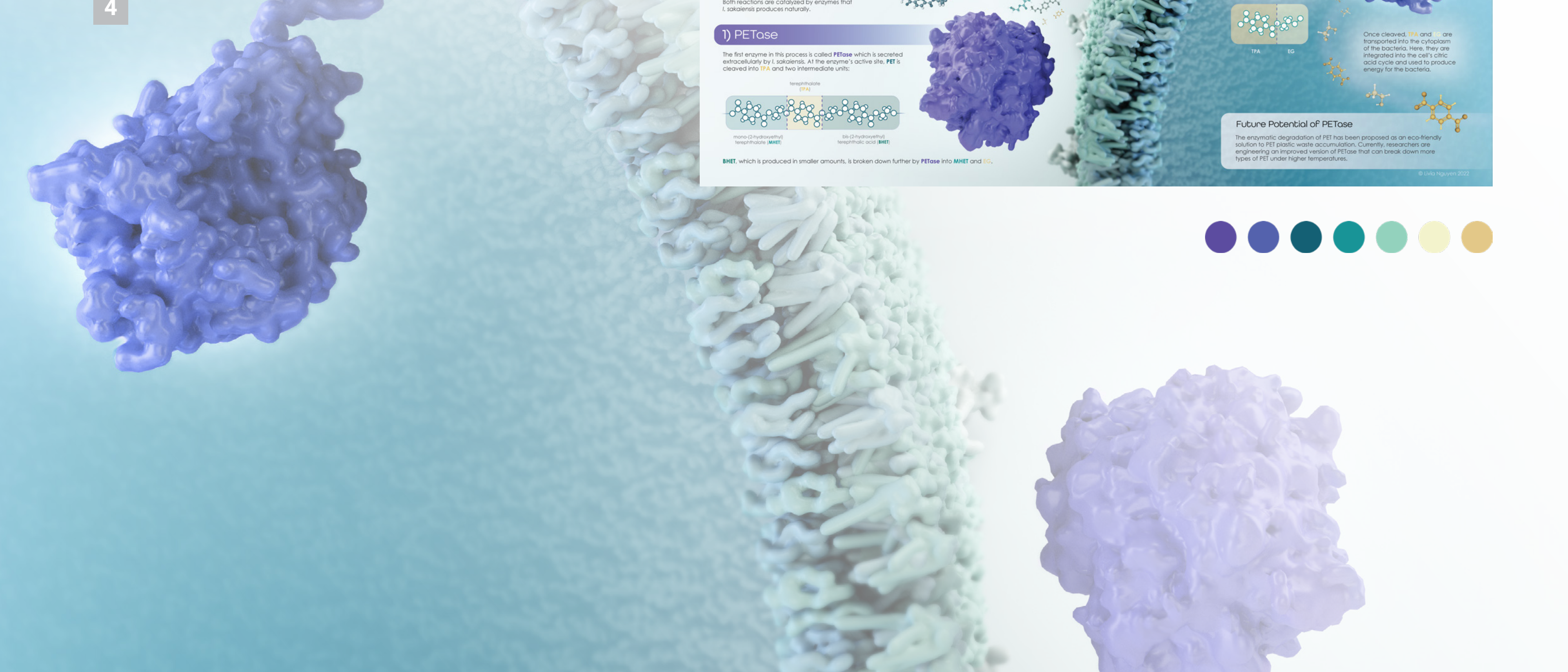

Pathological Illustration

Periodontitis is one of the most common diseases of the oral cavity and is a major cause of tooth loss for adults around the world. This piece aims to educate viewers about the deterioration of oral health that leads to this disease as well as the periodontal tissues affected.

1. Sketch. A series of thumbnail sketches created when ideating the overal layout of the piece.

2. Production process. A work-in-progress shot. Here, I planned the cut-outs of the periodontal tissues in purple, more details showing the progression of the diesease in orange and marked some layout edits in blue.

3. Production process. Step-by-step illustrations of the main visual in this piece from linework to fully rendered.

4. Final illustration. The final piece features the progression from healthy periodontal tissues to periodontits shown on successive teeth of a lower jaw. A timeline of this progress was also included to emphasize the importance of daily oral hygiene care.

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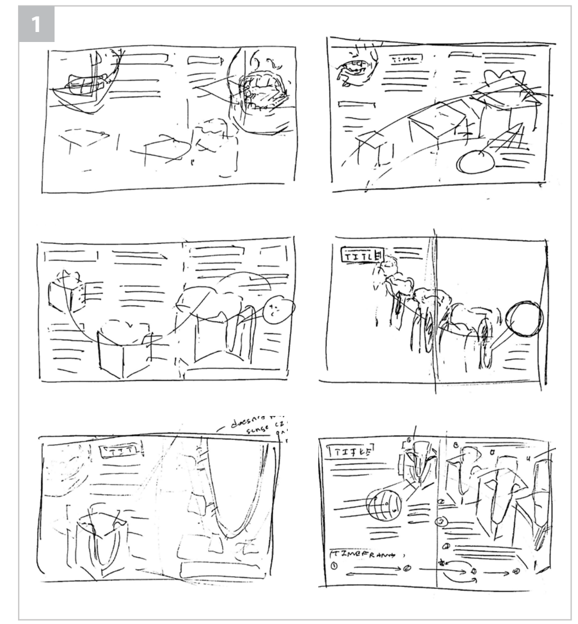

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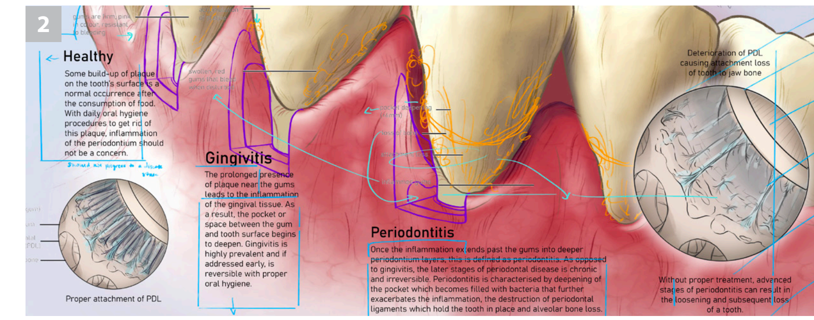

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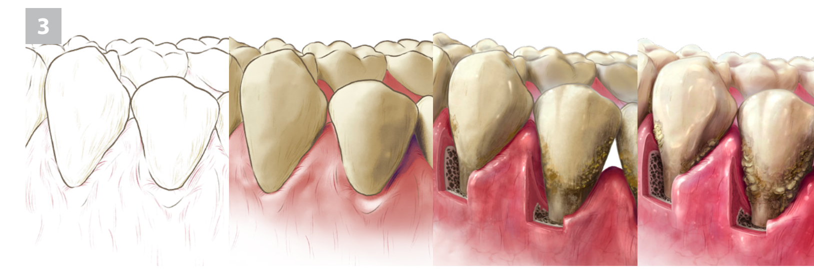

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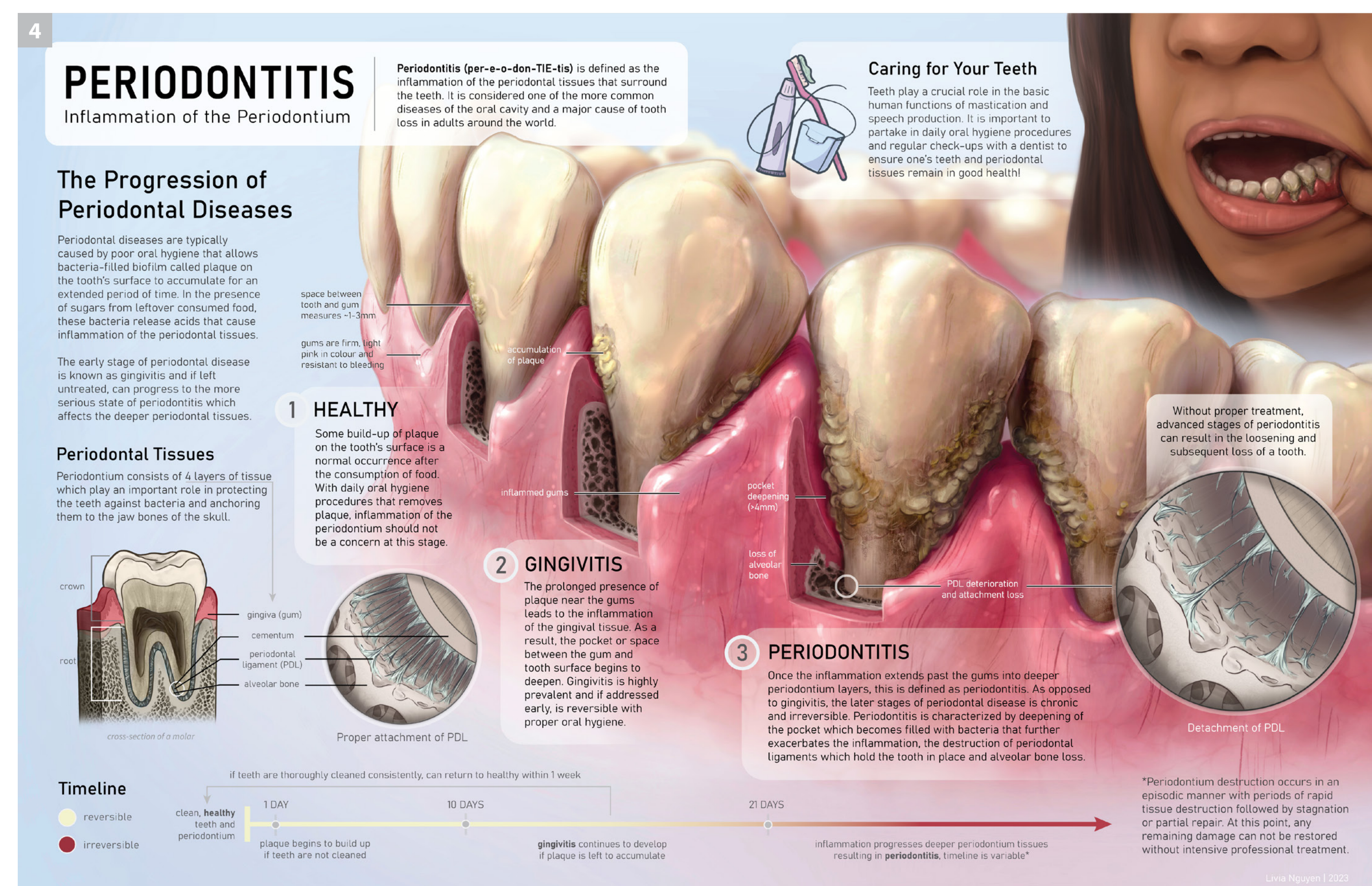


NavEDI: Navigating Equity, Diversity, and Inclusion in the Psychiatric ER

NavEDI is a 2D educational video game designed to teach medical students about equity, diversity and inclusion in the psychiatric emergency room (ER). Users experience the story through two different perspectives in which they explore stigma related to mental health, cross-cultural barriers and learn about patient advocacy.

1. Final interactive. NavEDI is a fully functional desktop game built using the Unity game engine and can be played on either Mac or Windows OS.

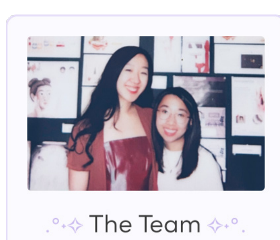
2. Notes. We collaborated with medical students and youth who had lived/are living with mental health experiences to write the storyline for the game. This image is a screenshot of the story prototype made in Twine which we presented during feedback sessions for the script.

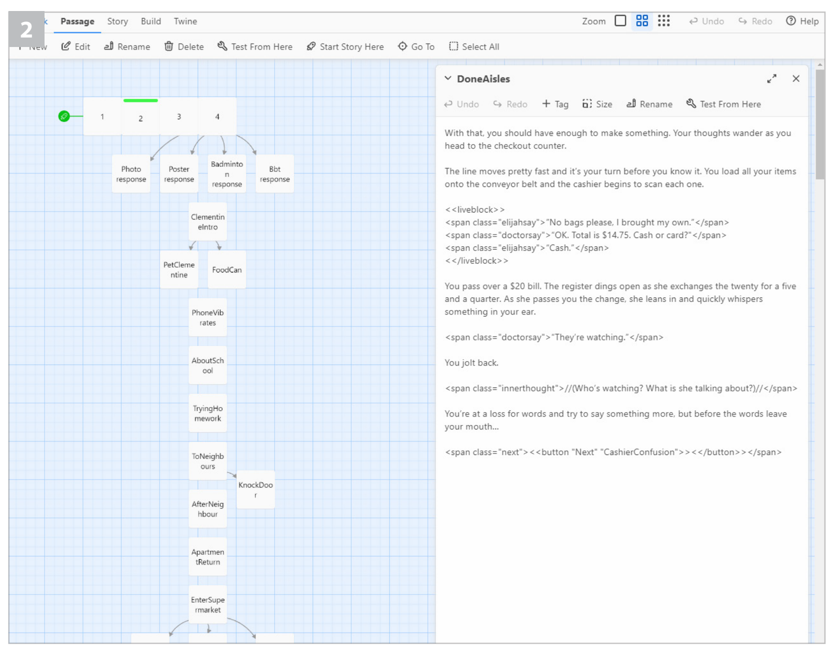
3. UX/UI design. A comprehensive design document was created for our project which included user personas, button user interface (UI) design, content inventory, etc.

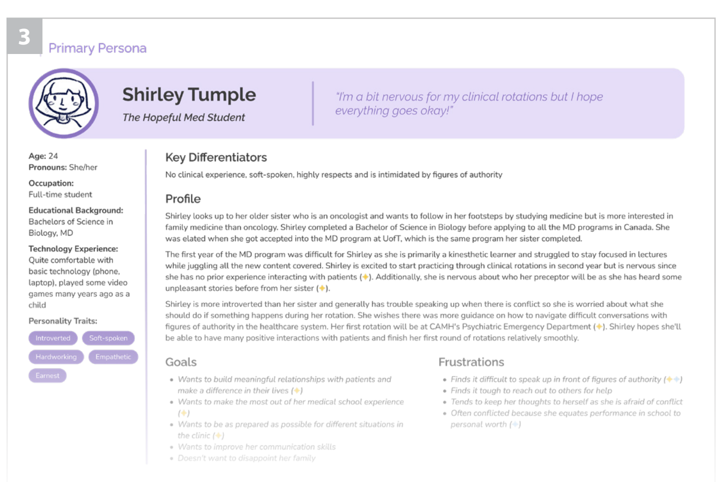
4. Production process. I lead the production of background art for the game. Shown here is one of the 13 original backgrounds drawn for the game including the interactable objects within this scene. The design of certain backgrounds were informed by research on real psychiatric ER spaces.

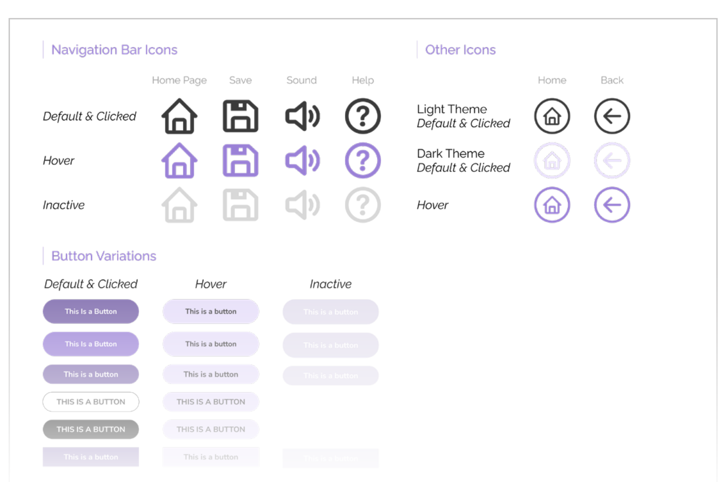
5. Production process. With the help of a plugin called Fungus, we assembled our script, illustrations, UI and audio assets within Unity to create the final game. The development phase of our project ended up being a lot shorter than we initially planned - it was a grind with many late nights, but we did it!

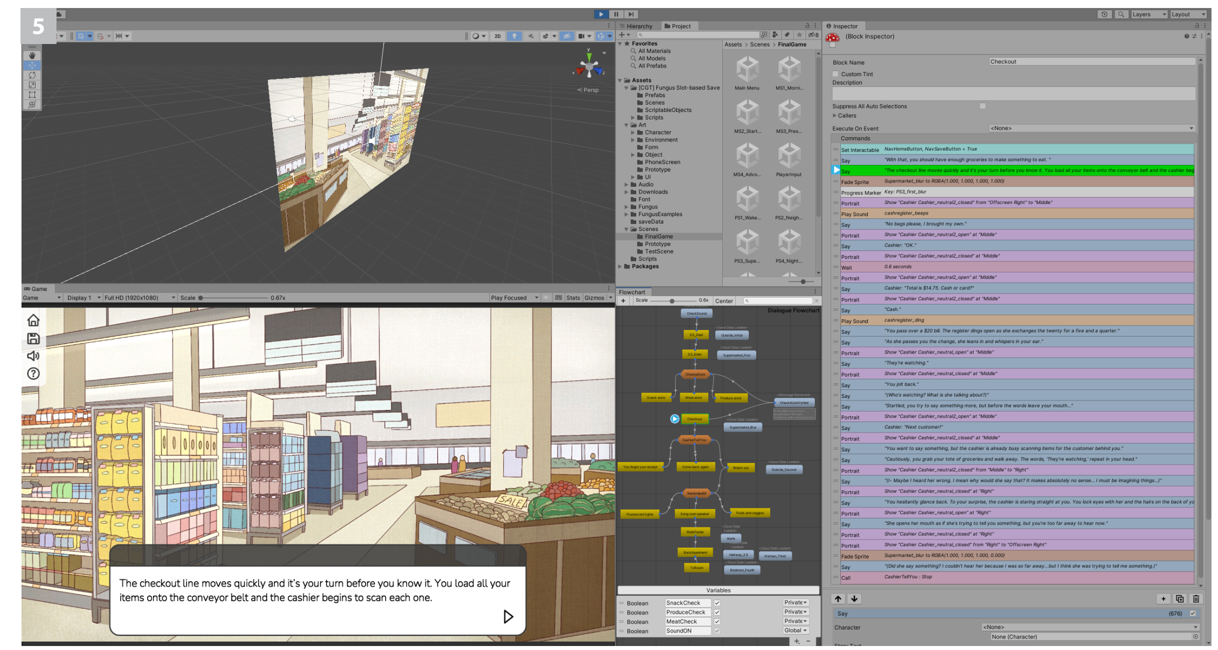
6. Final interactive. A variety of screenshots from the final game.

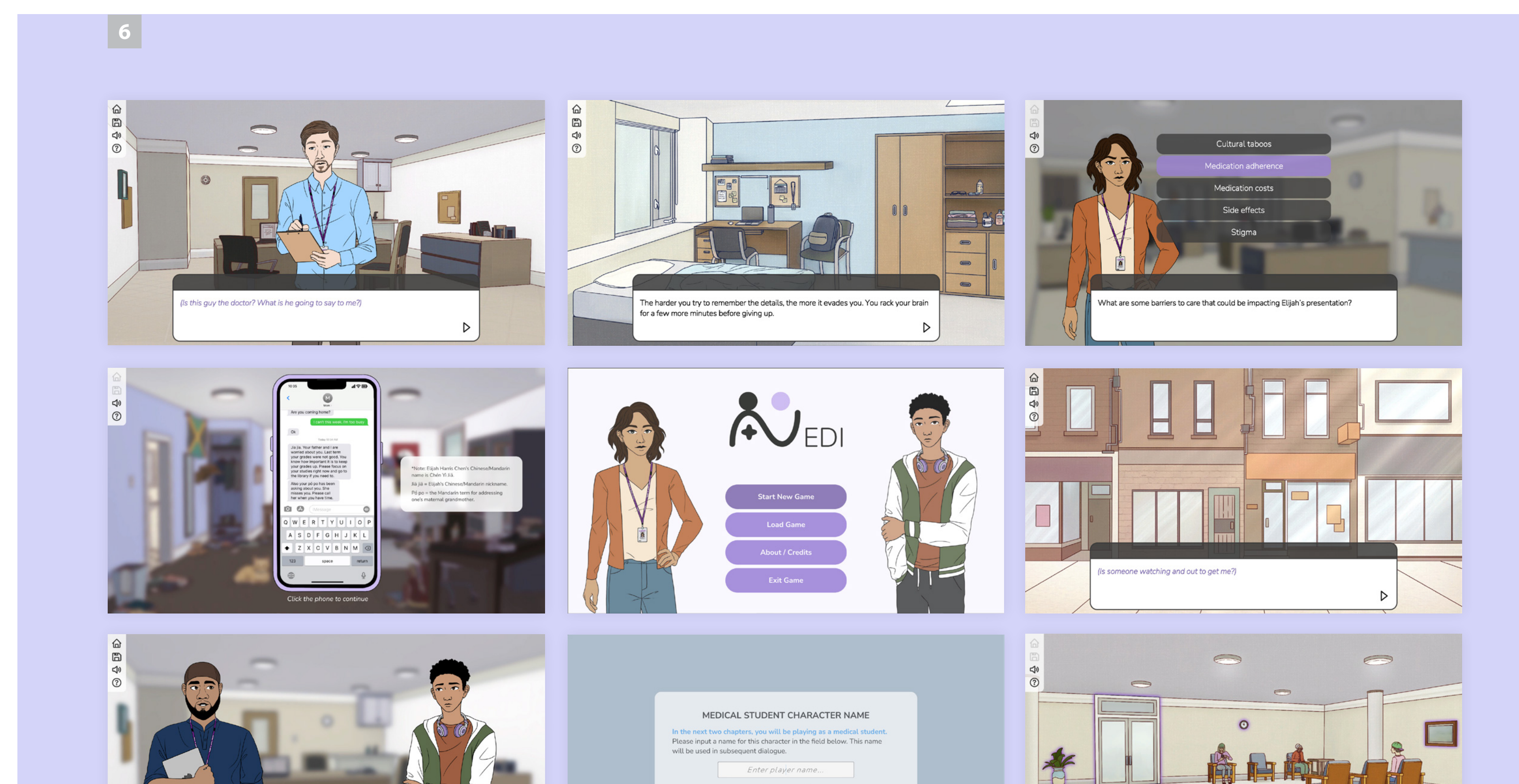












Vanessa Nguyen

I am a biomedical communicator specializing in information design and interactive experiences. I am passionate about using visuals to make science more fun, understandable and engaging for people of all backgrounds. I have always enjoyed learning about science and when I came across the MScBMC program I knew that I wanted to use my skills in art to do just that: communicate scientific concepts that were so interesting but also inaccessible to a majority.

3D Modelling

The purpose of this project was to sculpt an organic shape or animal. I chose to render a species of ant endemic to the Amazon forest called *Gigantiops destructor*.

1. Sketch. A sketch was made to familiarize myself with the ant's complex anatomy as well as to be used as a reference for sculpting.

2. Production process. I first used ZSpheres to lay down the general proportion of the ant. Then, I started on the sculpting process.

3. Final illustration. The final render emphasizes the small details in the the ant's antennae, head and mandible.

Previous spread. 3D sculpt of *Gigantiops destructor*.

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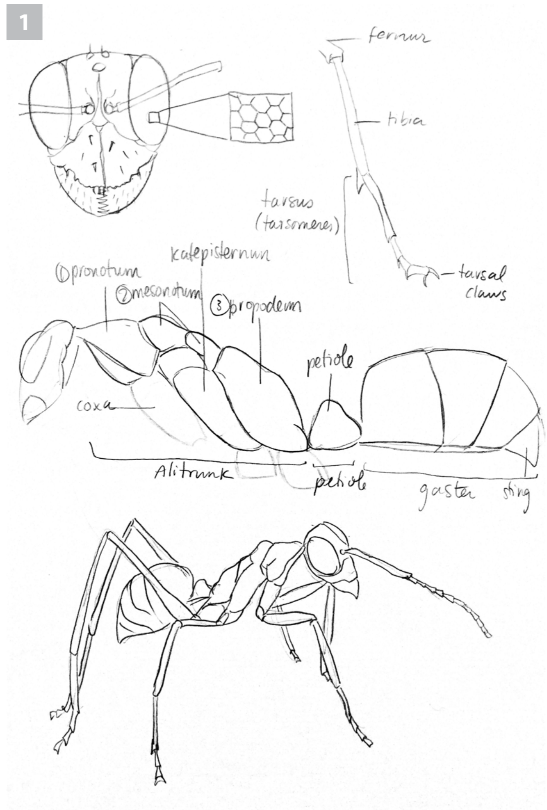

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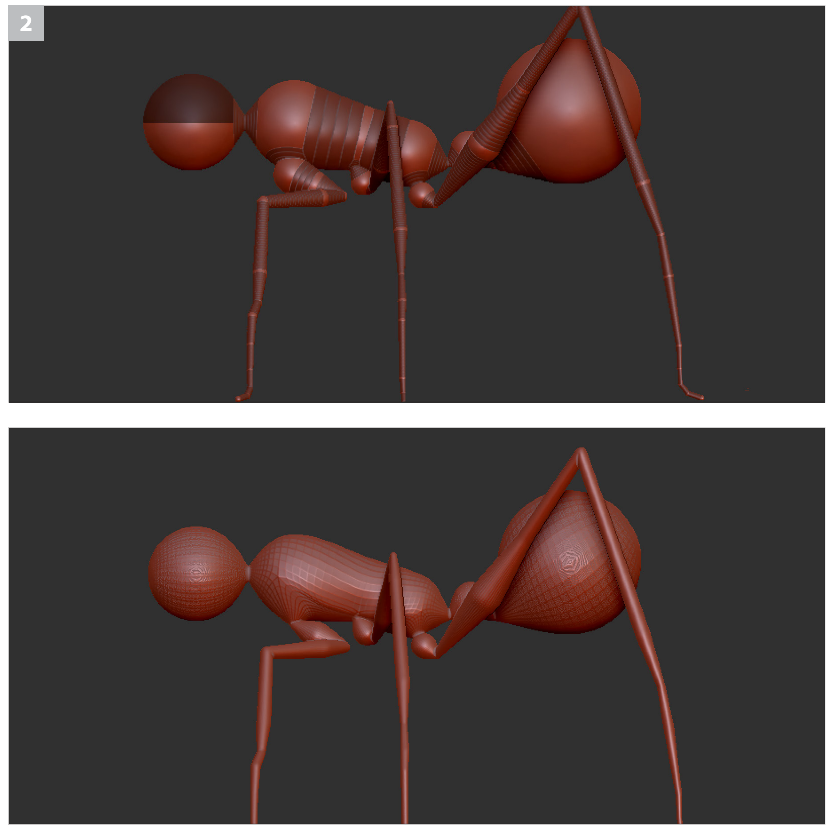

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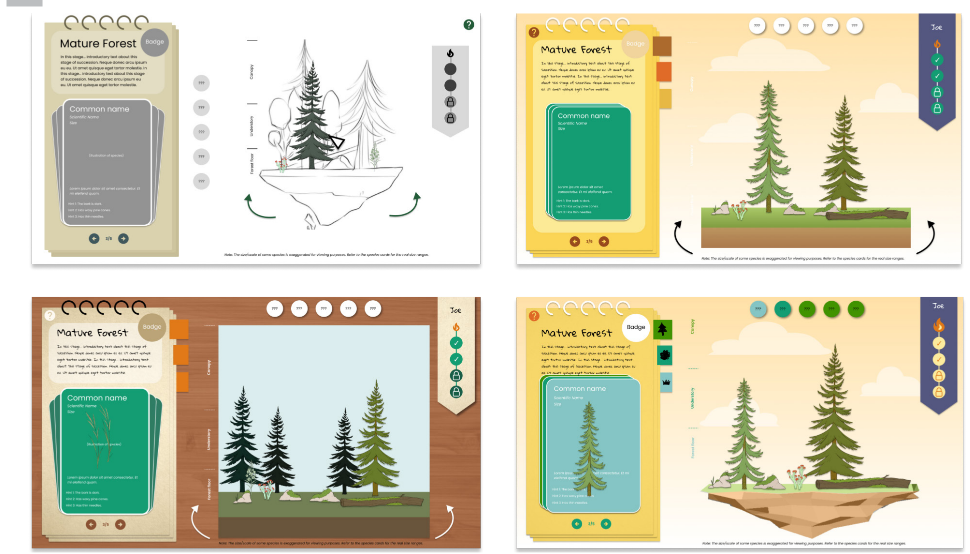

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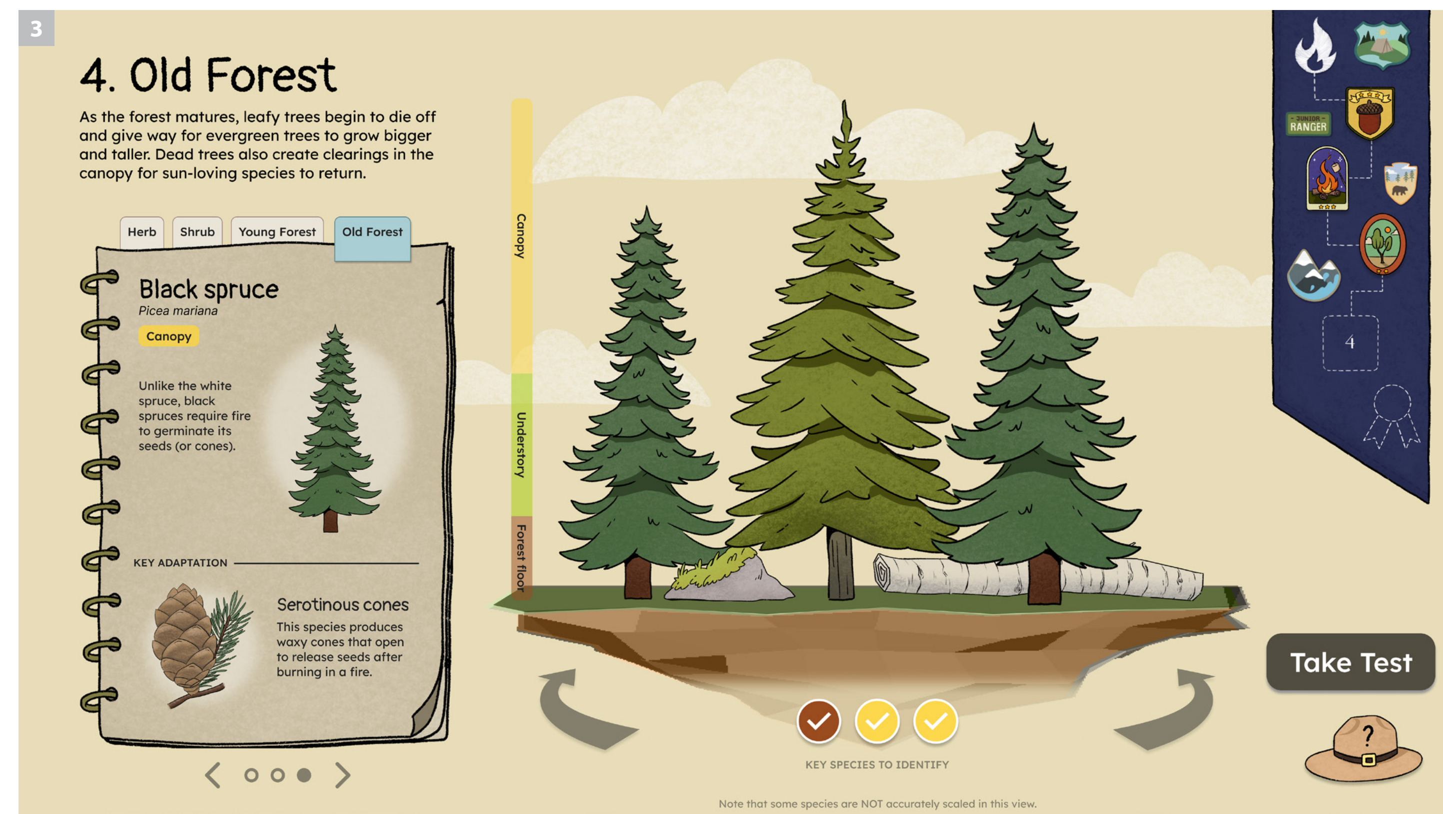


Interactive Game Design

TreeSearch is an educational game designed to teach about the ecological succession of the boreal forest following a forest fire. It was a team project I created with Linda Ding, Amy Jiao, Joshua Koentjoro, Livia Nguyen and Emily Tjan.

1. Study. After we had decided on the main interactable elements and their placement within the screen, we tested out different colour schemes to see which one would fit our park ranger theme.

2. Final illustration. We wanted our illustration style to remain simple and have a hand-drawn look with a warm colour palette.

3. Final interactive. The final interface contains a floating island featuring different species present in this stage of succession and a notebook with all the key species to find.

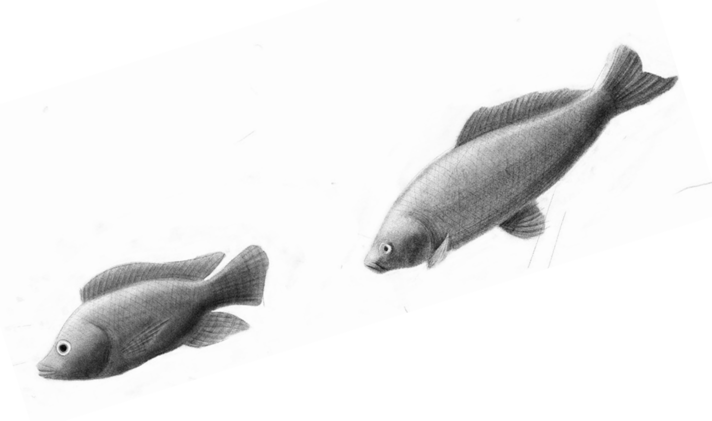
Information Visualization

Even though axolotls are found across the world in aquariums, wild axolotls are critically endangered and their survival is closely dependant on the quality of their habitat. I created this infographic to bring awareness to the precarious status of this species.

1. Final illustration. The final infographic depicts the axolotl in its environment to emphasize the interlacing between the animal and its natural habitat.

2. 3D modelling. A diorama of a chinampa was made using Maya.

3. Sketch. Preliminary sketches were done to figure out visuals and text placement.



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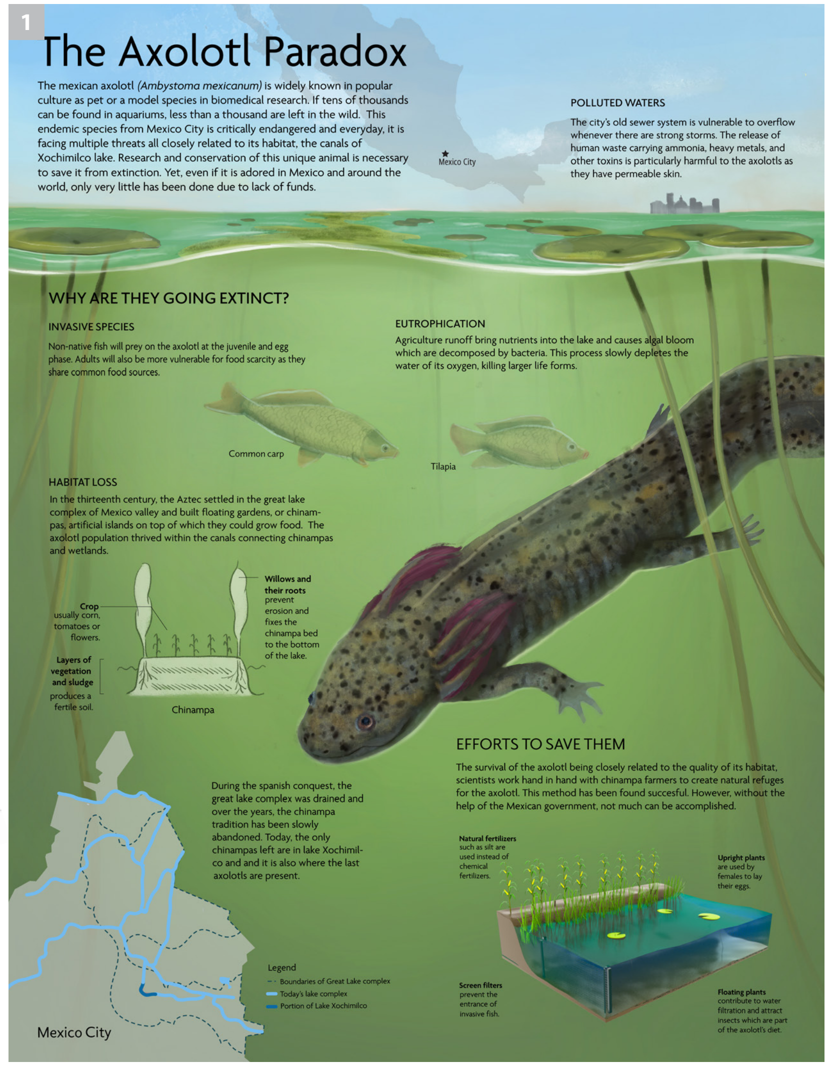

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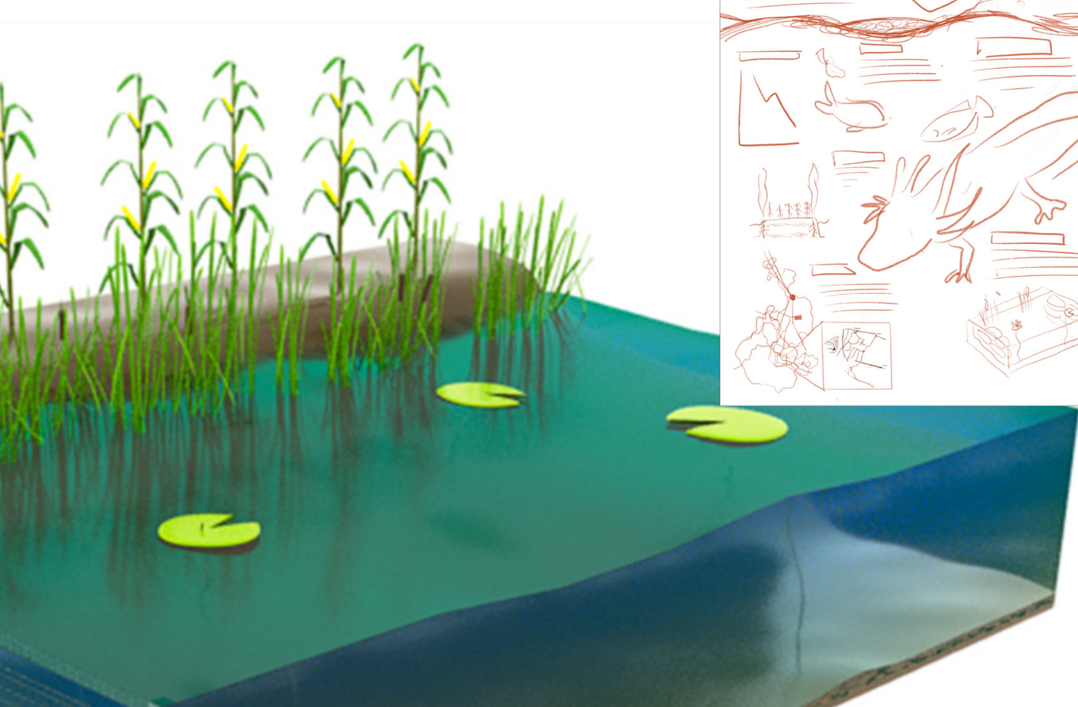

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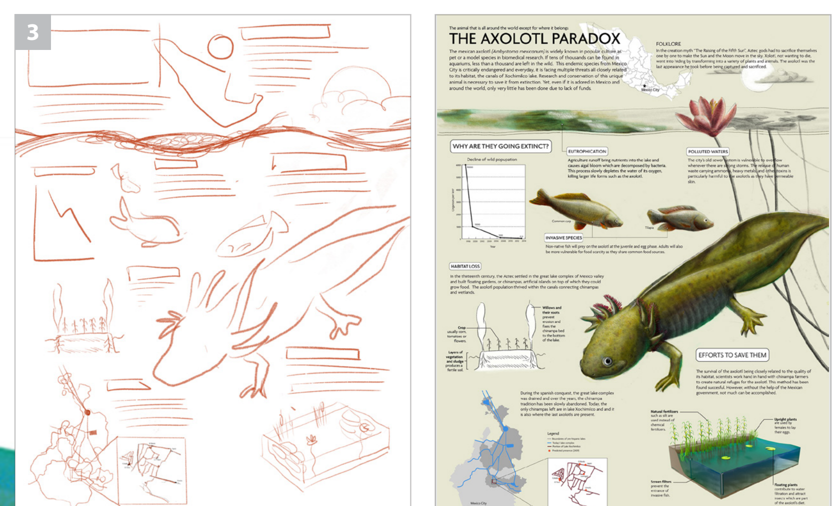

Pathological Illustration

This infographic depicts the pathological process of age-related macular degeneration, an eye disease that affects central vision.

1. Study. I completed a landscape study of the macular area of the eye to gain a better understanding of normal eye anatomy.

2. Sketch. Thumbnail sketches were made to decide on a final layout.

3. Study. Retinal tissue cubes were made to depict deterioration at different stages of the pathology.

4. Final illustration. The final illustration shows how the disease progresses through time and how vision is affected at each stage. I chose to use different styles of rendering to put more emphasis on the disease progression.

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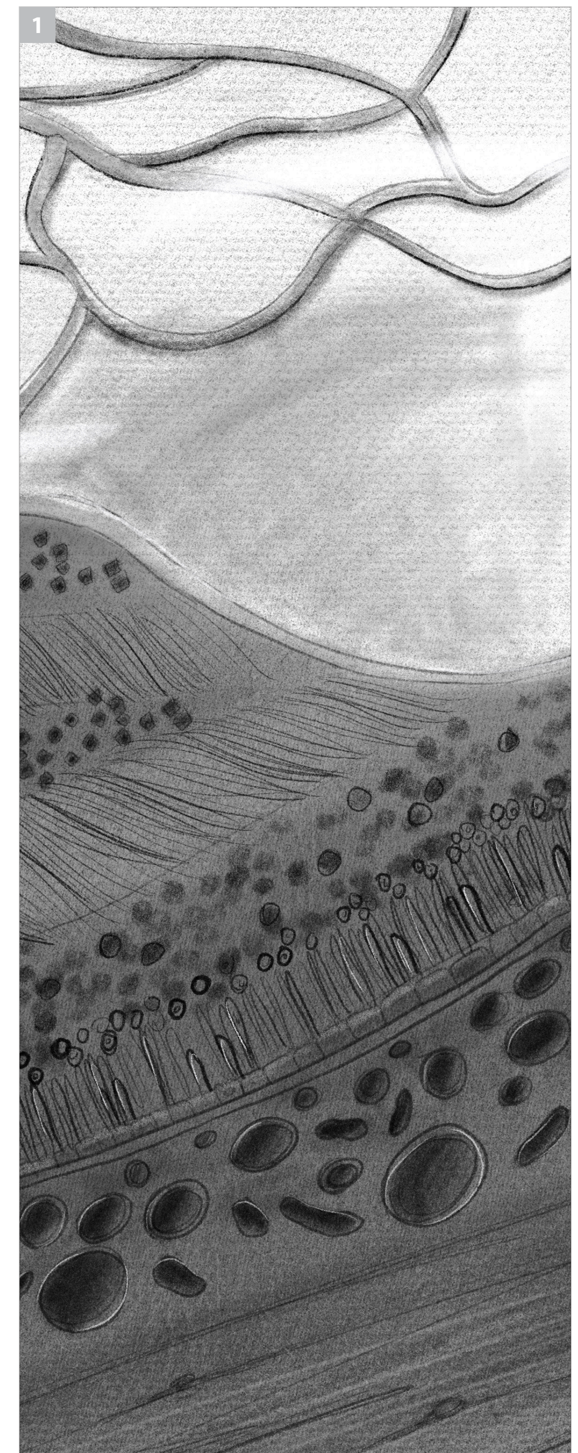

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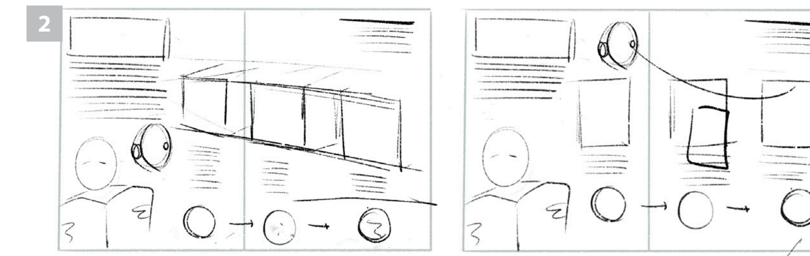

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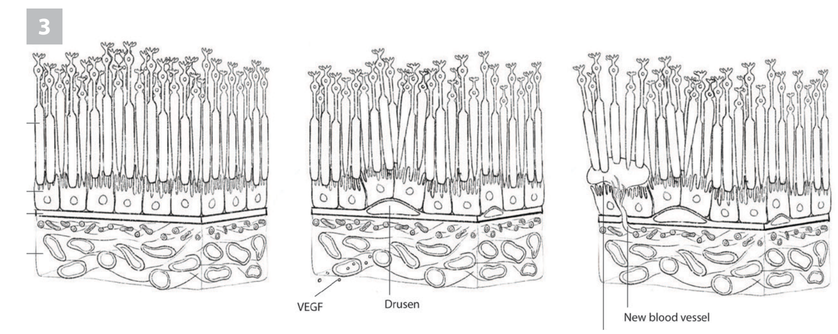

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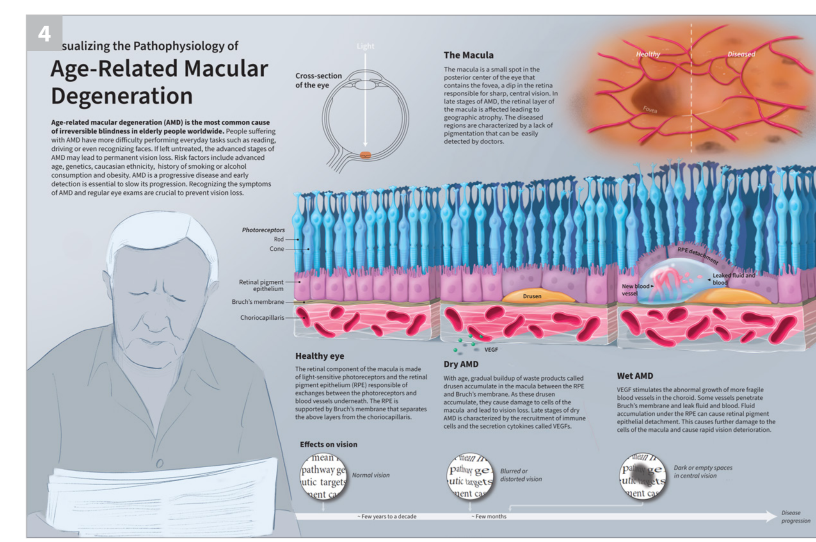

MindfulMap

MindfulMap is an initiative to create a platform that centralizes data from all mental health hospitals and clinics in the Greater Toronto Area. The goal of this project is to facilitate collaboration between clinicians by designing a platform that displays hospital information in a way that is useful and intuitive for clinicians and hospital managers.

1. Production process. This is an overview of the multiple phases we went through from beginning to end. Establishing the overall steps to accomplish was critical when working on a long-term project.

2. UX design. Early on, we established that our primary audience would be clinicians and hospital managers. To gain a better understanding their needs and goals, we had the opportunity of working with a small group of clinicians.

3. UI design. The project was still in its early stages as we designed our first set of wireframes. There was still a lot of variables to figure out but this exercise envision what the final product could offer.

4. Production process. This user flow diagram of MindfulMap demonstrates that this platform is meant to be browsed in an exploratory fashion and not linearly.

5. UI design. We wanted the user interface to be simple and effective.

6. Final interactive. The high-fidelity prototype was made using Figma. This prototype is meant to reproduce what the product would ideally look like without any functional capabilities. A working prototype was made with Tableau.

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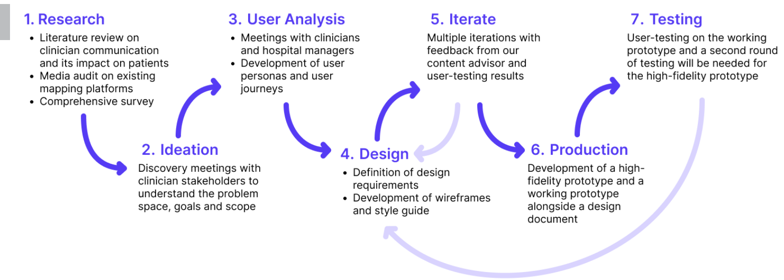

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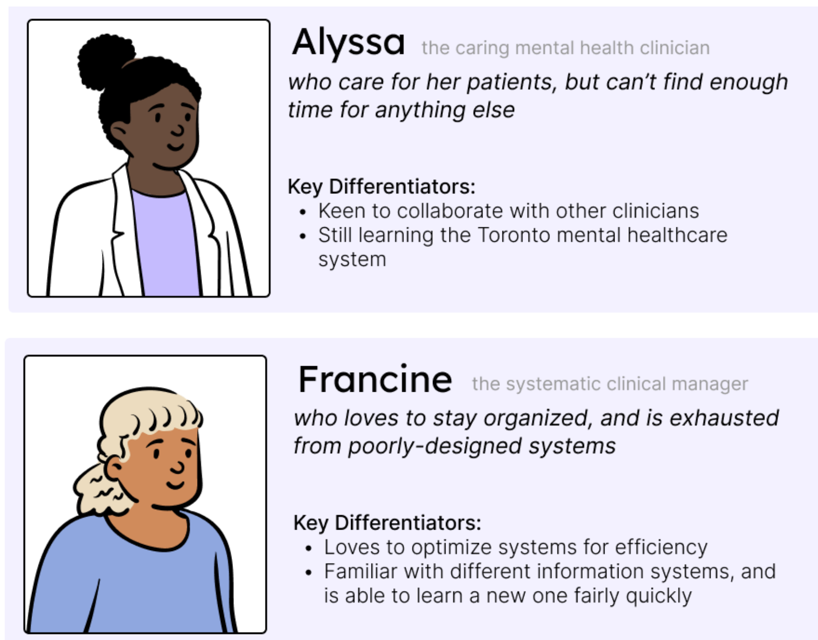

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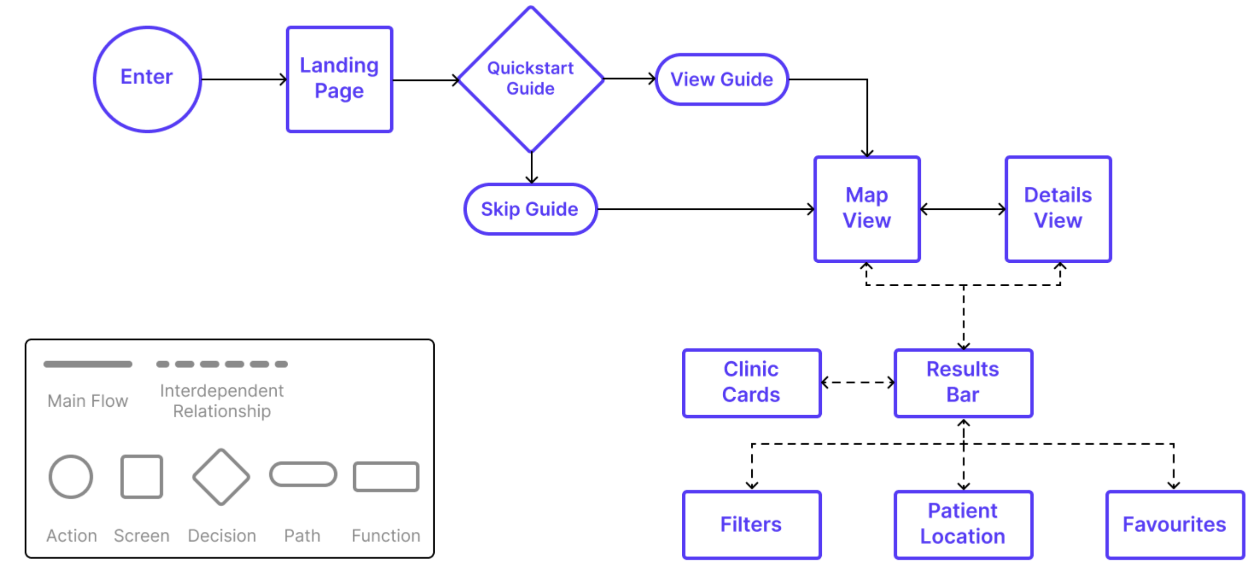

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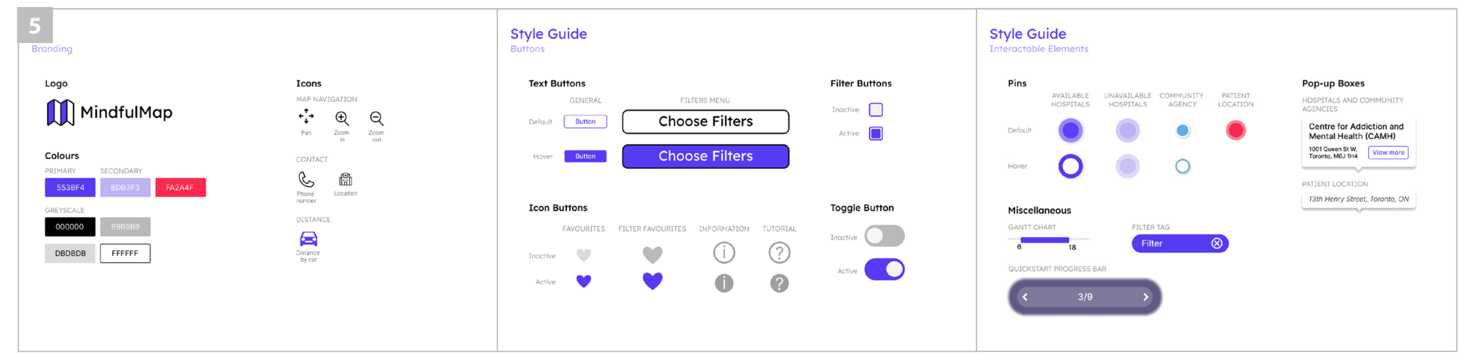

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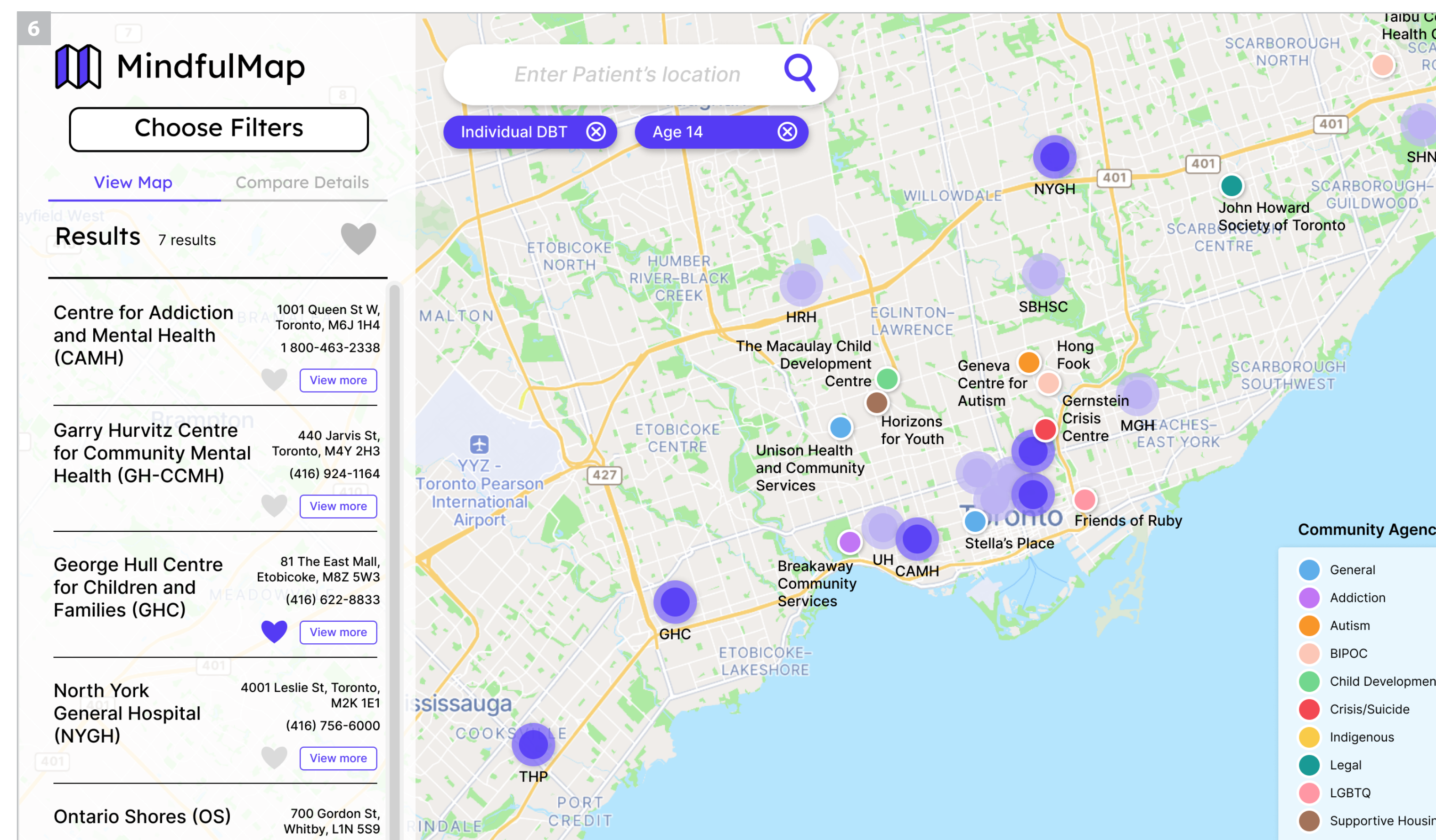
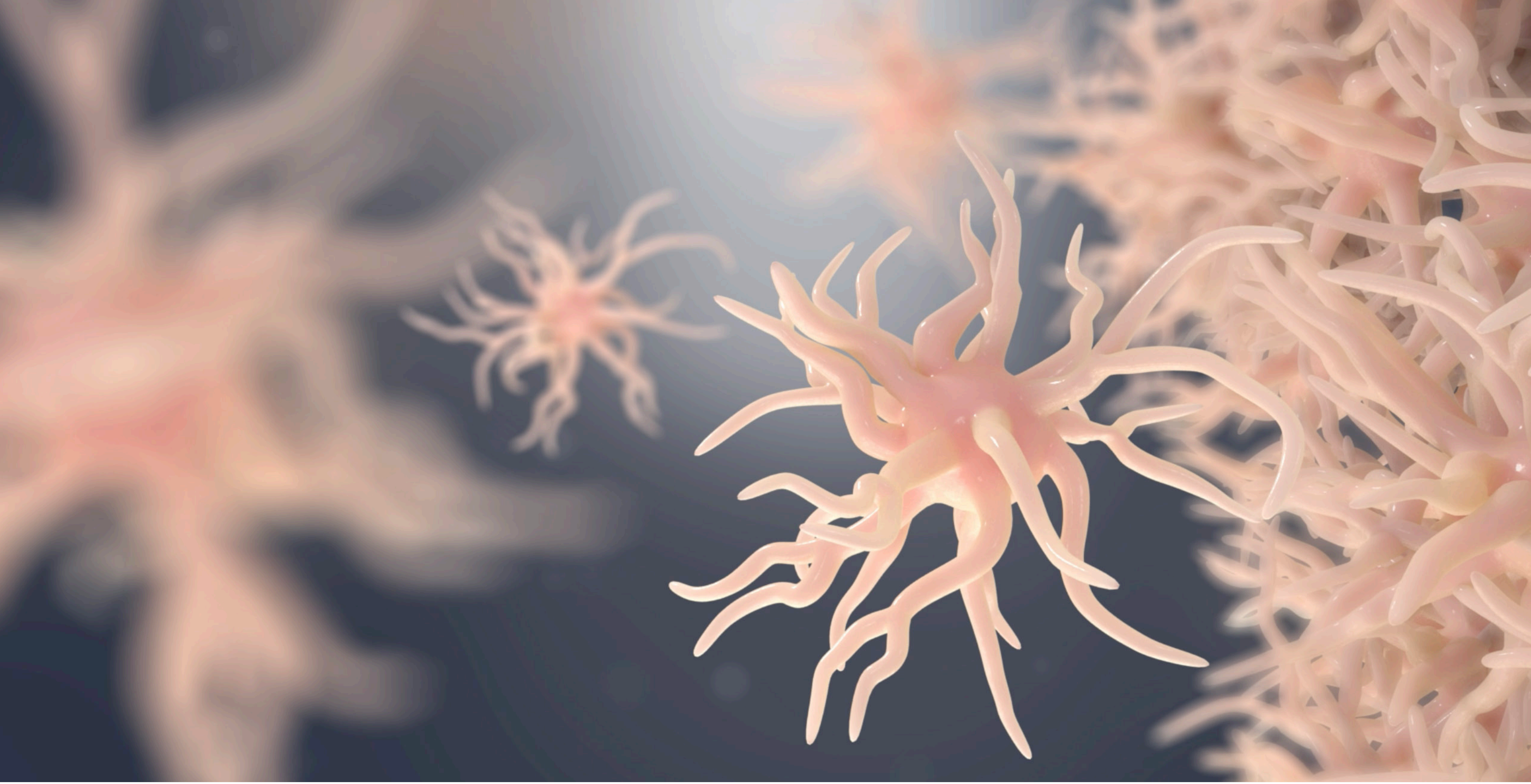




Avila Sanchez

I have always loved not only learning about complicated scientific topics, but rearranging that information into understandable resources. As a student I did this for myself, but in BMC I learned that making science accessible to others can be even more interesting and rewarding. In my work, I strive to create dynamic content that is equally informative and engaging in order to effectively share scientific information with a variety of audiences.

Information Visualization

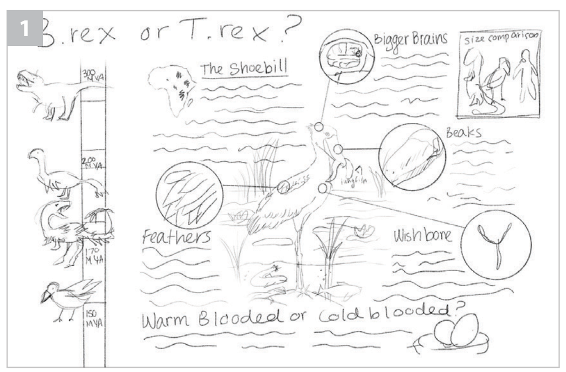
Originally, I intended to do my infographic solely on the topic of the shoebill stork. However, during my research I was inspired by the prehistoric look of the shoebill to investigate the evolutionary lineage of birds, which led me to change direction and create the entire piece on the topic.

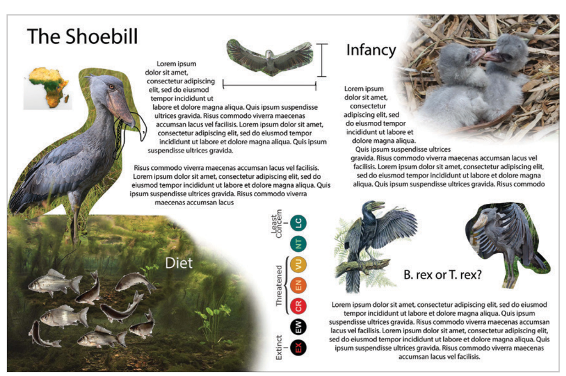
1. Sketch. I kept the shoebill as a focal point, using it as a reference from which to highlight the characteristics of birds that are related to dinosaurs.

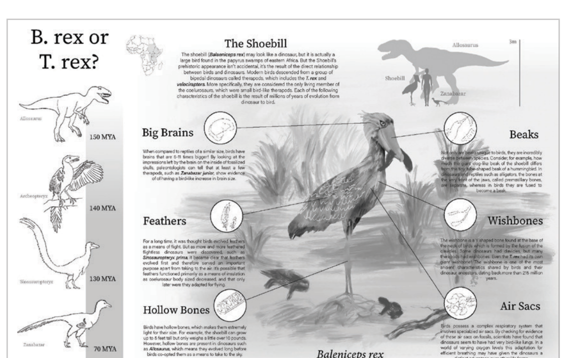
2. Production process. I created each of my illustrations in Procreate, first laying down base colours and then adding detail. I composited them in Illustrator.

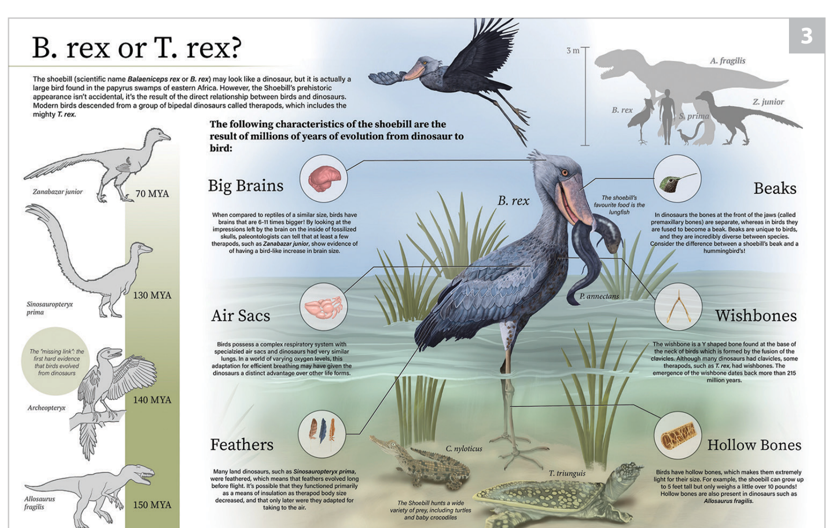
3. Final illustration. My final inforgraphic depicts the shoebill in its natural habitat, surrounded by information about its evolutionary past. The timeline to the left depicts some important discoveries in the dinosaur-to-bird lineage, while the scale comparison in the top right shows how the size of the creatures has fluctuated greatly over time.

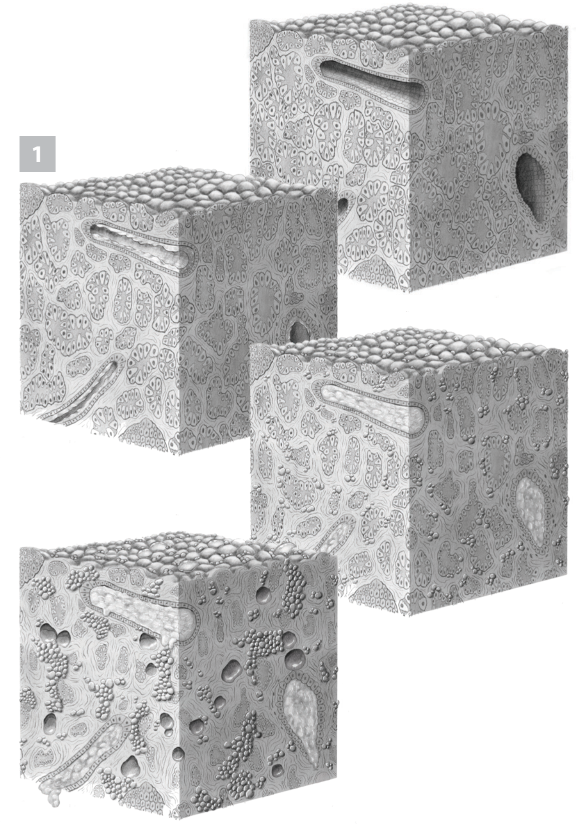
Previous spread. A still from my Master's Research Project.

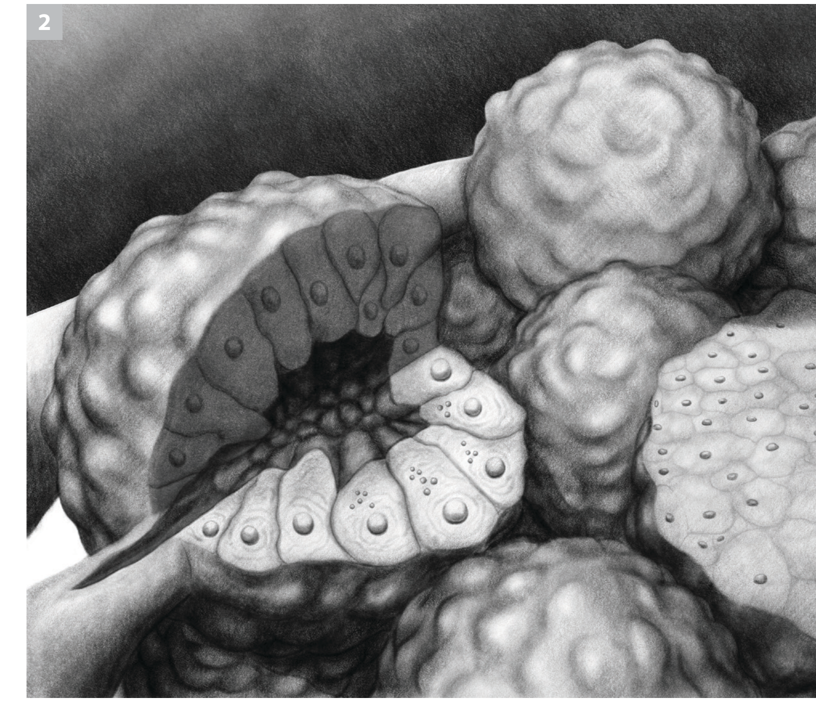


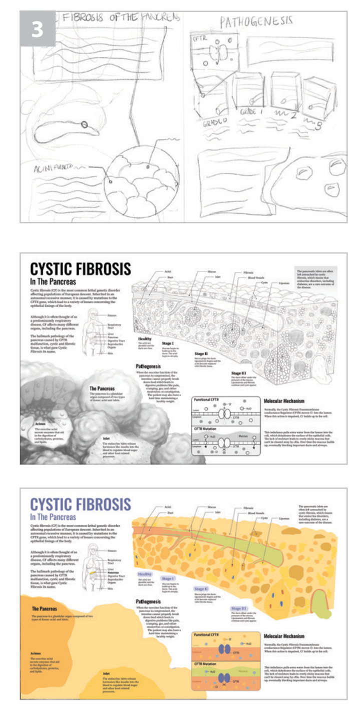


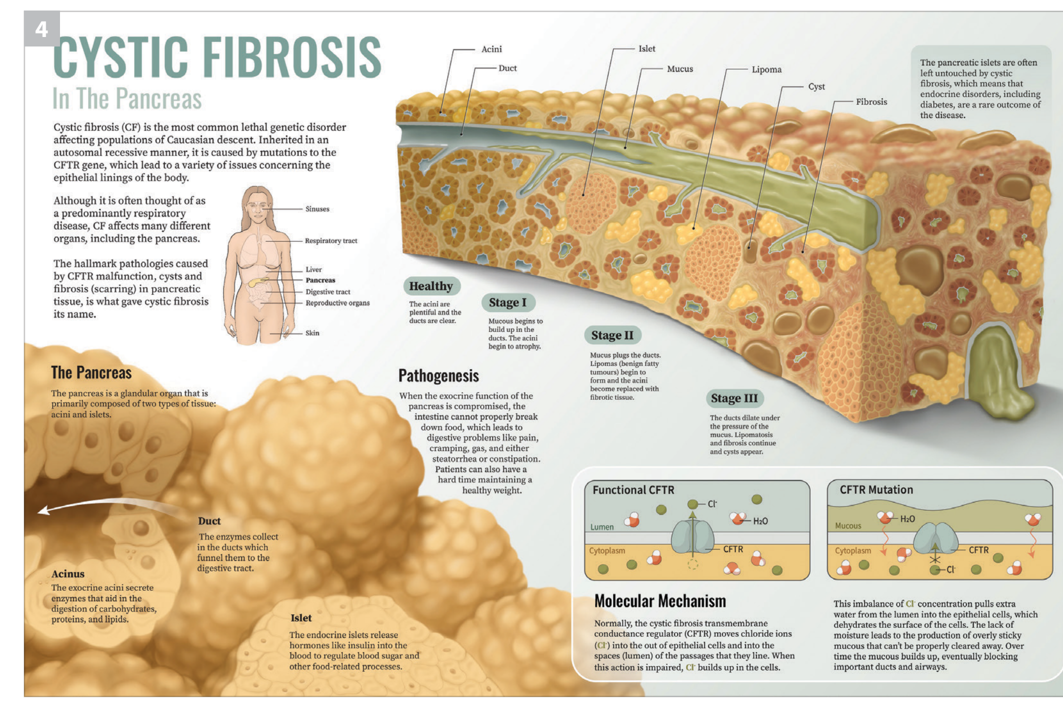












Pathological Illustration

This two-page spread details the pathogenesis of cystic fibrosis as it pertains to pancreatic tissue.

1. Study. Study of the stages of cystic fibrosis in the pancreas.

2. Study. This dramatic landscape depicts the pancreatic acini as they would appear if the viewer were inside the human body. This exercise helped me to understand the scale, composition, and shape of pancreatic tissue.

3. Production process. The process by which I created my pathological infographic: initial pencil sketches, colour thumbnails, and a final greyscale composition before embarking on the final illustrations.

4. Final illustration. On the bottom left is healthy pancreatic tissue and on the right is a long tissue cube that shows the stages of disease. The molecular mechanism underlying the genetic disorder is explained diagramatically with vector illustrations.

Molecular Visualization

The aim of this project was to create a two-page magazine spread explaining a recent discovery or development in biochemistry. I chose to focus on new research by Rahman et al. (2022) showing how the poison curare causes paralysis by blocking the effects of acetylcholine at the neuromuscular junction.

1. Final illustration. This molecular visualization depicted the paralyzing mechanism of the poison curare. This piece was completed using a variety of 3D, molecular, and 2D programs.

2. 3D modelling. The main visual, a muscular nicotinic receptor, was created in Maya using real data from a protein structure bank. The data was downloaded and then had to be run through multiple programs before being imported into Maya. I then took the resulting render and made final edits in Photoshop.

3. Production process. The entire layout process, from initial sketches to final comprehensive layout. I also made two complete colour options; light (as seen here) and dark (as seen in the final).

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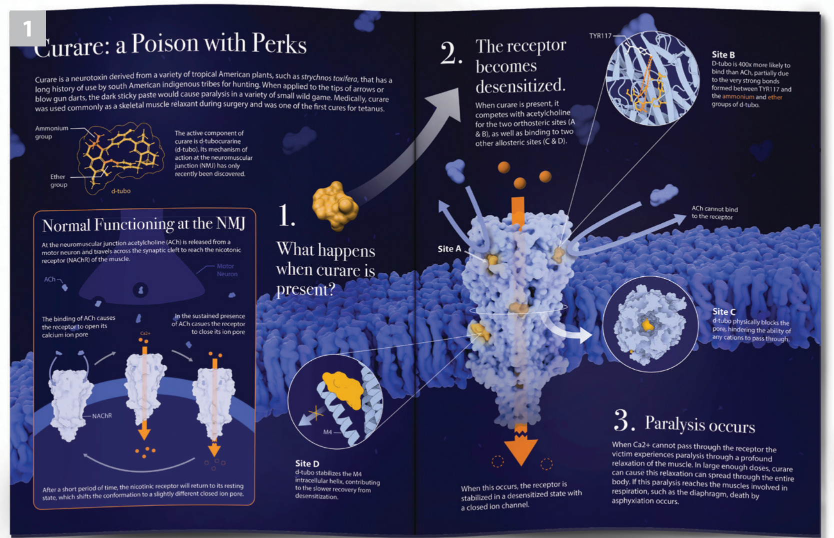

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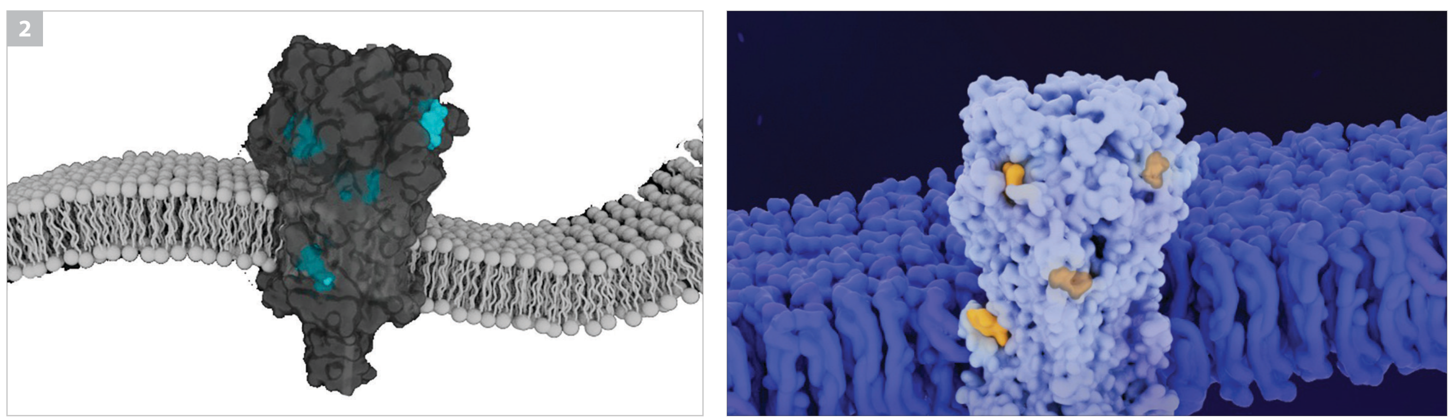

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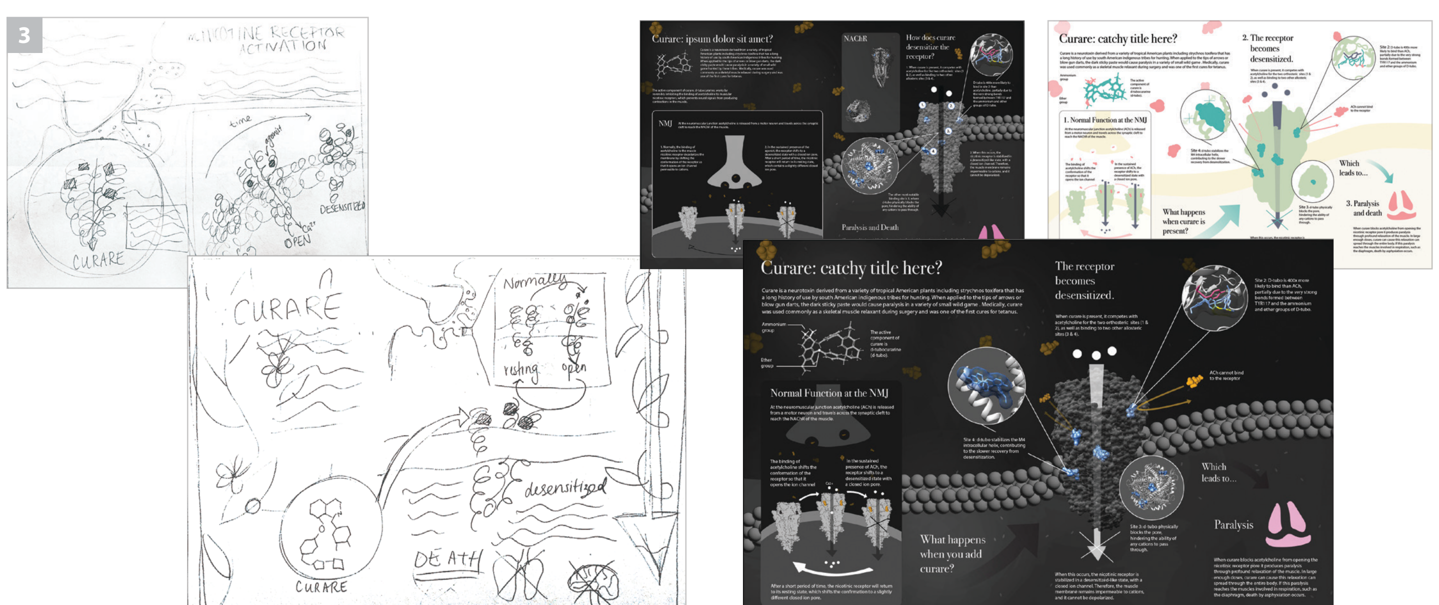

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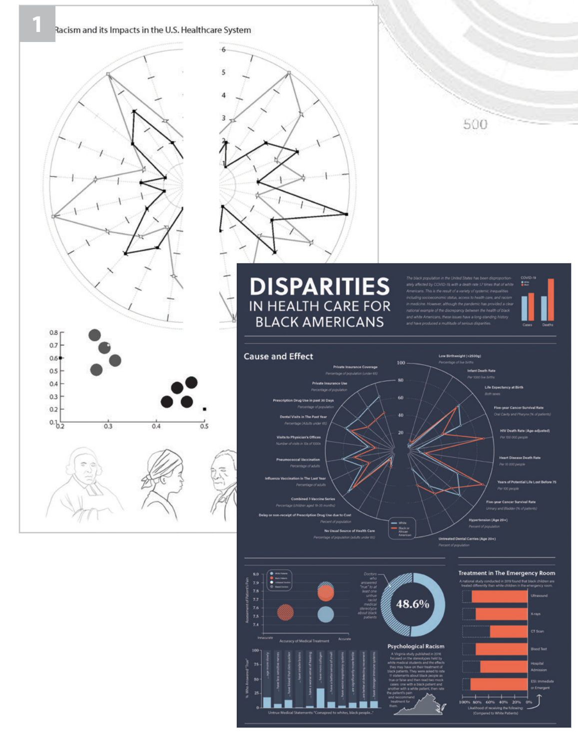

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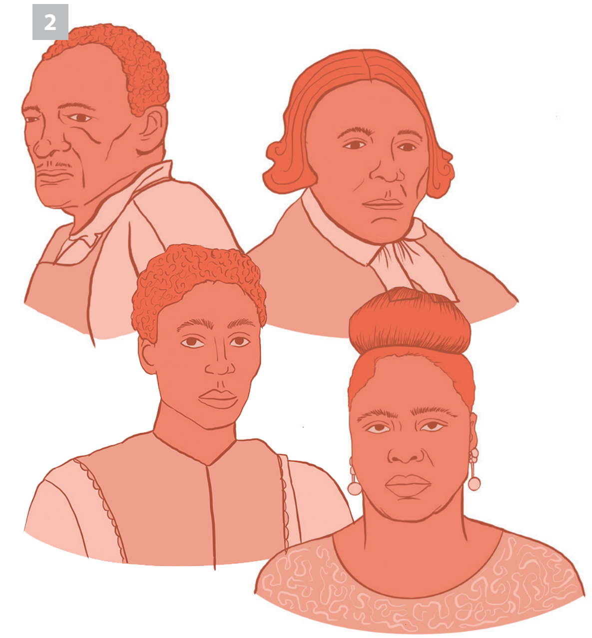

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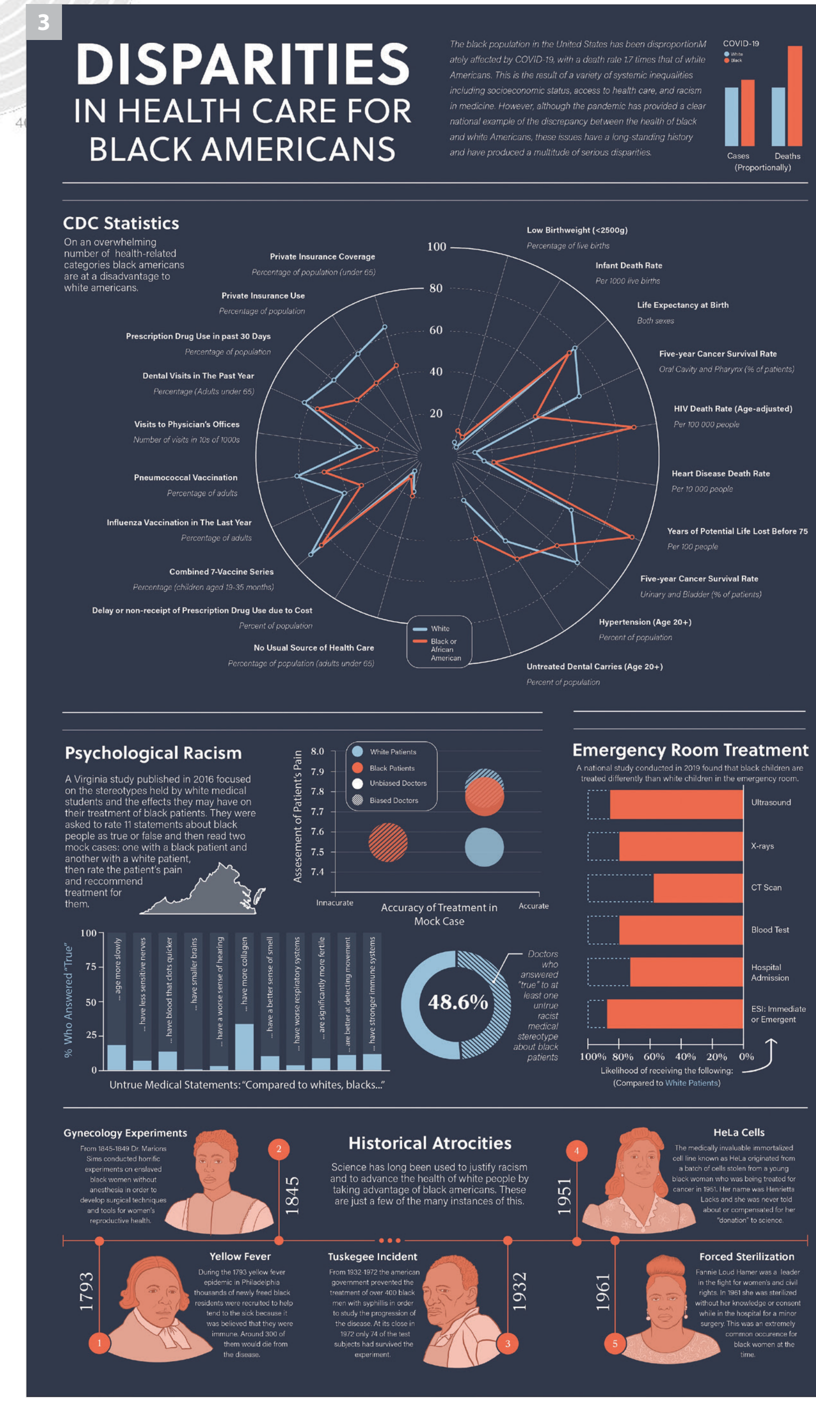


Information Visualization

This data visualization was created with data from the CDC and two studies on psychological racism by healthcare providers, as well as information on how some perceived medical advancements have historically disregarded the safety and humanity of Black lives.

1. Production process. The illustrations of famous Black figures were completed in Procreate.

2. Final draft. After compiling and cleaning all my data, the final graphs and layout were created in Illustrator.

3. Final illustration. The final data visualization, which compiled data from three different studies and historical information on Black lives in medicine.

Astrocyte Reprogramming

My Master's Research Project explains the features and benefits of an emerging cellular reprogramming therapy developed by Cindi Morshead and associates at UofT and UHN. The therapy takes astrocytes from an injury site and turns them into neurons in order to replace any neurons lost. The goal of this project was for my supervisors to use the video to garner support to further develop this therapy.

1. Final animation. Animation title card.

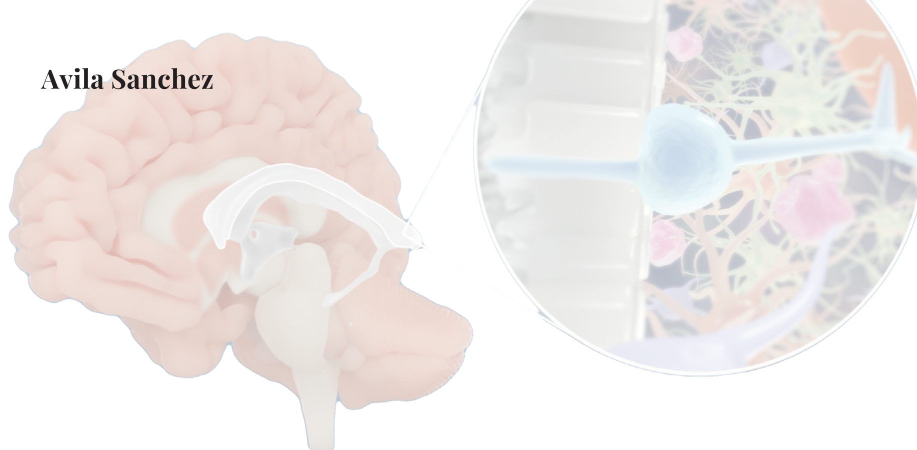
2. Production process. The evolution of the female figure in the animation, from sketch to final design.

3. Production process. The set up of one of the most complicated shots: the background was illustrated in Photoshop, while all other components were created in Maya. Each part of this scene was rendered on to a different layer and then the depth of field was manually created in After Effects by blurring each layer a different amount.

4. Production process. Some shots from the animatic and their corresponding scenes in the final animation.

5. Production process. Cellular scenes from the animatic.

6. Final animation. Final shots from a laboratory scene. Everything in this scene was modelled by hand.



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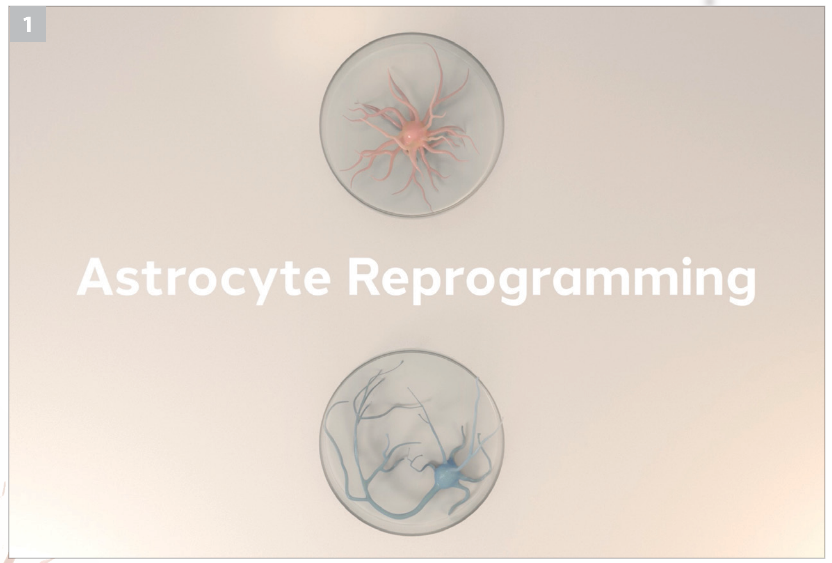

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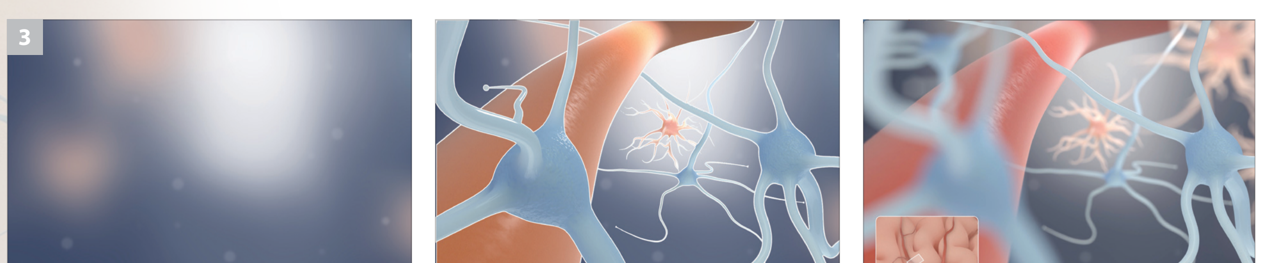

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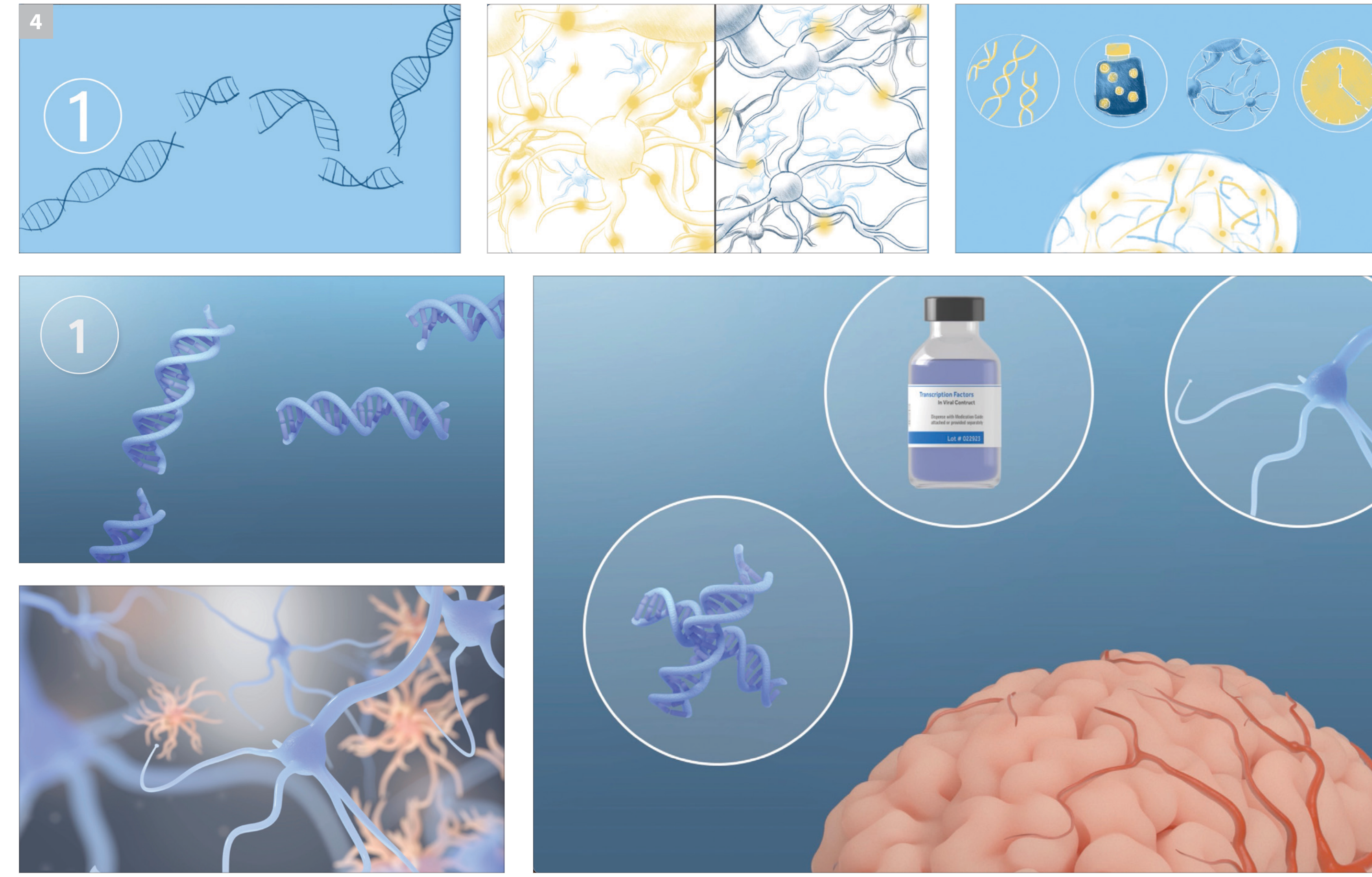

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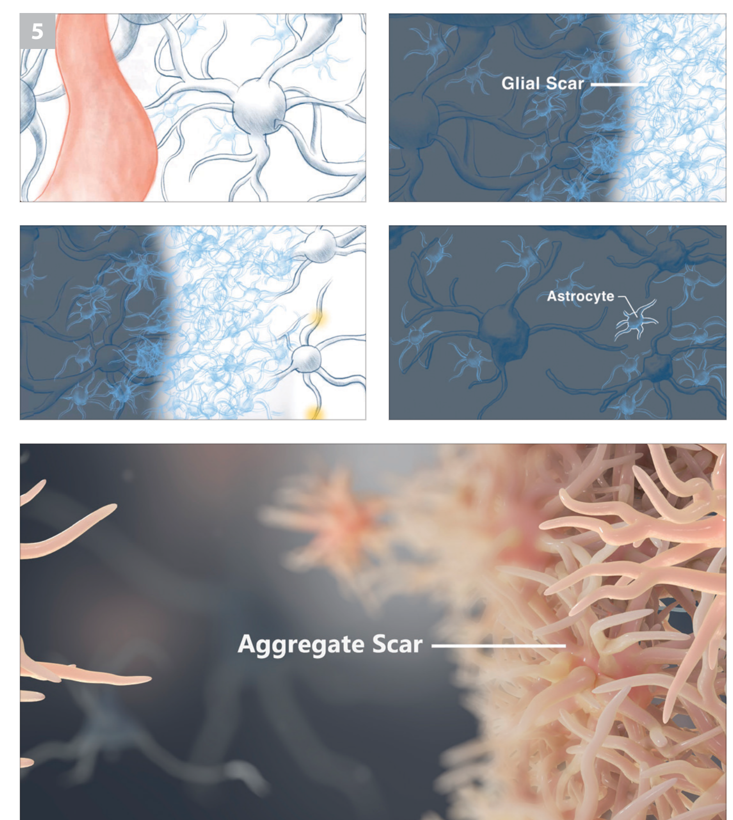

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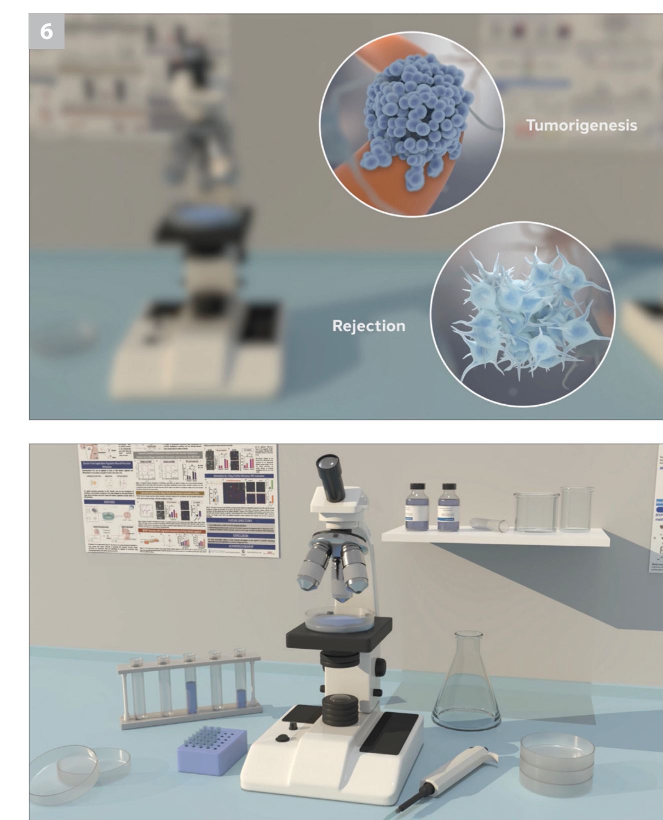

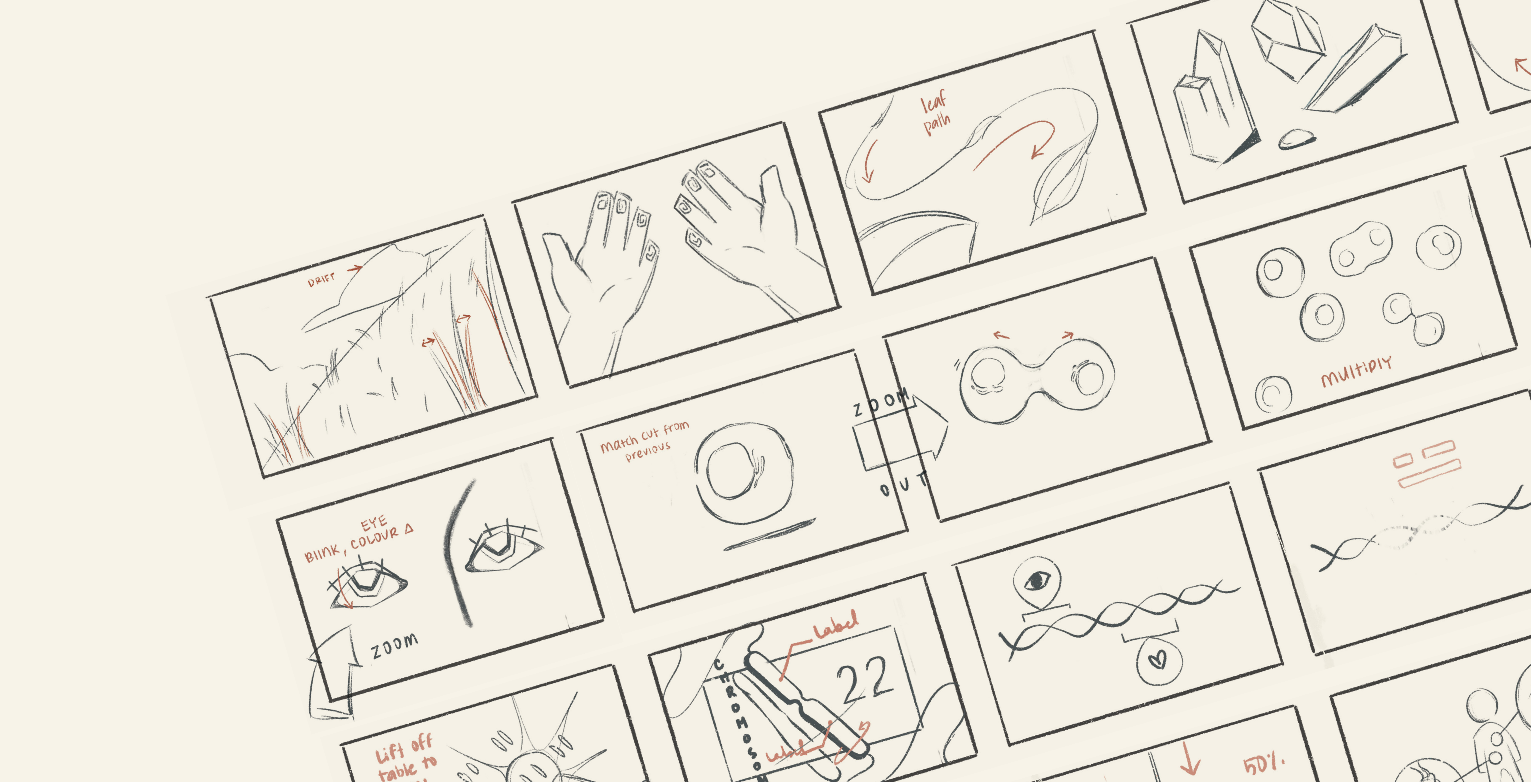

Emily Tjan

The scientific world around us is intricate, and I've always been captivated by the way scientific visualizations can capture that complexity so beautifully. During my time at BMC, I developed a love for pre-visualization work, storytelling, and the iterative ideation process that comes with creating scientific communication pieces. As I grow in my skill and craft, I hope to continue sharing and creating these stories to help spark curiosity of the world of science in others.

Data Visualization

The Nobel Prize is considered one of the most prestigious awards one can receive. This data visualization piece strives to breakdown the distribution of these awards by category, continent, sex, and age of recipients for comparison.

1. Final illustration. This piece evolved quite a bit from the initial previsualization stage. The final piece resulted in this 2D illustration that more coherently and cohesively compares all the laureates ever awarded a Nobel Prize as well as drawing comparisons between the youngest and oldest recipients.

2. Sketch. Nobel Prizes have been awarded to recipients since 1901, and has been very well documented so I had plenty of data to work with. My initial idea was to create an interactive prototype of a timeline between 1901-2019 with each recipient plotted by category. Users could then hover over each point and retrieve information about each laureate.

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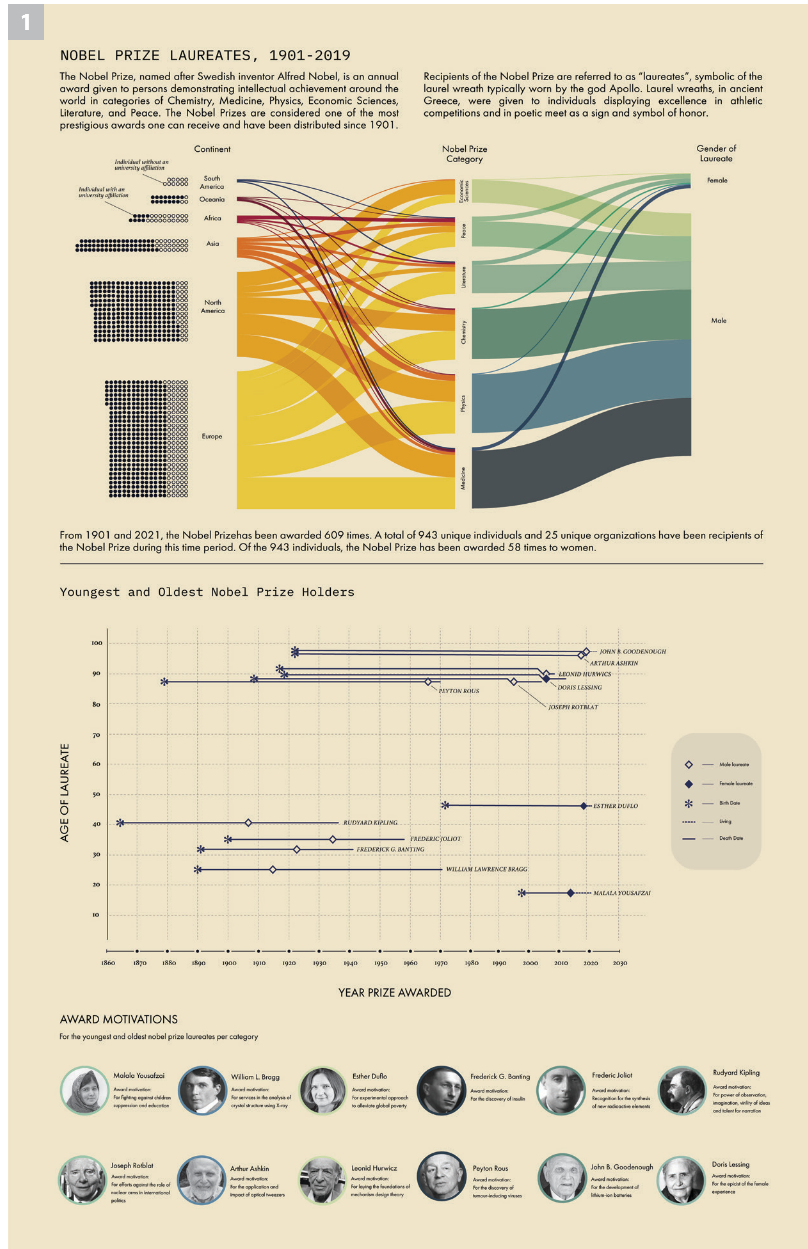

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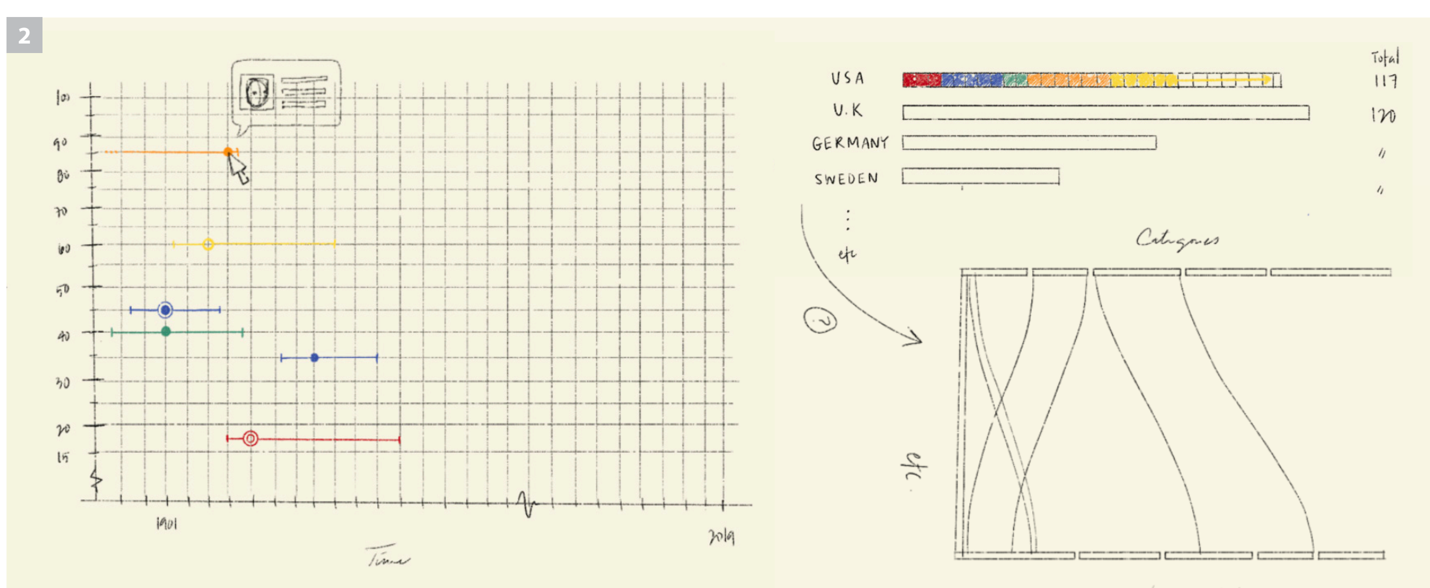

Neuroanatomical Illustration

The limbic system is composed of intricate structures that are not often visualized in the common cross-section. The goal of this piece was to communicate the spatial relationships of these structures by strategically cutting away specific planes to reveal them in their entirety.

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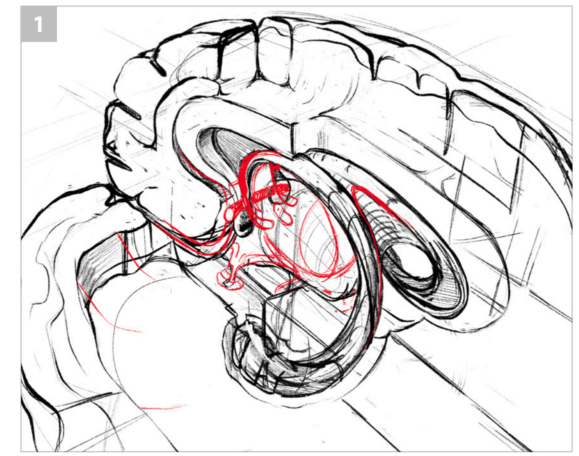

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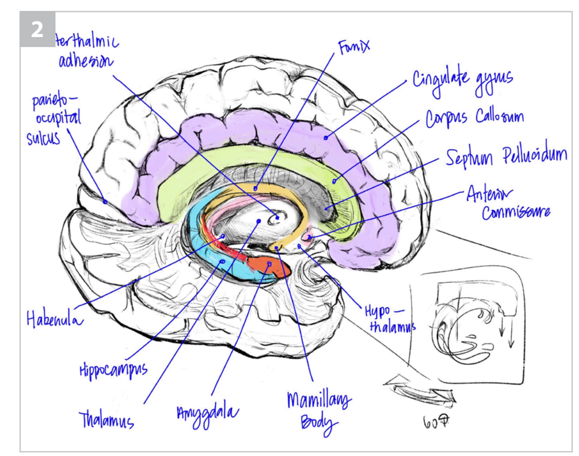

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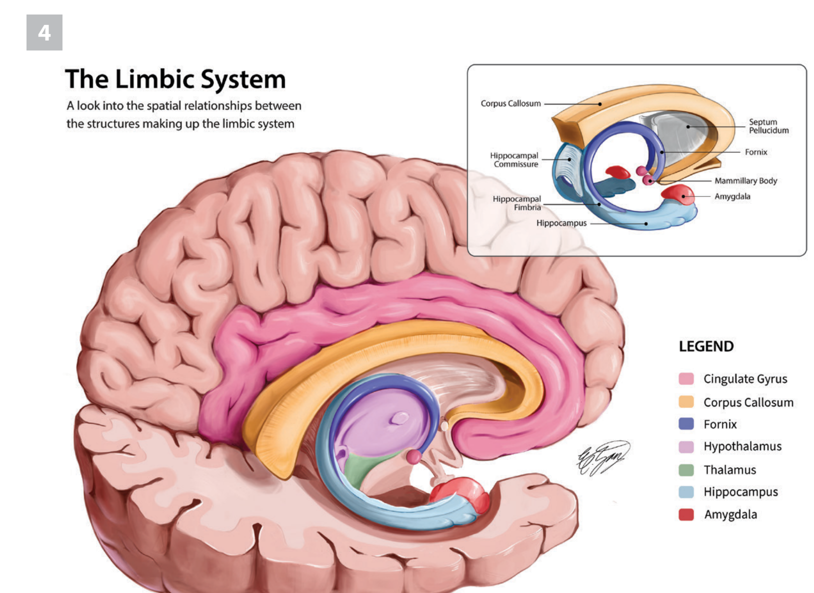


1. Sketch. One of the challenges of this illustration was figuring out how to clearly display the key structures of the limbic system while also creating visual intrigue. This is one of many sketches that were done to explore this.

2. Notes. Using various text resources and specimens from Grant's Museum, I took many notes to ensure a good understanding of the internal anatomy of the brain.

3. Production process. Once I decided on the final sketch, I cleaned up the lineart and solved any contrast issues in greyscale before moving into colour.

4. Final illustration. For the final piece, I wanted to show the limbic system situated in the brain to emphasize the relative spacial relationships between structures. The inset was included to highlight that these structures are reflected in the other hemisphere.

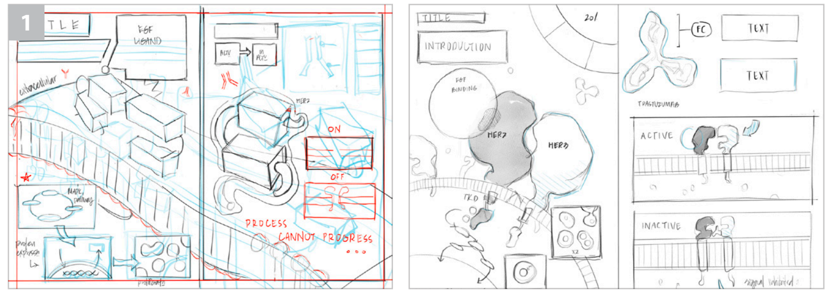
Molecular Visualization

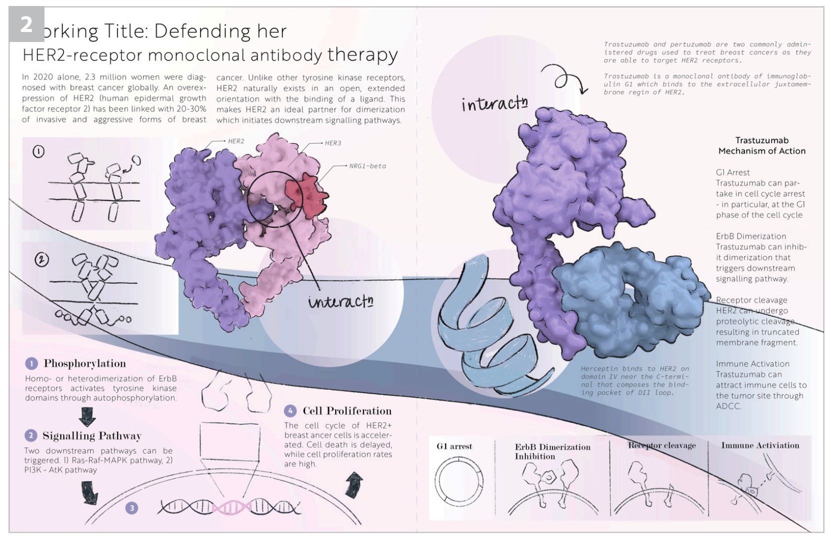
Breast cancer is the most commonly diagnosed cancer amongst women globally, and has been found to be linked with an overexpression of HER2, a tyrosine kinase receptor. These receptors make an ideal drug target due to their open conformation. This molecular visualization piece works to describe the structural relationship between HER2 receptors and pertuzumab, a monoclonal antibody used to sterically inhibit HER2.

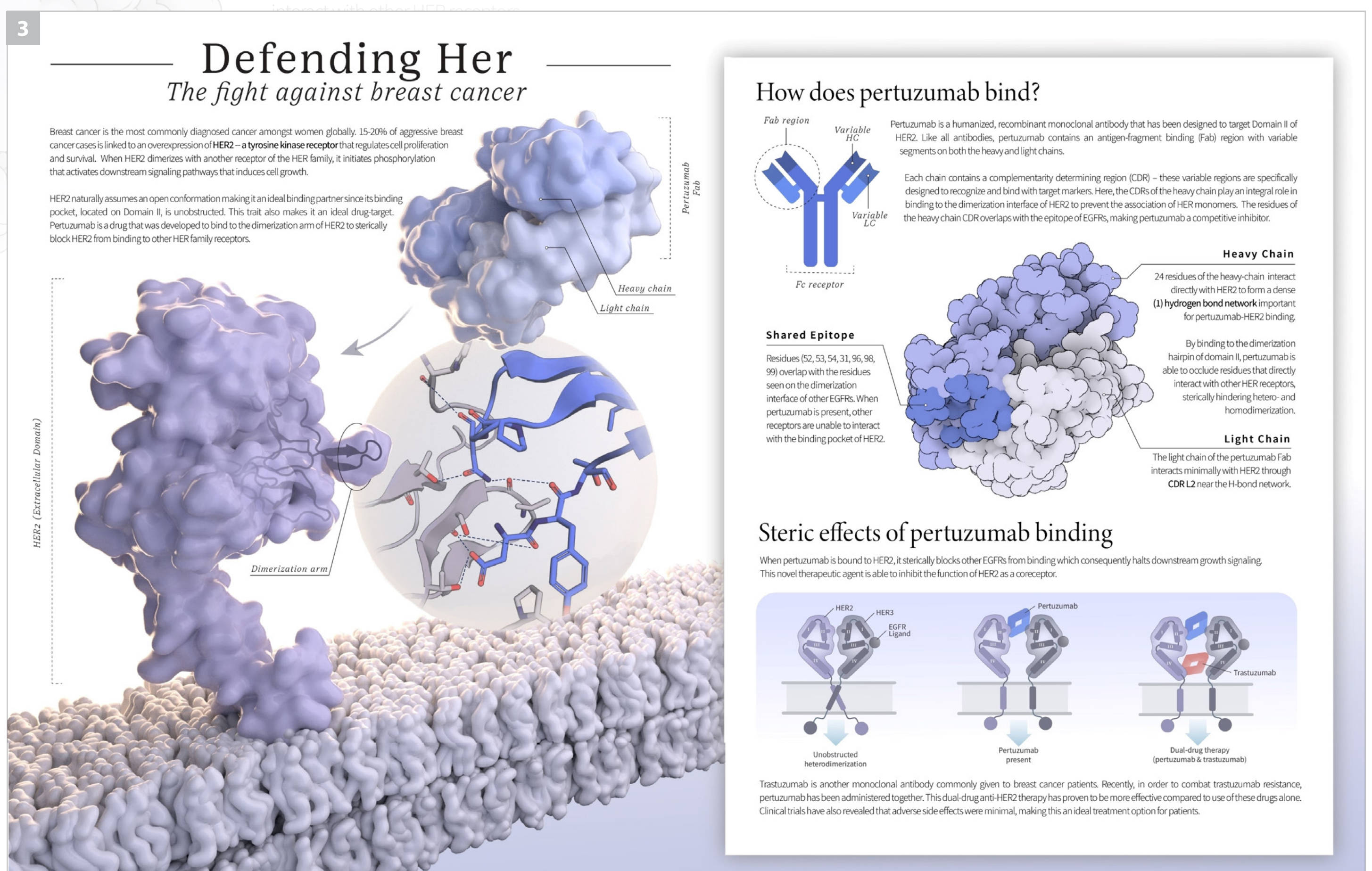
1. Sketch. The ideation process for this project was very long. These two sketches are just a few of many that were created to flesh out the layout, visual flow, and narrative of this piece.

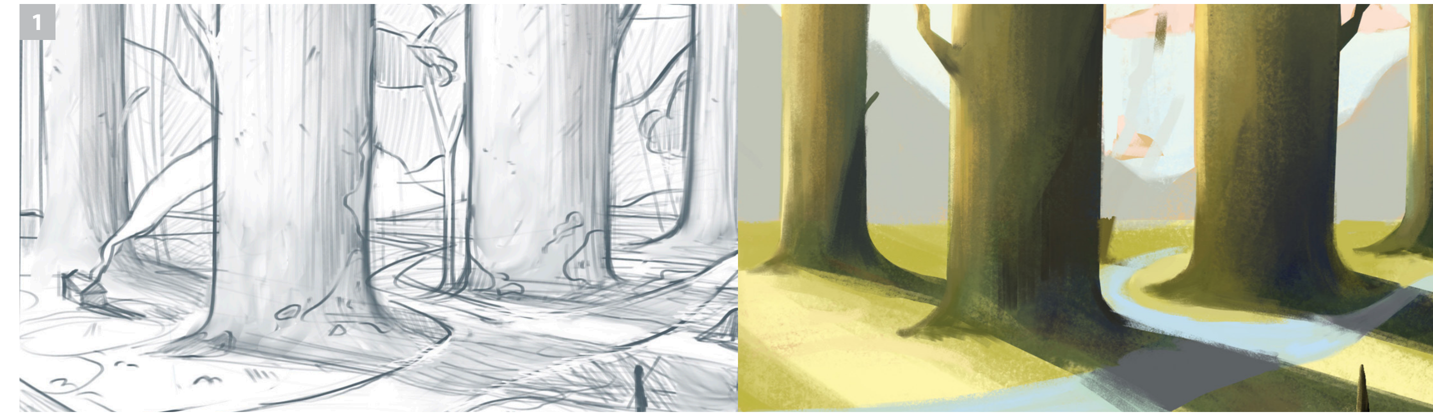
2. Production process. This is a very early draft of the project where I was working out the composition and layout. At this point in the process, I identified quite a few problems that needed to be workshopped before moving forward.

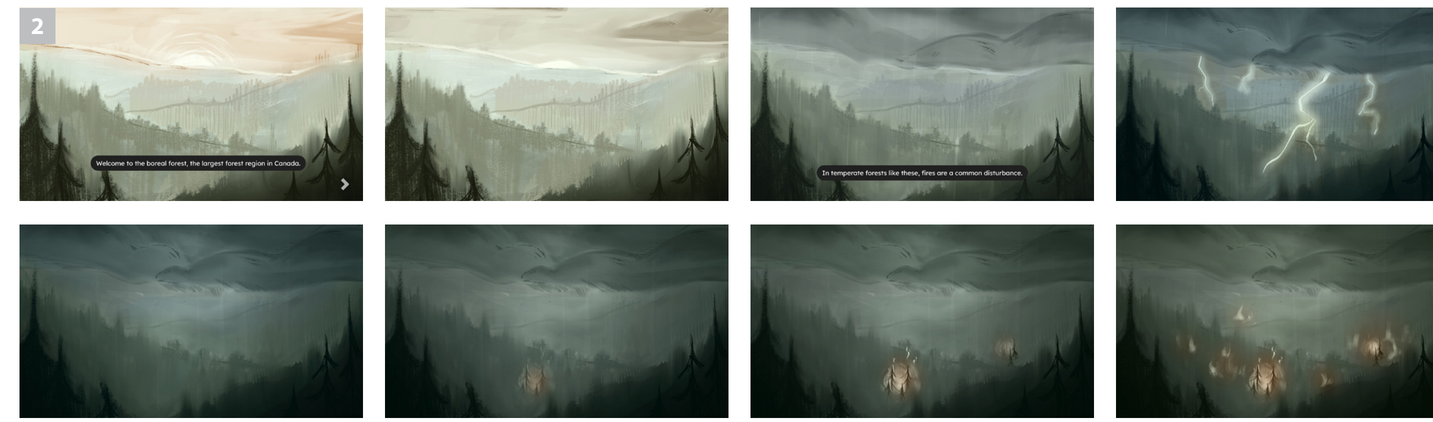
3. Final illustration. As mentioned above, the previous iteration of this layout wasn't quite working. In the end, rather than tackling this topic broadly, I decided to really zero-in on the structure of HER2 and how the monoclonal antibody interacts with it's dimerization arm. In this way, I could better emphasize how HER2 dimerization is sterically inhibited in more detail.

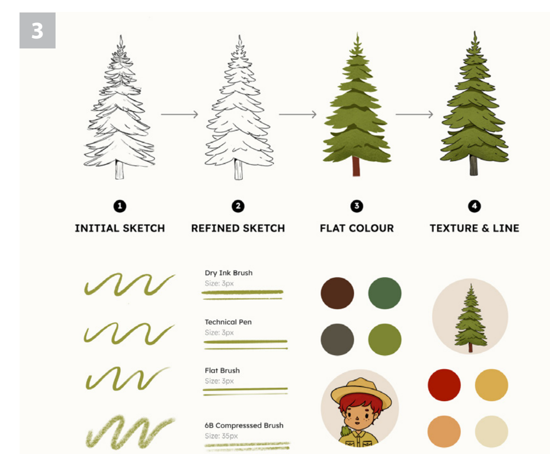


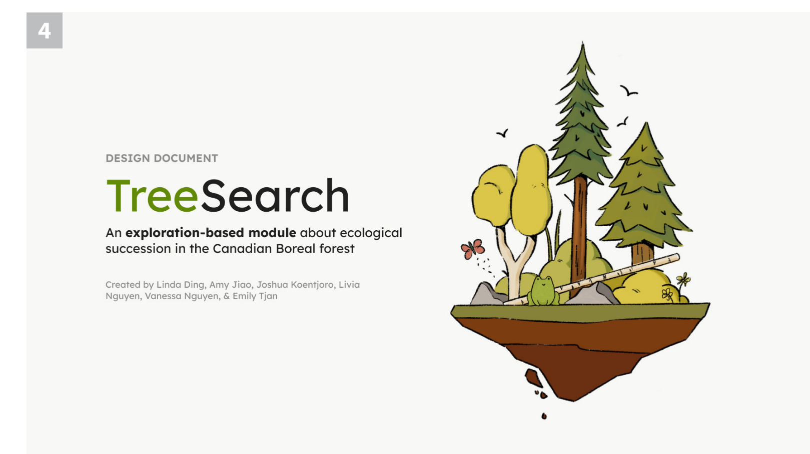












Interactive Game Design

TreeSearch is an interactive, exploration-based module created to teach Grade 9 students about ecological succession in the Canadian boreal forest. For this project, I was the lead on visual design and developement for the look-and-feel for the module.

1.Sketch. Exploratory concept art for mood and atmosphere.

2. Production process. For this project, we knew we wanted it to be narrative-driven. So to help with that, I created a short frame-by-frame animatic that would play for users before they enter the interactive module to set the scene and context. Here are a few frames.

3. Production process. We set up this workflow early on to help keep uniformity between assets as it passed along multiple hands in the pipeline.

4. Final interactive. As part of our final deliverable, we created a design document that explained all the design decisions that were made when creating our interactive module. This was by far the most rewarding project I had done at BMC, and it was made even more enjoyable getting to work with my amazing and brilliant groupmates!

Understanding The Missing Piece

This patient-education animation was created to help explain what 22q11.2 deletion syndrome (or 22q) is to patients and their caregivers. In this animation, I cover the genetic basis of 22q, the different features that might arise in patients, and the potential treatment options that are available.

1. Sketch. This animation evolved in many ways since its conception. Most of the hardwork was done upfront during the pre-visualization and storyboard phase which lasted several months. During this part of the process, I was trying to figure out things like character design, level of visual complexity, and narrative. I must have drawn at least 4-5 different rounds of storyboards before we landed on one we were all happy with!

2. Production process. Colour was an extremely important aspect of the animation. I wanted to use colours that were friendly, inviting, and warm to help evoke hopeful and positive feelings in the target audience, especially when navigating a genetic condition like 22q, which can be overwhelming and stressful. This is a colour script I created to help map out the colours throughout the animation.

3. Final animation. Featured here are a couple of key stills from the animation. My content advisor expressed the importance of creating an animation that was informative, interesting, and hopeful. I hope that I achieved that through the various design decisions that I made - whether it be from character design, colour, or the depiction of community and support in my animation.

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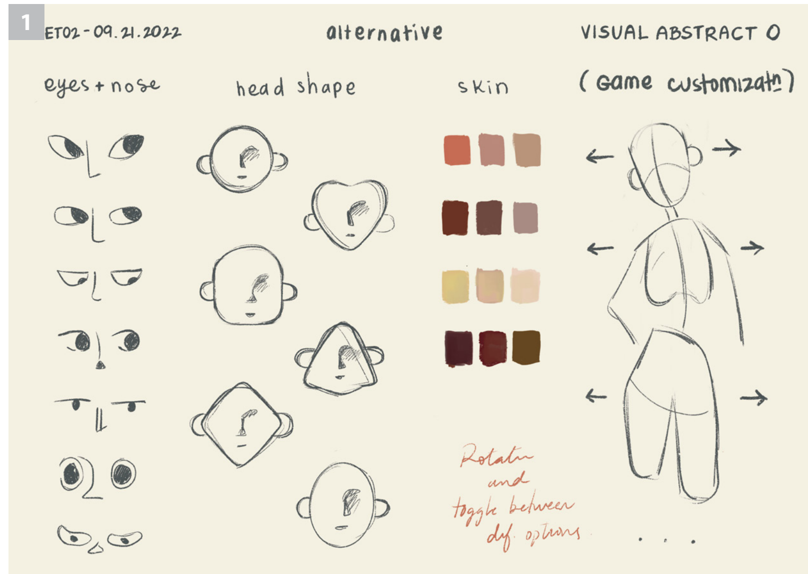

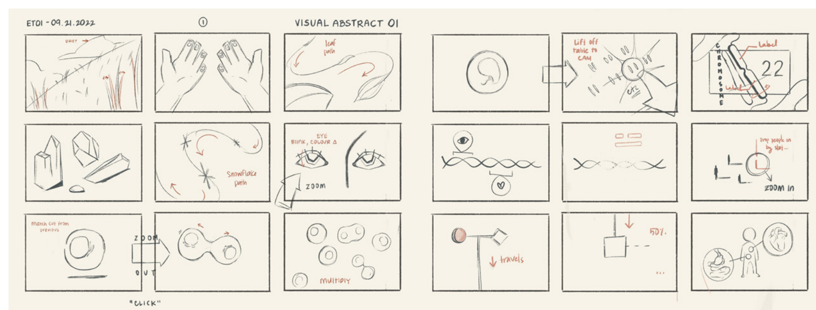

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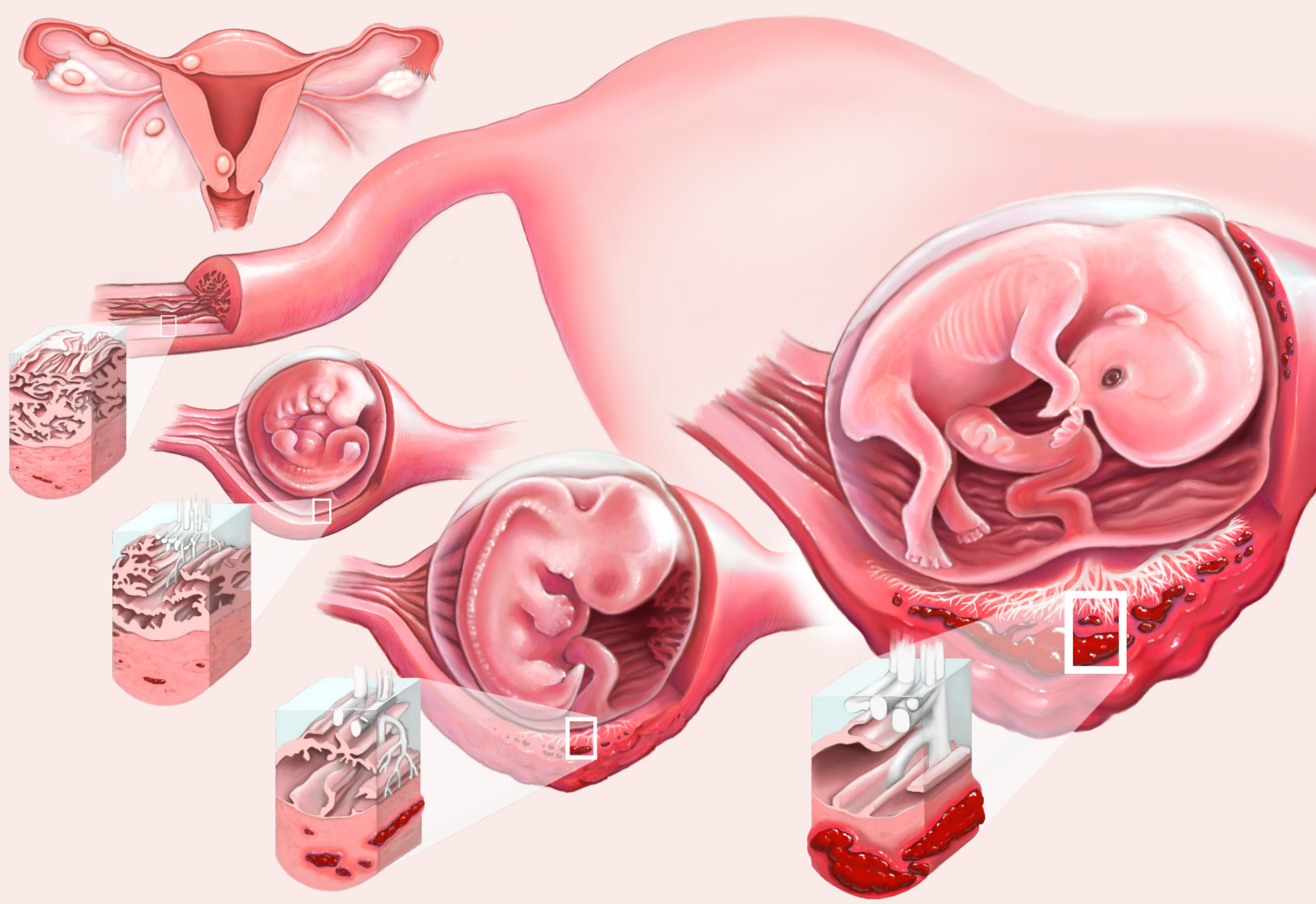

Viola Yu

As a passionate biomedical visualizer, I specialize in the art of transforming intricate scientific concepts into captivating visual representations. With expertise in creating stunning illustrations, intricate 3D models, UI/UX interactive designs, and dynamic animations. I am committed to simplifying the understanding of biomedical ideas.

Editorial Illustration

This editorial cover translates a research paper that discovered that honey bees became queen bees when fed royal honey. As queen bees, they lived ten times longer than their worker bee counterparts.

1. Sketch. Drawings to brainstorm potential ways to visually describe the essential idea of the research paper.

2. 3D modelling. In Maya, I created the bee and used XGen hair to make the furry texture on the head and carapace. Then, I rigged and posed the bee and the honey hands to create the final composition.

3. Final illustration. Final 3D renders were exported out of Maya. They were composited and colour corrected in Illustrator where it was mocked up in an editorial cover format.

Previous spread. A close-up of my pathological illustration.

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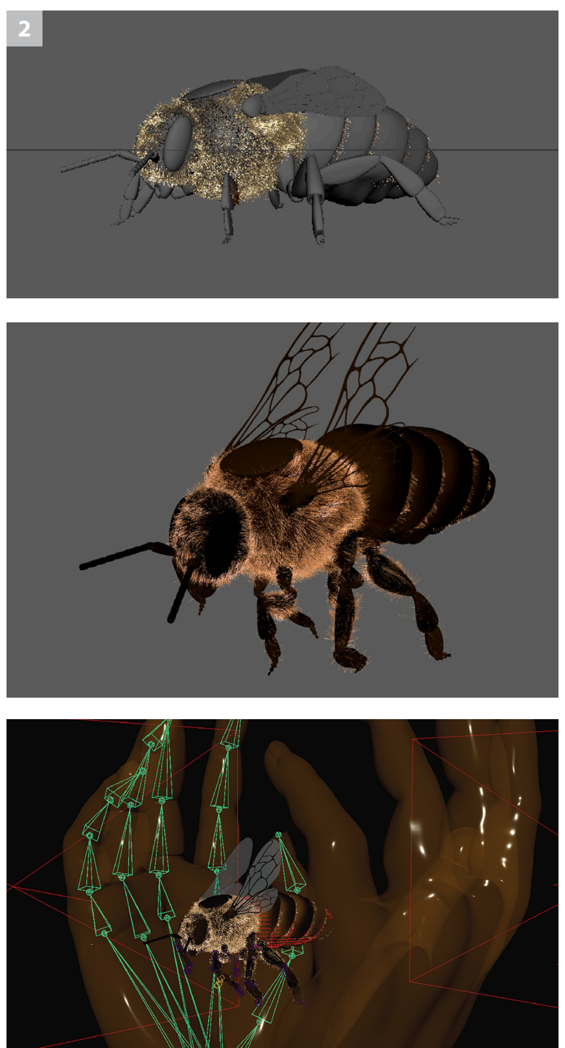


3

Information Visualization

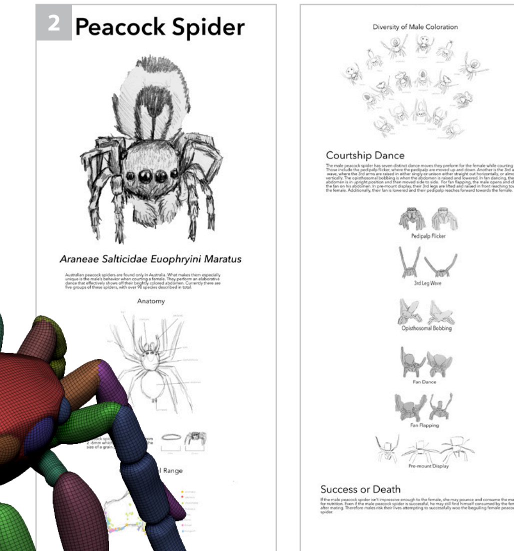
Male peacock spiders have an intricate mating dance. The scrollytelling website contains illustrations, 3D models, interactive maps, and short 3D animations.

1. 3D modelling. A 3D model was created in Nomad Sculpt and ZBrush.

2. Sketch. I condensed the important parts of the story that I wanted to tell about these spiders and put the potential visuals into a scrollytelling layout.

3. Final interactive. I created a scrollytelling website prototype that shows the movement of the spider's mating dance through animations.

2



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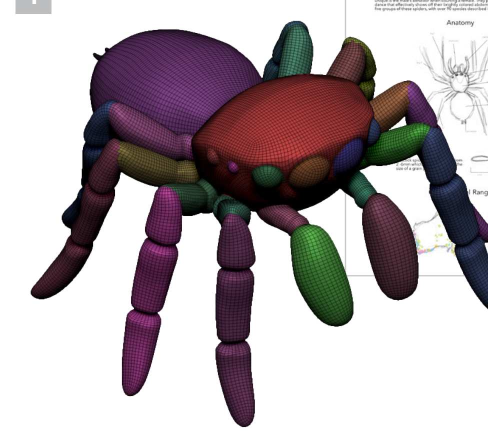

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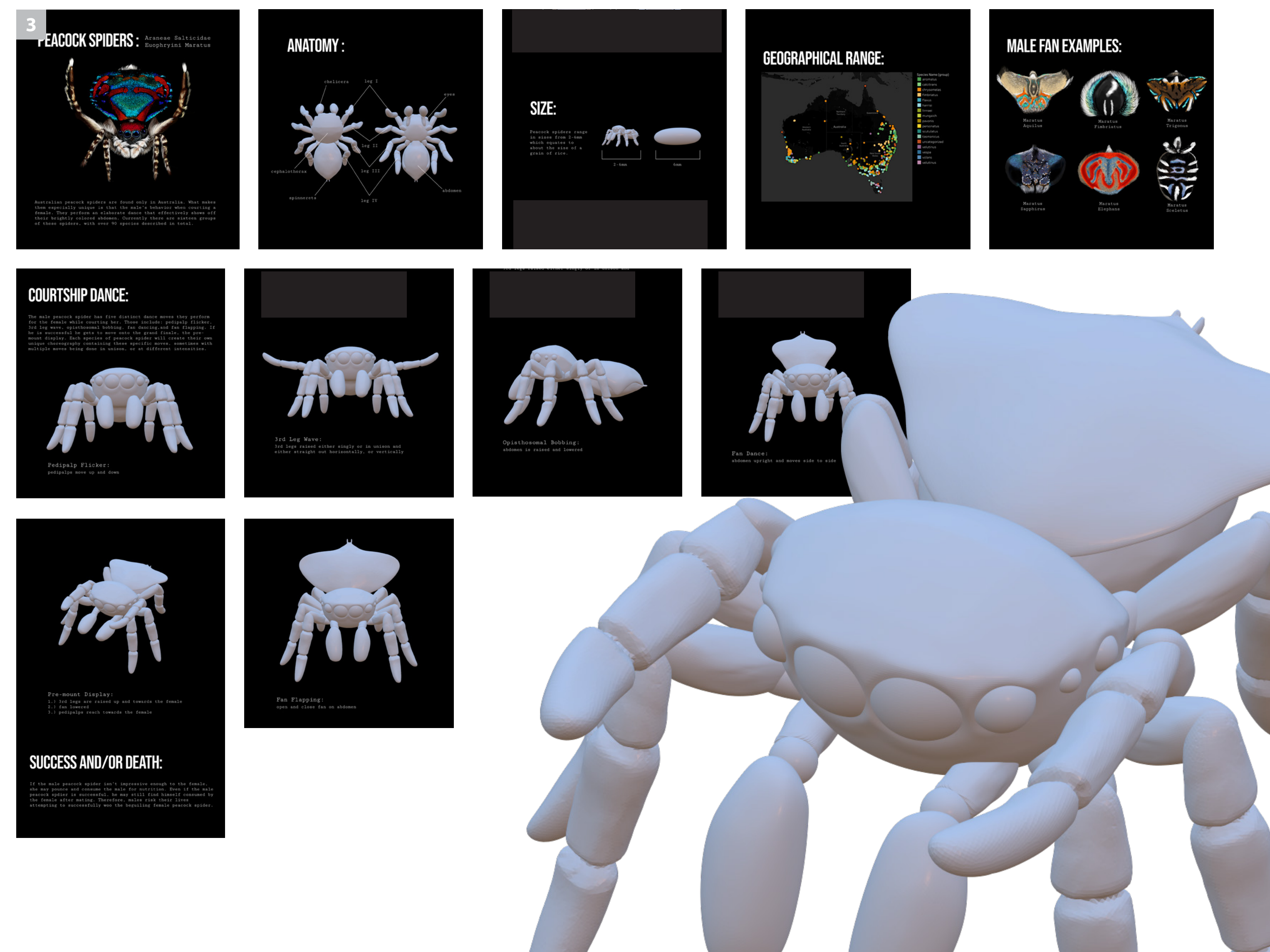

Neuroanatomical Illustration

The cerebral arteries can be complicated to decipher and learn in correlation to where they lie near the brain and the skull. To bridge this visual media gap, I created this illustration to show the physical relationship between both anatomical features as well as to label the names of the arteries.

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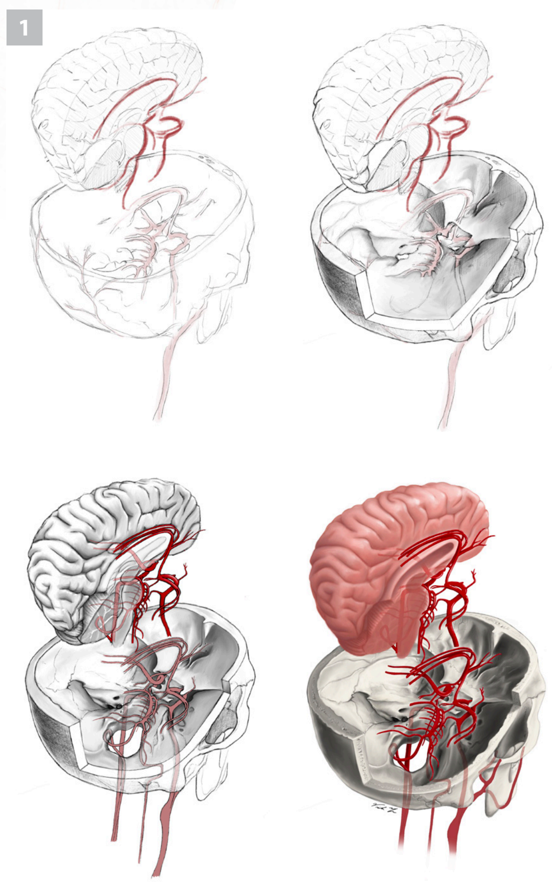

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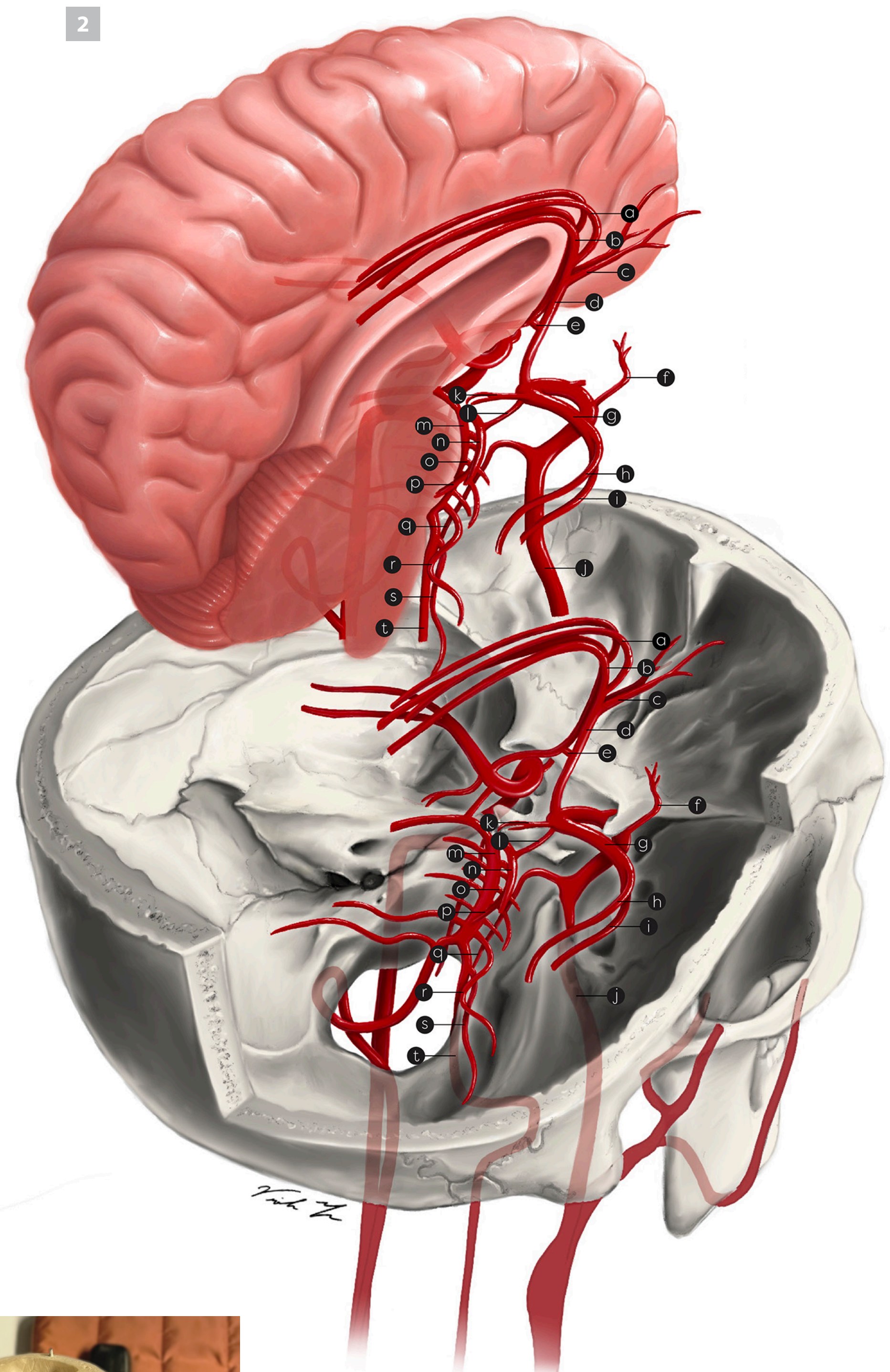

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1. Final illustration. Final colourized illustration with labels.

2. Production. Progression of how the final illustration was created.

3. Study. I used multiple different resources to reference the correct orientation of the skull, brain, and arteries.

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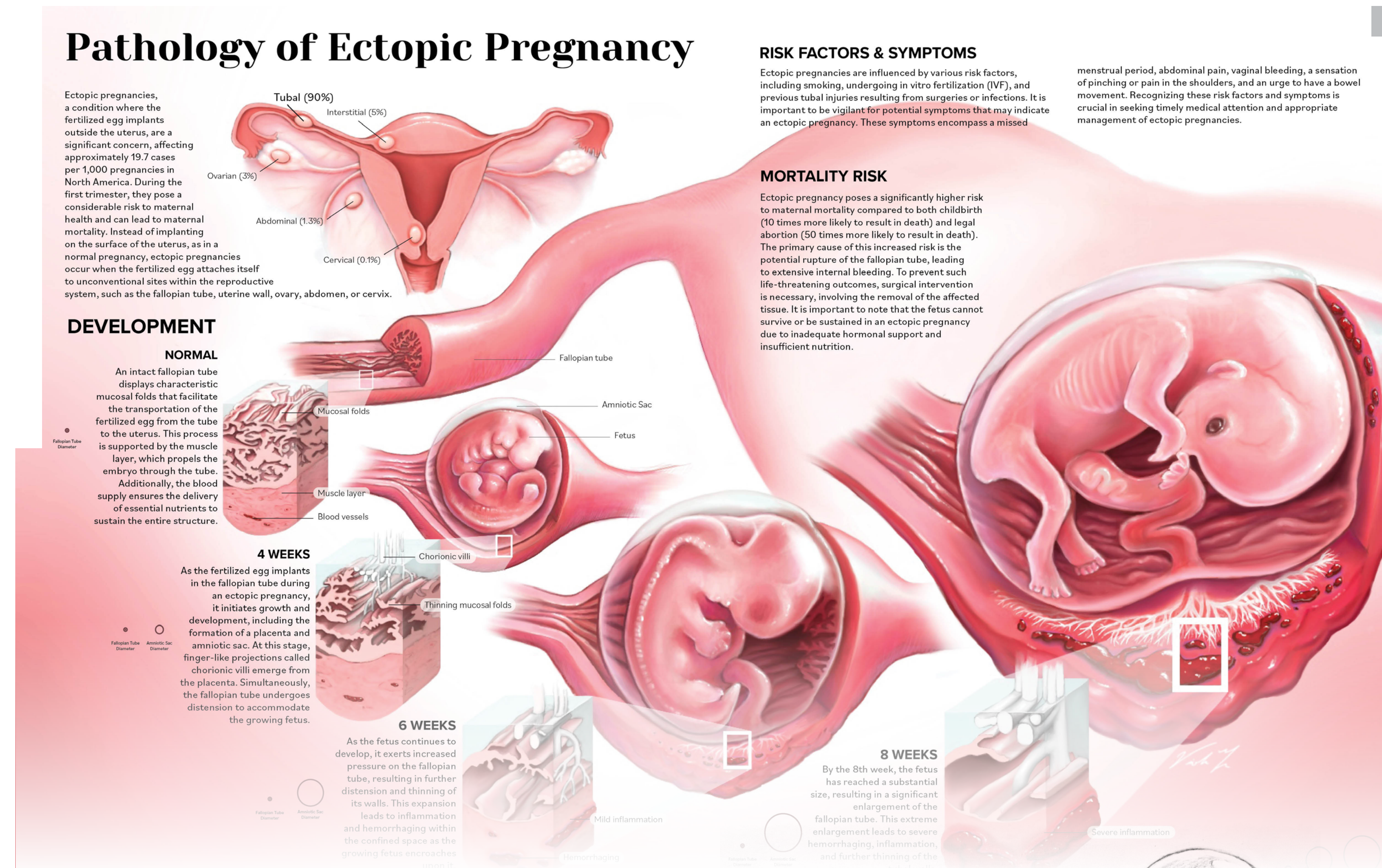

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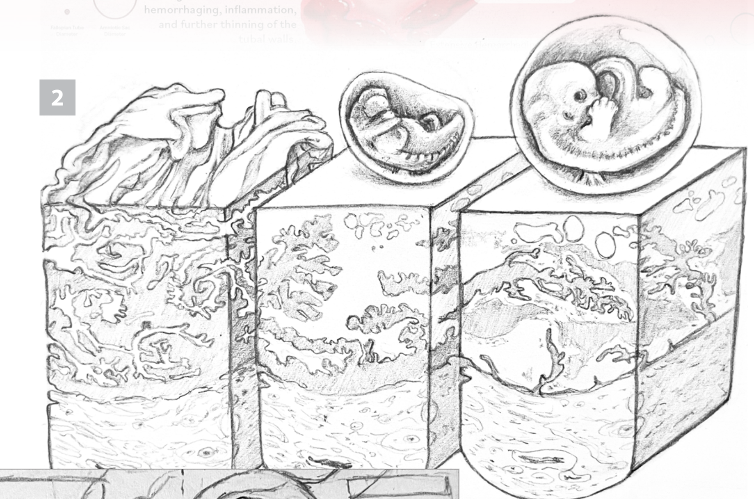

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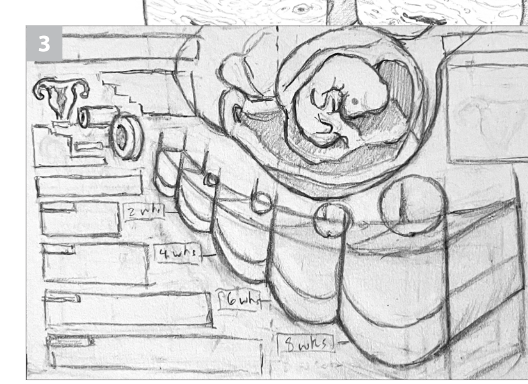


Pathological Illustration

Ectopic pregnancy occurs when a fertilized egg improperly implants in an atypical location. This two-page spread focuses specifically on a tubal ectopic pregnancy where the egg implants in the fallopian tube.

1.Final illustration. A two-page spread intended for a scientific journal describing ectopic pregnancy. It was challenging to find a way to keep the center crease free of any important visuals or text.

2. Study. I used hysteroscopy imaging and histological stains to create tissue cube sketches of the progression of the disease.

3. Sketch. The layout stage of project depicting ectopic pregnancy in the desired two-page spread.

Fourlo: Tetralogy of Fallot

Tetralogy of Fallot (TOF) is a congenital heart disease (CHD) that involves four main types of heart defects that affect the heart's ability to separate oxygenated and de-oxygenated blood. Fourlo is an interactive scrollytelling website for parents of children diagnosed with TOF. It combines still images, short animations and a self-led 3D model modules to help educate the parents about the normal heart, a TOF-affected heart, and the possible surgical repairs.

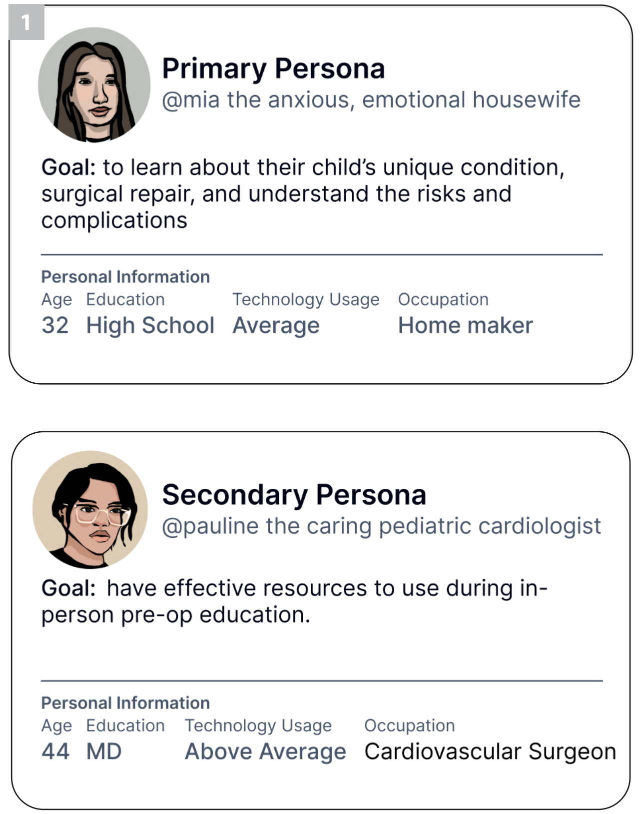
1. UX design. User personas were created based on the digital resource's primary and secondary target users.

2. UX design. After conducting interviews with the stakeholders, the main components of the proposed website were drafted into a sitemap.

3. UI design. Wireframes were created to lay out the general composition of the digital resource.

4. UI design. An interactive mockup was created in Figma to demonstrate interactivity to stakeholders and to facilitate feedback.

5. Final interactive. Images of the final prototype.



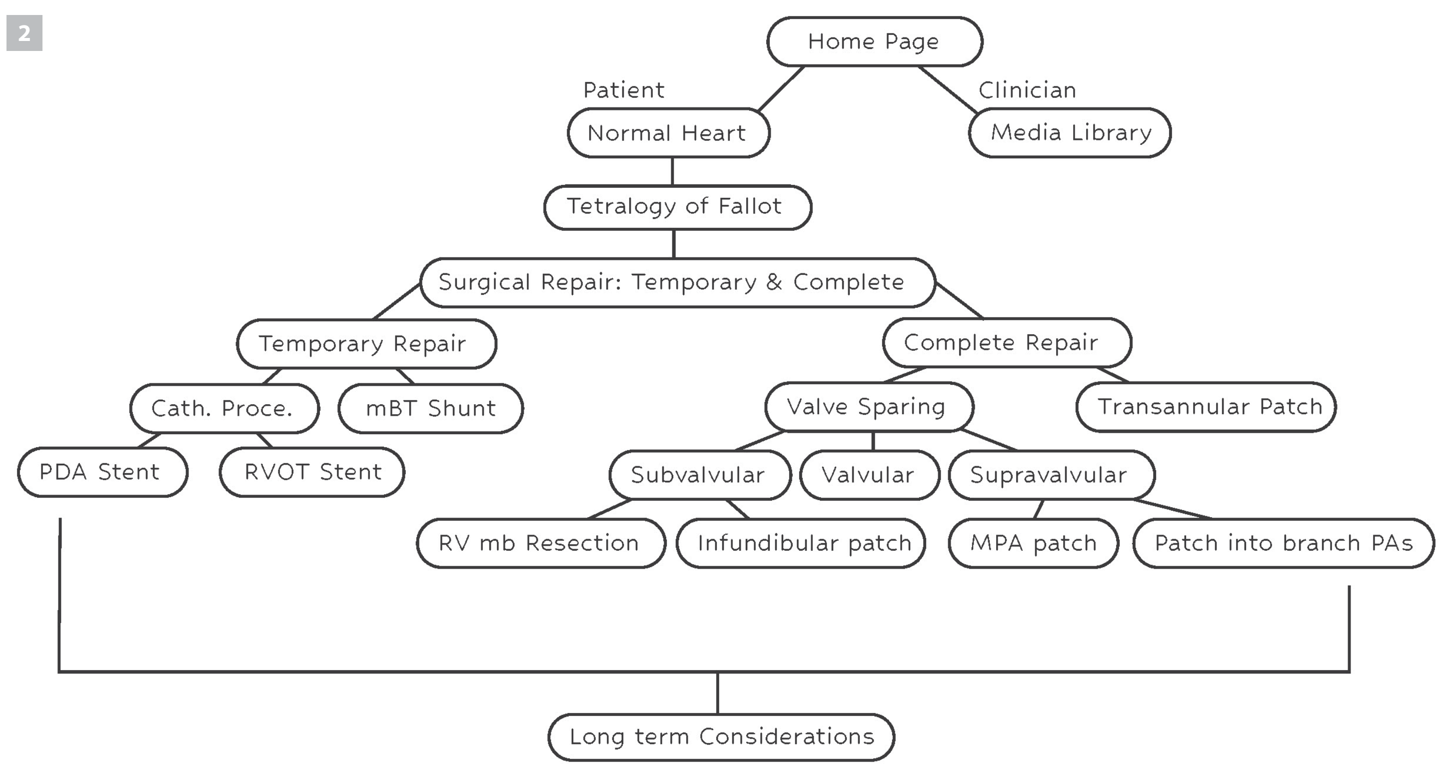
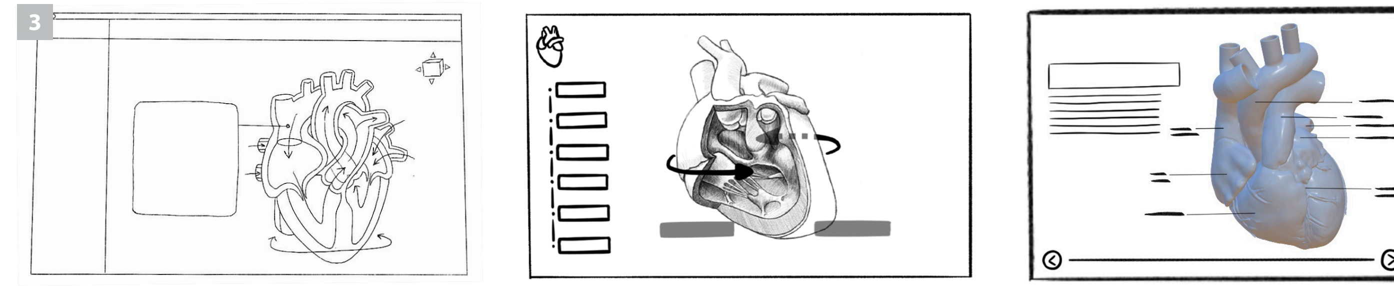
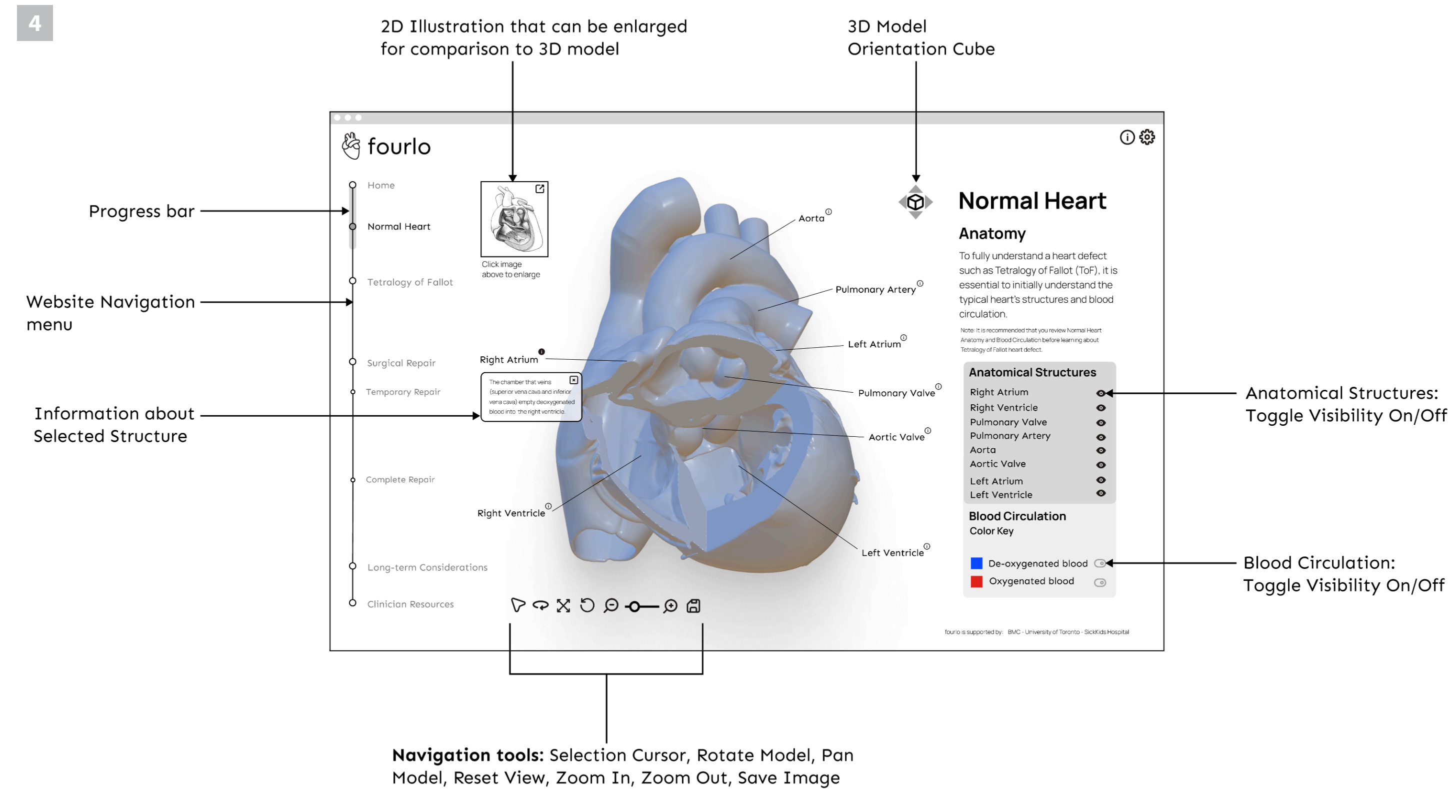
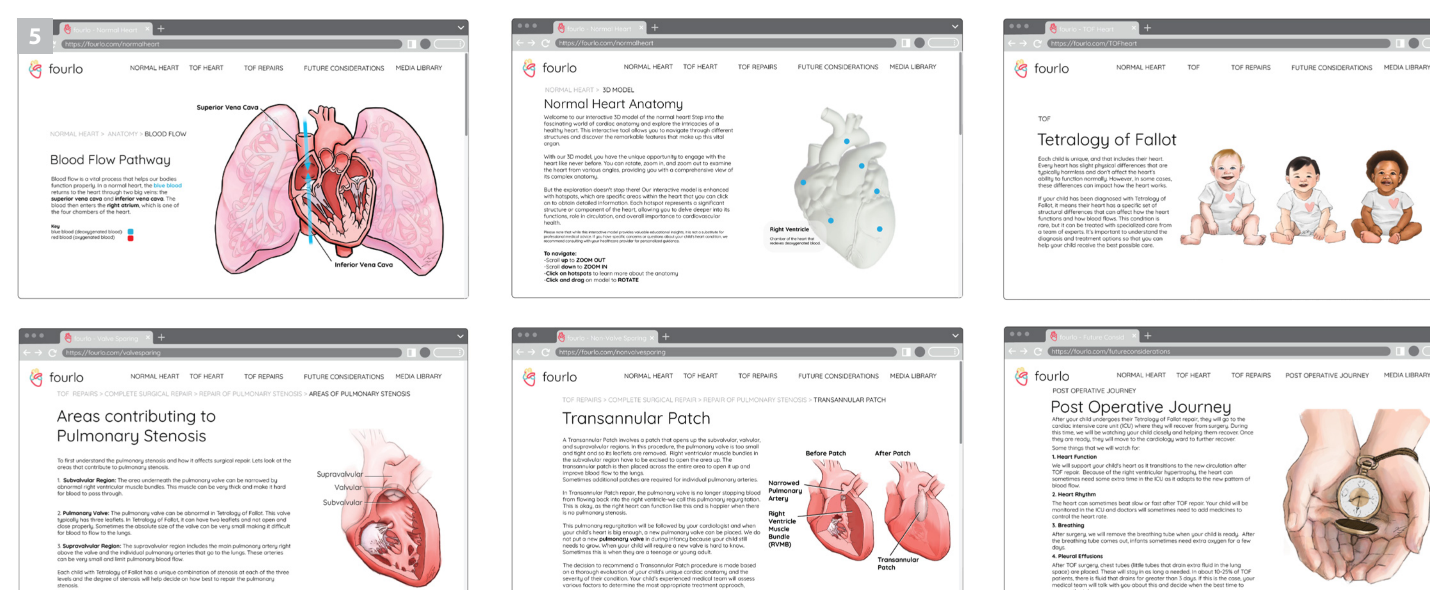
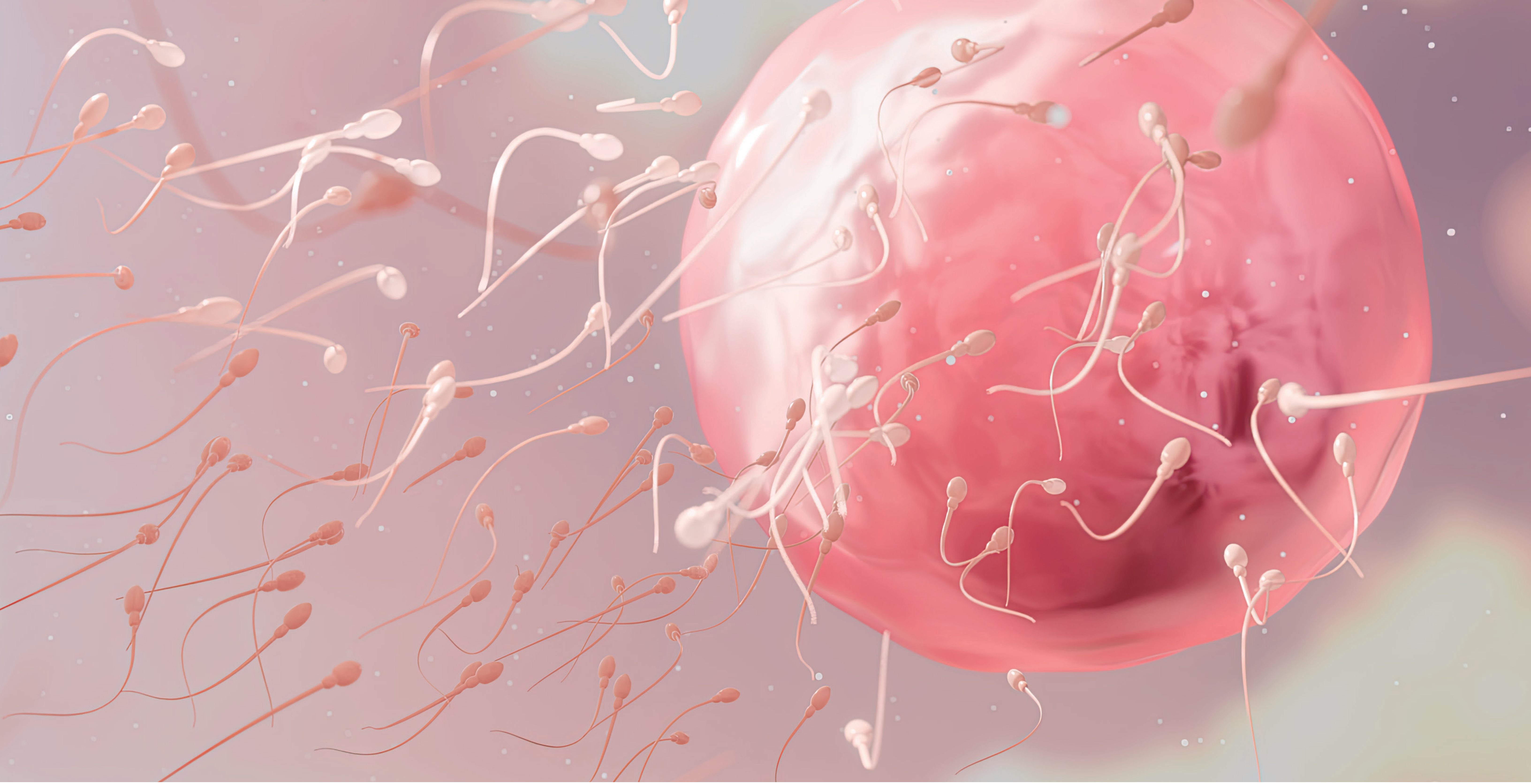


Fig. 1: Sitemap









Amy Zhu

A love of art and a love of science have been two lifelong constants for me — working as a biomedical communicator, I am grateful to be surrounded by the things I enjoy and share them with others. By working with scientists, healthcare professionals, and patients to craft visually compelling narratives, I hope to foster an environment of equity and accessibility, and create a meaningful change in the world and people's lives.

Pathological Illustration

Pulmonary barotrauma occurs due to the body's inability to adapt to rapid changes in pressure, often as a result of ascension during diving. This editorial illustration depicts the pathology of pulmonary barotrauma as well as arterial gas embolism, which causes a stroke downstream in the body.

1. Sketch. Pulmonary barotrauma has a disease progression that is atypical and occurs at different areas of the body. During the sketching phase, I explored many possible layouts to best convey its progress.

2. Final draft. Further refining the sketch and placing text, the final layout features an immersive environment depicting damaged alveolar sacs and an arterial gas embolism in a brain capillary.

3. Study. Various colour palettes and combinations were considered, both for aesthetic appeal and for comprehension and clarity.

4. Production process. Here is a stepwise example of rendering on the air bubble of the arterial gas embolism.

5. Final illustration. The final layout includes the background image, but also insets and graphics further detailing the effects and stages of this disease.

Previous spread. A still from my Master's Research Project.

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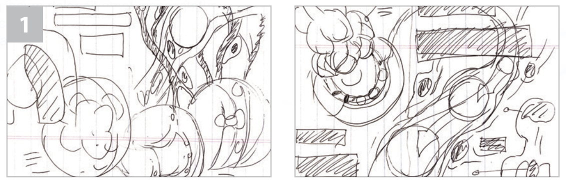

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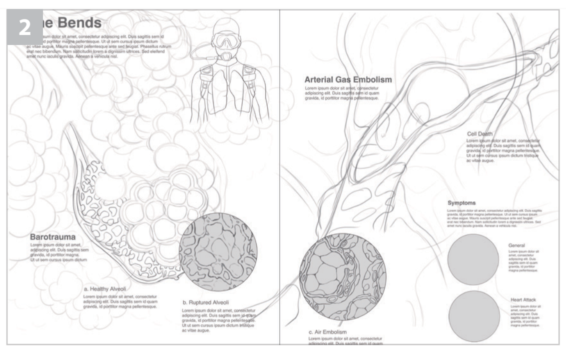

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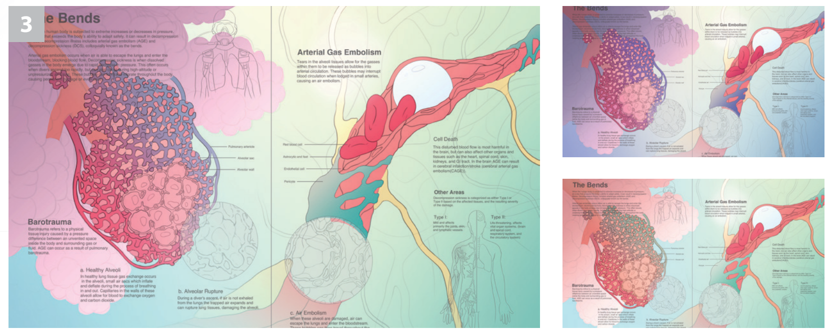

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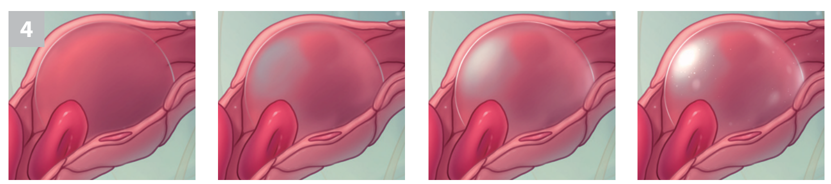

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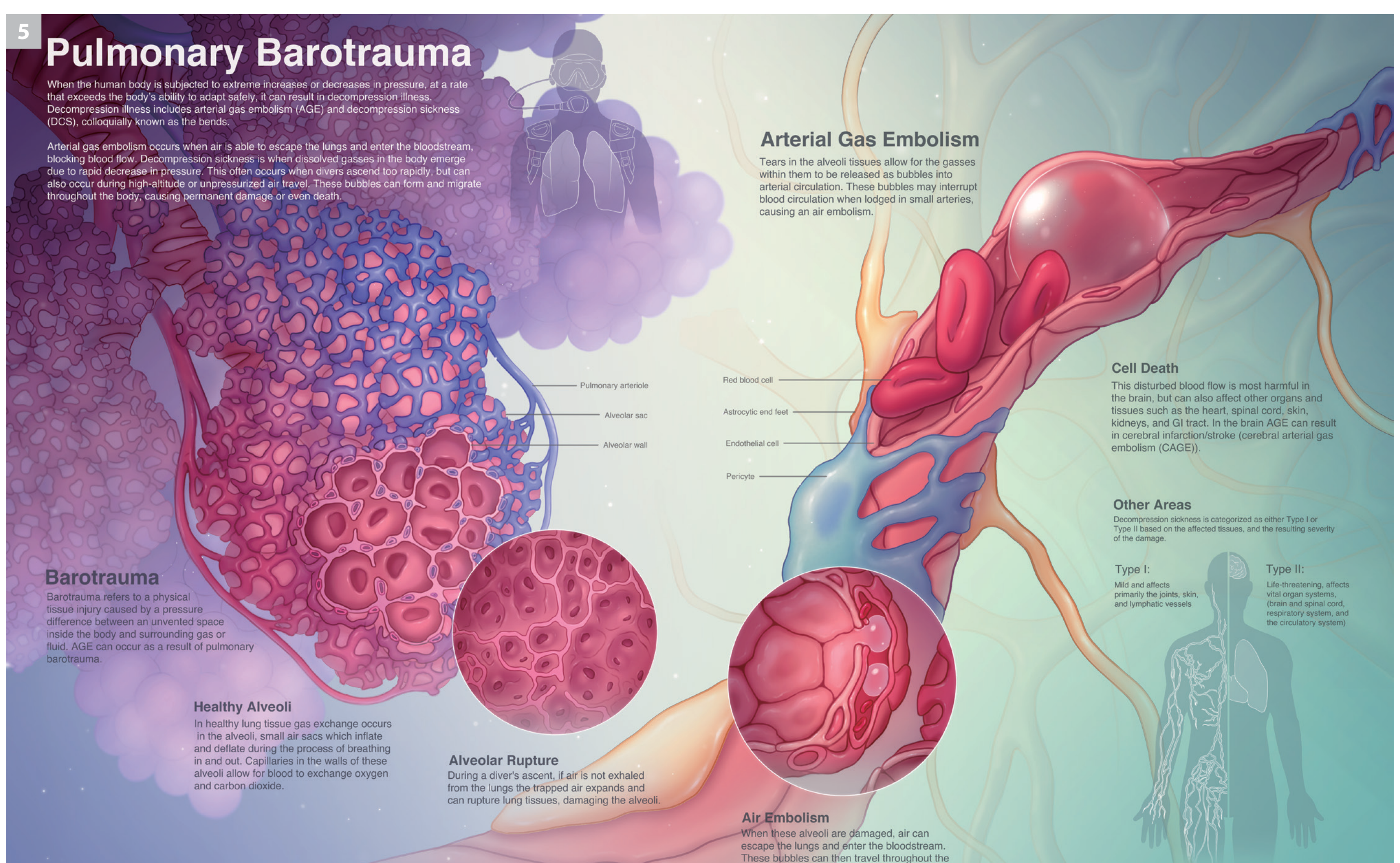

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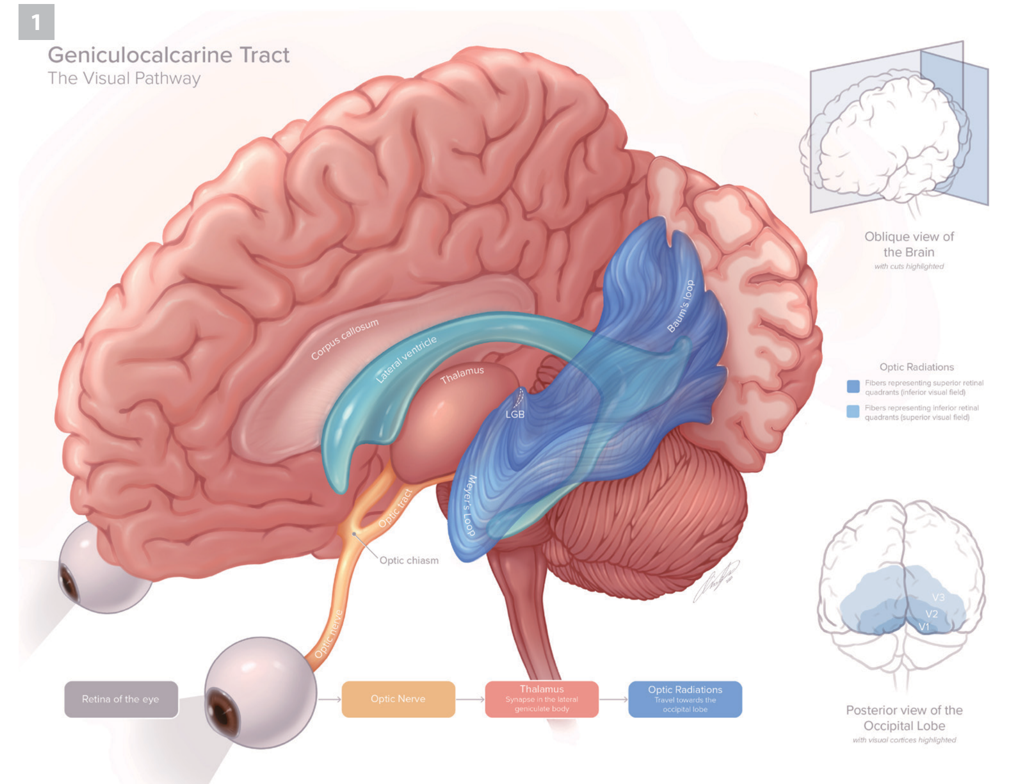

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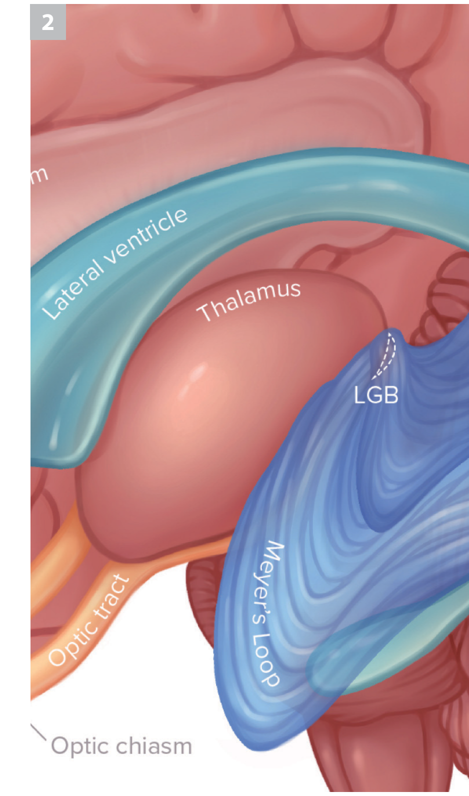

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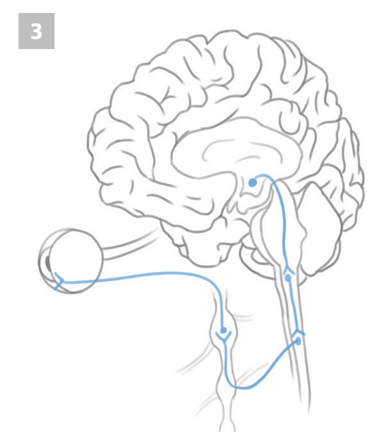

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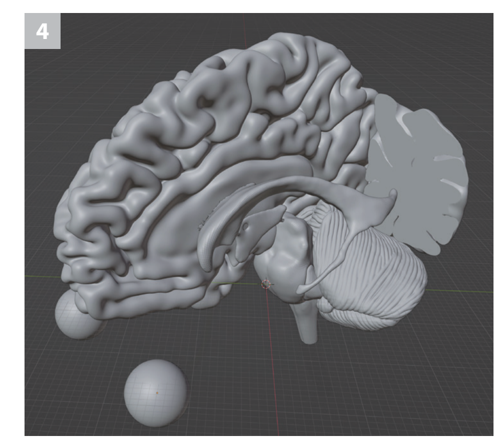

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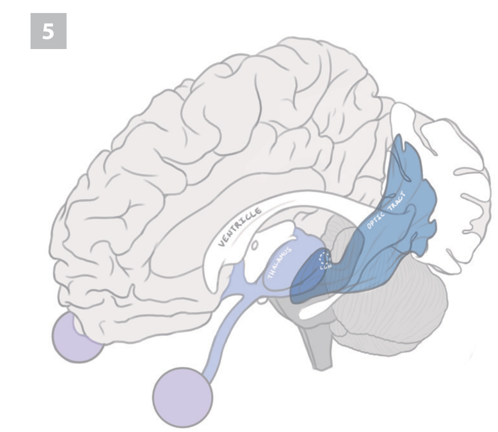

Neuroanatomical Illustration

This illustration depicts the geniculocalcarine tract, or visual pathway. Using 3D models, data from current research, as well as dissection images, this illustration was created to highlight the unique texture of these tracts and the way they curve in 3D space around the other structures of the brain.

1. Final illustration. This depicts the tracts of the visual pathway as they originate at the lateral geniculate body and terminate towards the occipital lobe.

2. Final illustration. A close-up of the final illustration shows the rendering of the piece, as well as the featured anatomical landmarks.

3. Sketch. Early development included research and rough sketches exploring possible ways to depict the visual pathway.

4. 3D modelling. A maquette was created with 3D models generated from scan data to create an accurate anatomical reference to draw from.

5. Final draft. The final layout of the image was decided, showing the visual pathway from the eye, to the optic nerve, thalamus, and optic radiations.

Interactive Game Design

Biome Blocks is a 3D interactive game that educates players about prehistoric environmental conditions that contribute to animal life and extinction. Our game intends to introduce these concepts through play-based learning, allowing the user to gain a deeper understanding and appreciation of the interconnected elements of a biome.

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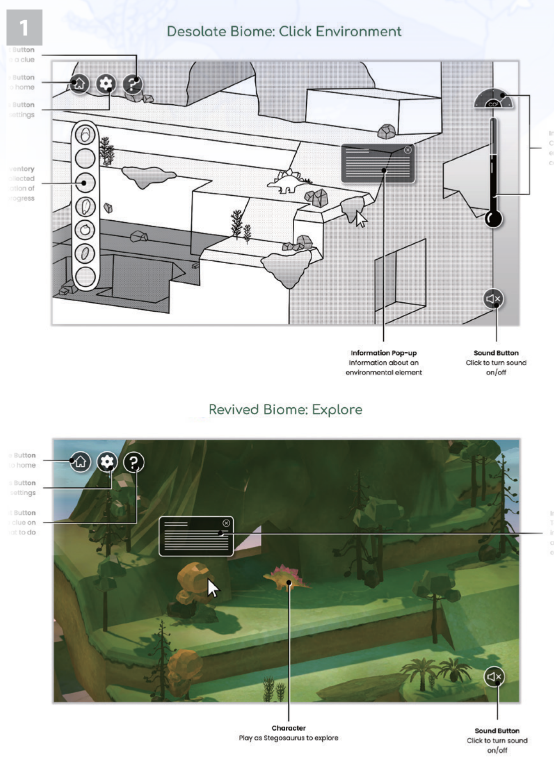

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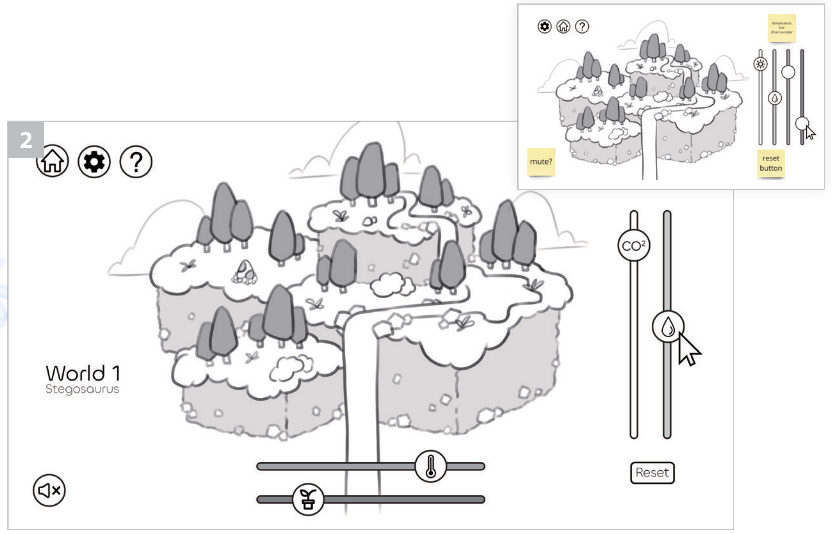

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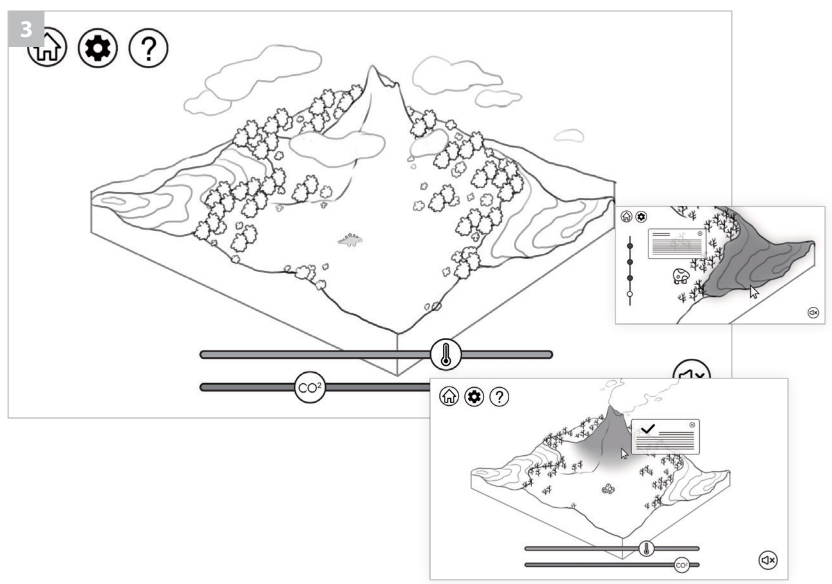

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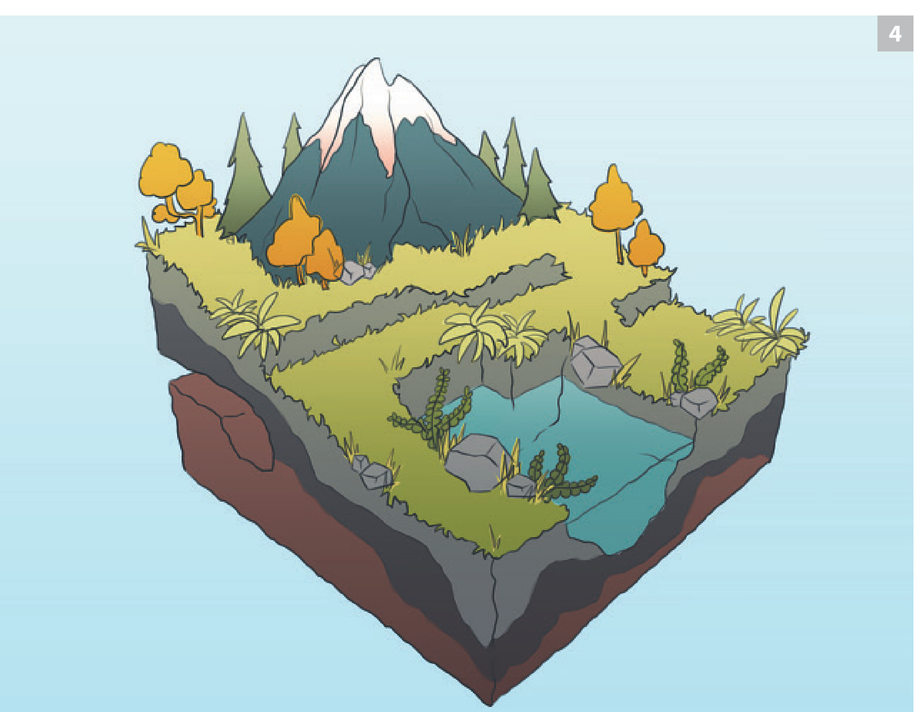


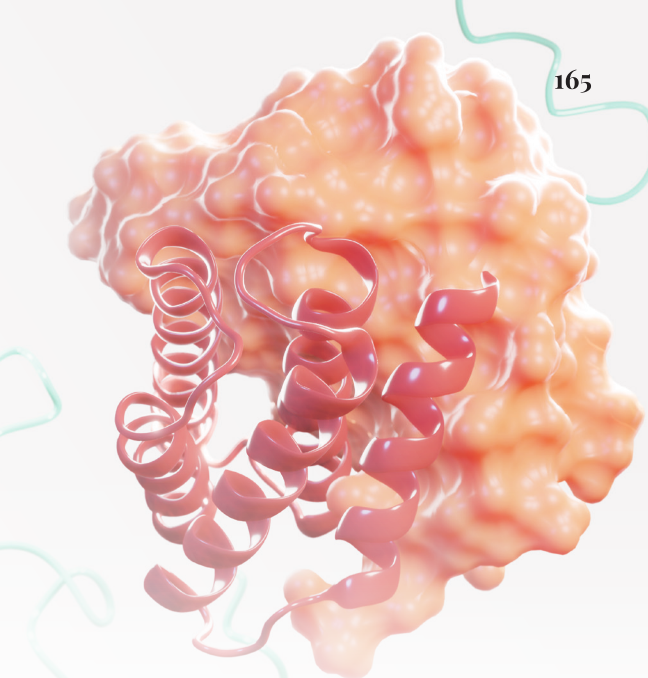
1. Production process. Here the gameplay and UI elements are displayed both with the concept art and with the finished 3D Unity environment.

2. UX/UI Design. Concept A: The initial design phase included development for the game world as well as interactable elements in the environment, integrating our research with game play mechanics.

3. UX/UI Design. Further refinement to gameplay led to the development of a clickable environment, and multiple phases that included resource collection, environment modification, and exploration.

3. Final illustration. This piece of coloured concept art shows the final game environment, which was then created with 3D in Unity.

Molecular Visualization



This molecular visualization project is an indepth dive into spider silk and what gives it its remarkable properties. From its unique chemical makeup to its physical structure, spider silk represents a promising future for research in material sciences.

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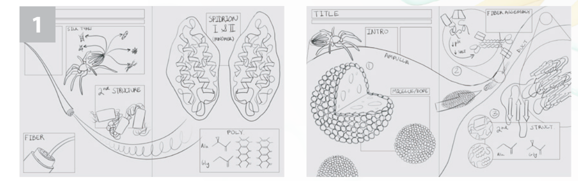

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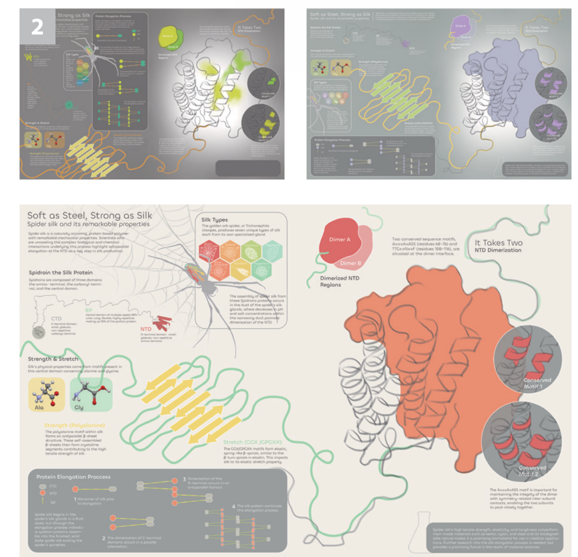

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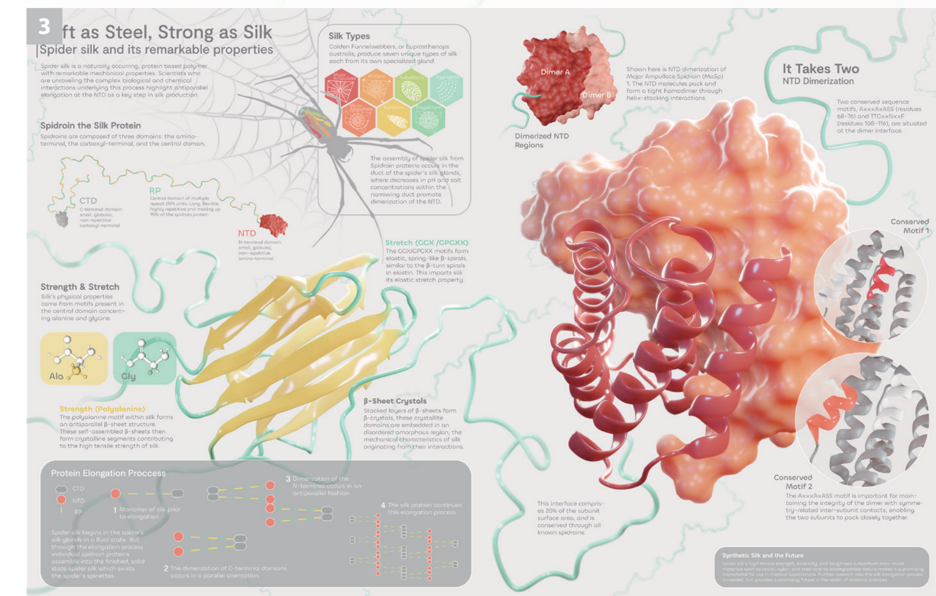

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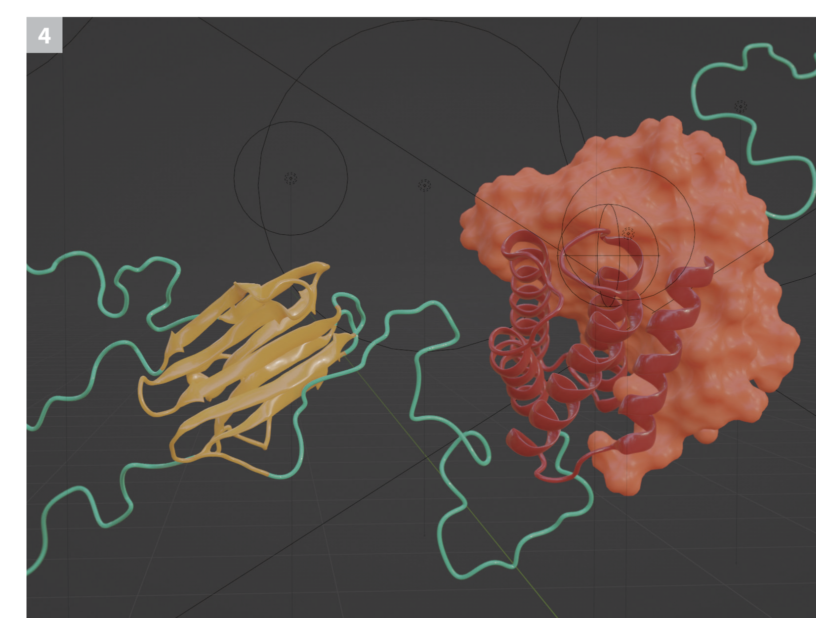


1. Sketch. Spider silk has a very complex structure, so research was conducted to gain an understanding of this material and to focus in on the most interesting and important features of its structure.

2. Final draft. Multiple iterations of the layout were produced with various text, image, and colour configurations.

3. Final illustration. The final spread includes all 3D, 2D, and textual elements, together covering silk structure, dimerization, and how they give spider silk its distinct stretch and strength.

4. 3D modelling. Spider silk is mostly intrinsically disordered, so while 3D models from databases (PDB, UniProt, etc.) were used, sections of the protein had to be manually created. Made based on research and visual references to most accurately depict the true structure of the protein.

IUI & U: Patient Education at Mount Sinai Fertility

This patient education video was created in partnership with Mount Sinai Fertility (MSF) to explain the IUI (Intrauterine Insemination) procedure to incoming patients. Working closely with practitioners, clinic nurses, and patients themselves this 3D animation was developed to supplement the current print and online resources.

1. Notes. A needs assessment was conducted based on interviews with MSF patients, from which I developed preproduction materials that targeted areas of concern and confusion.

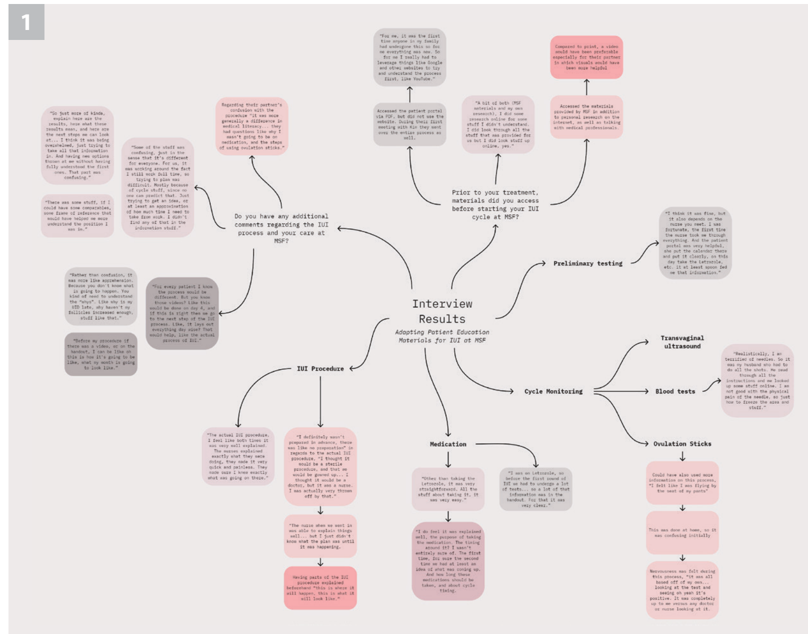
2. Production process. During the media audit and needs assessment, the visual presentation of anatomical/surgical processes were highlighted as an source of stress for patients; this was taken into consideration when designing visual elements.

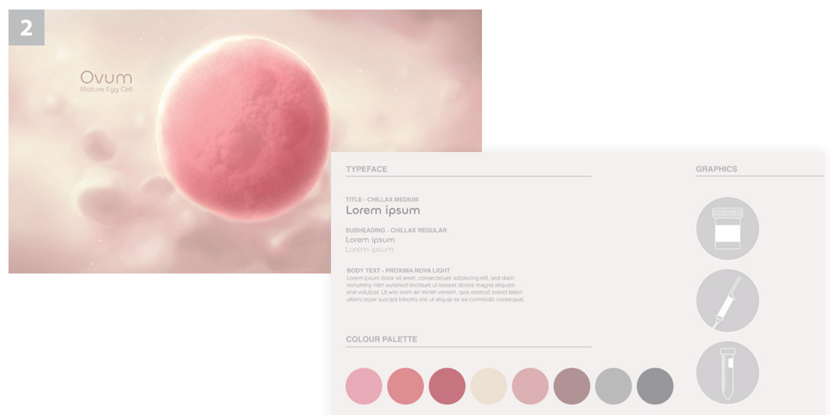
3. Final animation. Patient experience was considered in all aspects of the final video, including narration, colour palette, fonts, 3D texturing, animation, and music which were all utilized during the final composting process.

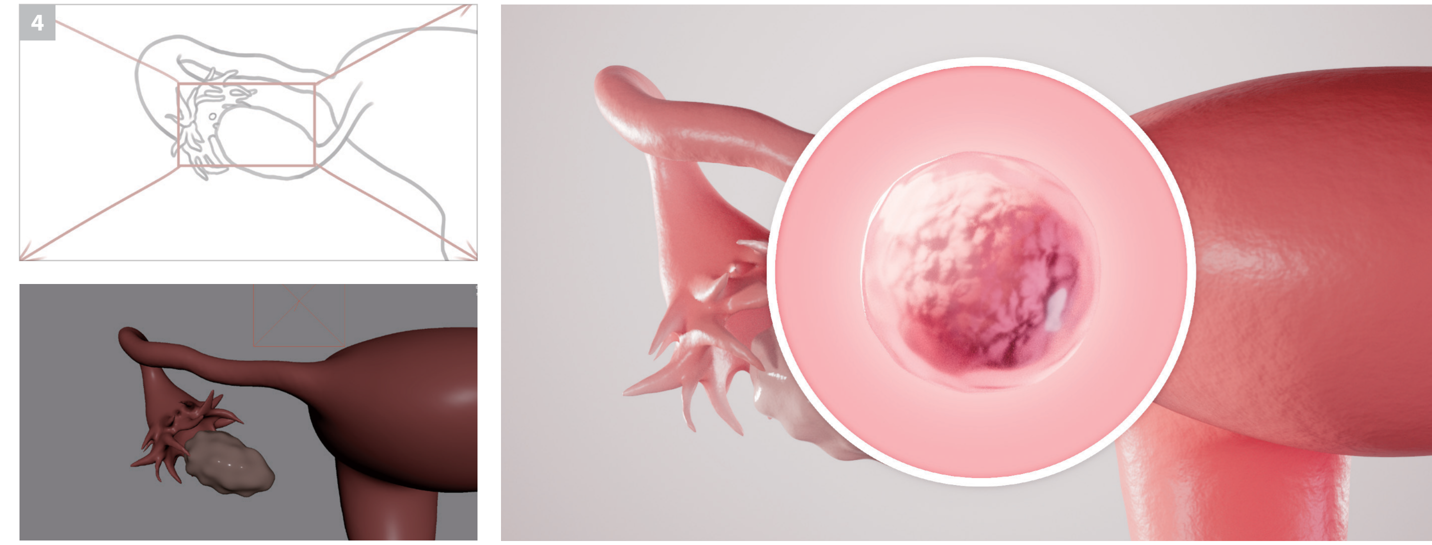
4. Production process. Existing media depicting IUI tend to have a realistic/visceral style for anatomical structures. Based on feedback, I chose a more stylized texturing approach while maintaining structural accuracy.

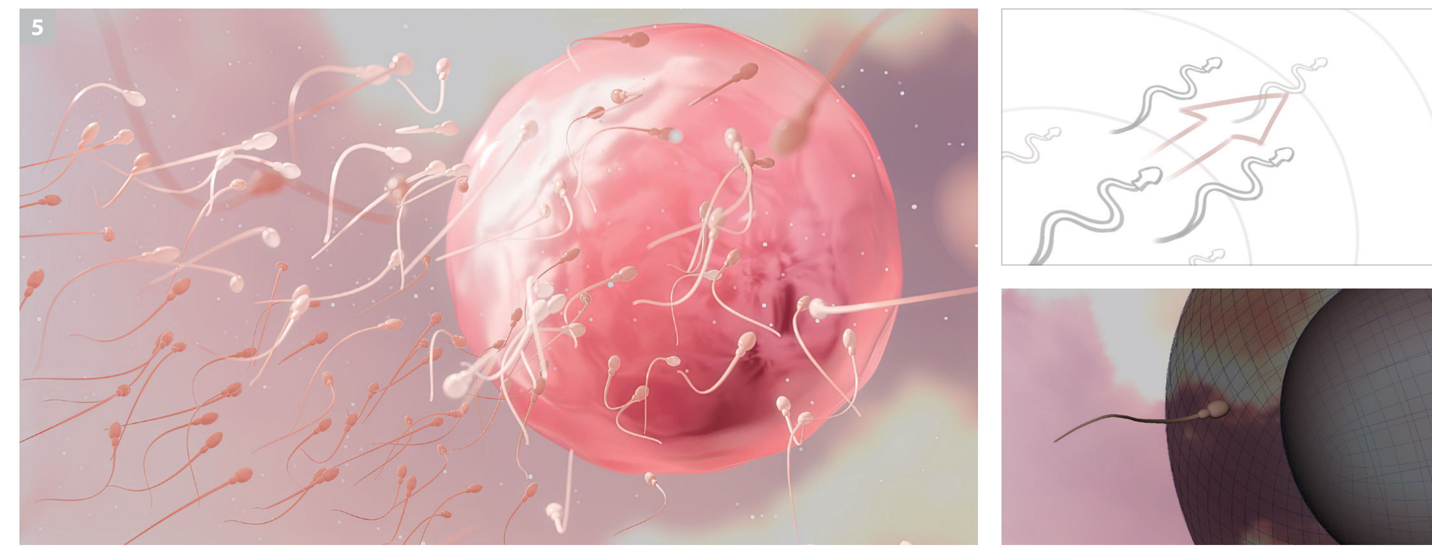
5. Production process. These immersive environments were created as a cinematic depiction of the fertilization process, made in Maya and composited in After Effects.

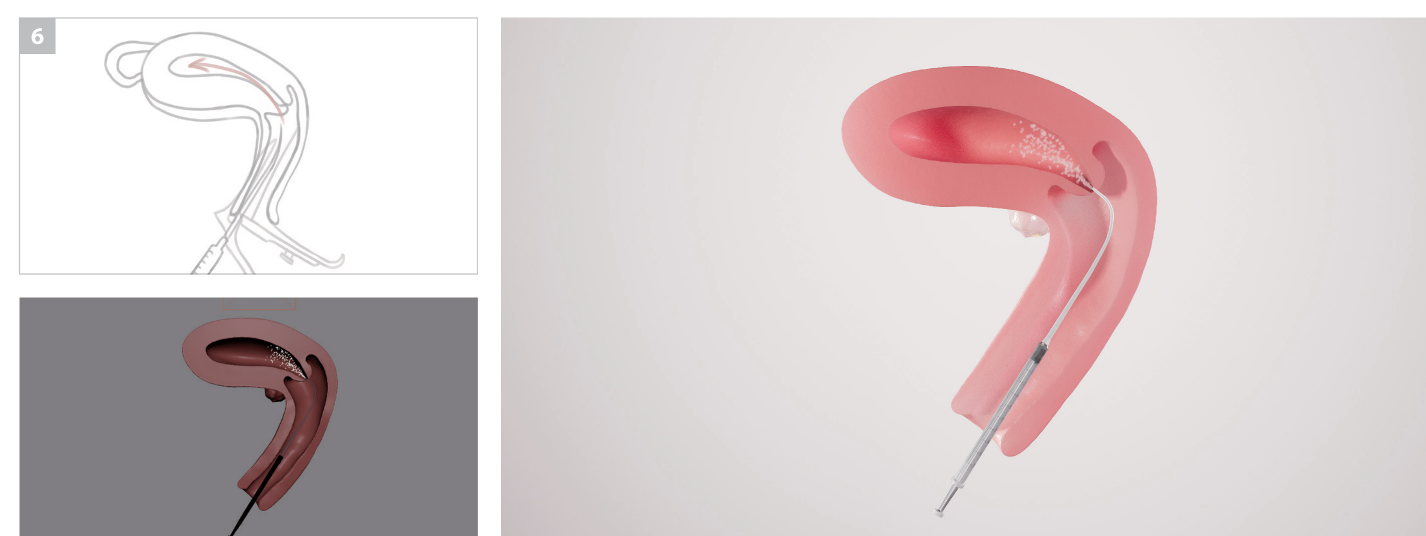
5. Production process. Anatomical models were produced based on research and feedback from practioners, and surgical tools were modelled based on the real tools used at the clinic for accuracy.











Project Glossary

The course descriptions listed below correspond to the project spreads found throughout the Viewbook, and are intended to provide additional context regarding the learning objectives for project work completed during the BMC program. While not an exhaustive list of BMC course requirements, these descriptions provide a glimpse of how students are taught to apply critical thinking and scientific research skills to visualize and communicate complex concepts.

MSC2001Y

Visual Representation of Medical Knowledge

(Anatomical Illustration, Surgical Illustration)

Emphasizing the theories of perspective, colour, design and storyboarding as they relate to textbook and journal illustration, this course follows a seminar format where students complete readings and applied assignments in cellular and surgical illustration. The objectives are to enhance problem solving, rendering, and time management skills.

MSC2002H

Sequential Medical Communication

(Medical Legal Illustration)

This course focuses on relationships between content, medium and audience to visually clarify complex medical and scientific concepts for sequential storytelling in medical malpractice and personal injury cases. Relationships are examined through the design and creation of demonstrative evidence for the Canadian courtroom.

MSC2003Y

Biomedical Communications Technology

(3D Modelling, Editorial Illustration)

The goal of this course is to provide a foundation for the use of digital 3D media technologies in the communication of scientific research and medical/health information. To start, students focus on digital organic sculpting and the extraction of anatomical data from medical imaging for use in visualization. Student then turn their attention to digital 3D modelling and rendering for the creation of editorial-style visual media.

MSC2006H

Advanced Media Design Technologies

(Interactive Game Design, Interactive Animation)

Building on the principles presented in MSC2003Y, Biomedical Communications Technology, this course allows students to explore high-performance visualization and/or human-computer interaction as it applies to instructional technology and research.

MSC2011H
Special Topics in Biomedical Communications

(2D Animation)

This course is designed to cover emergent issues in the field of Biomedical Communications, providing students with the course time necessary to explore areas not covered in typical curriculum. Topics suitable for this course change from year to year but can include novel technology or software not covered in other courses; for example: 2D animation, advanced surgical illustration, ichthyology, entomology, or any other relevant areas of scientific illustration.

MSC2012H
Neuroanatomy for Visual Communication

(Neuroanatomical Illustration)

Taught by faculty members from BMC and the Department of Anatomy, this course requires students to independently produce a series of original, conceptual neuroanatomical illustrations suitable for a medical student textbook. The main objectives of the coursework are to enhance students' knowledge base, problem solving, presentation, time management, and rendering skills, while conforming to set criteria for textbook publication.

MSC2018H
Visual Representation of Processes in Pathology

(Pathological Illustration)

This course includes pathology lectures delivered by faculty from the Department of Laboratory Medicine and Pathobiology and an illustrative component supervised by faculty from BMC. Students work to produce an original, conceptual medical illustration demonstrating pathological change in a tissue over time.

MSC2020H
Visual Representation of Biomolecular Structure and Function

(Molecular Visualization)

This course explores the structure and function of biologically-relevant macromolecules and their visual representations. Key concepts include the examination and visualization of molecular structure, environment, interaction, and dynamics. The main goal of this course is to equip students with the fundamental knowledge, language, and practical skills necessary to create accurate visual depictions of these biologically-important macromolecules and associated processes for different audiences.

MSC2022H
Graphic Medicine Seminar

(Graphic Medicine)

"Graphic medicine" is a term often used to describe the growing body of creative work (graphic novels, webcomics, and hybrid forms) that deals with issues of illness and caregiving from the perspectives of patients, family members, caregivers, and healthcare professionals. In this course, students become familiar with major works of graphic medicine, science comics, and key theoretical texts related to sequential art. As their major project, students develop their own graphic narrative on a medical or scientific theme.

MSC2023H
Information Visualization

(Information Visualization, Data Visualization)

This course addresses the fundamental principles of information visualization, including a discussion of human visual perception, cognition, and approaches to graphic representation. Practical application of course material requires students to develop visualizations that yield insight into complex biomedical subject matter and successfully communicate to a range of audiences.

Acknowledgments

Three years ago, I started my BMC journey behind a computer screen from the safety of my own home during the height of the COVID-19 pandemic. So much has changed in such a short time, and now as life gradually returns to normalcy, it's remarkable to see how BMC continues to evolve and adapt. Even during all the uncertainty in the past several years, the Viewbook remained an upheld tradition by our former Head Viewbook Editors, Alexander Young and Geoffrey Cheung, and I'm so grateful to have the opportunity to continue its legacy.

I extend my heartfelt thanks to all the students who generously shared their incredible artwork for the creation of the sixth volume of the MScBMC Viewbook. To our current BMCAA executives, thank you for all of your support and for helping us bring the Viewbook to life. I also want to express my profound gratitude to Jodie, Michael, Maeve, and the entire BMC faculty and staff for their continuous support, not only for the Viewbook but also for the guidance and inspiration that they provide to each graduating class.

Lastly, a special thank you goes to my fellow editors, Aimy, Amy, and Tracy. Not only are you exceptionally talented designers, but you are also wonderful friends. Working together has been an absolute joy, and I am deeply grateful for your unwavering dedication and the countless hours you've poured into this project. This year's Viewbook wouldn't have been possible without the extraordinary contributions of each one of you.

— Amy Assabgui Dogan

"...Art is knowing which ones to keep."

— Scott Adams

Biomedical Communications
Alumni Association

Master of Science in Biomedical Communications
University of Toronto
Ontario, Canada