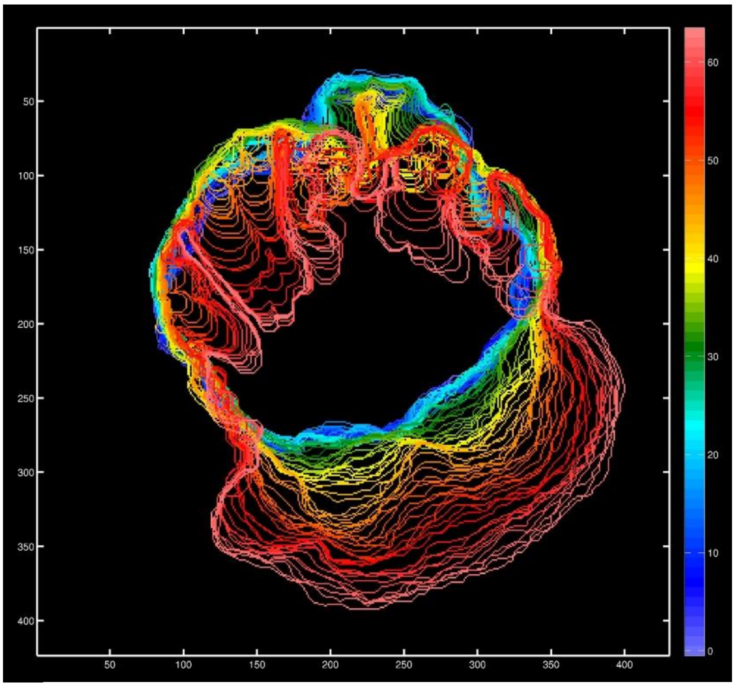
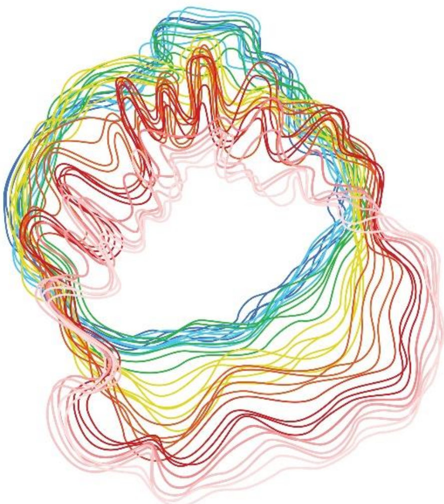
Human skin cell





This image by shows the movement of a human skin **stem cell** responding to skin **injury**. Damaged skin cells send chemical signals to skin stem cells which initiates their **migration** to the site of the injury to replace the damaged tissue. Alexis was able to record this behaviour using digital video cameras connected to a microscope looking at an individual human skin stem cell. The cell edge was tracked over time, & the outlines were used to measure how the cell shape changed in response to wound alarming signals. The cell edge outlines at different time points were overlapped & color-coded so that early time points are represented by cold colours (blue), & late time points by hot colours (red).

Image by Alexis Lomakin

Nerve cells

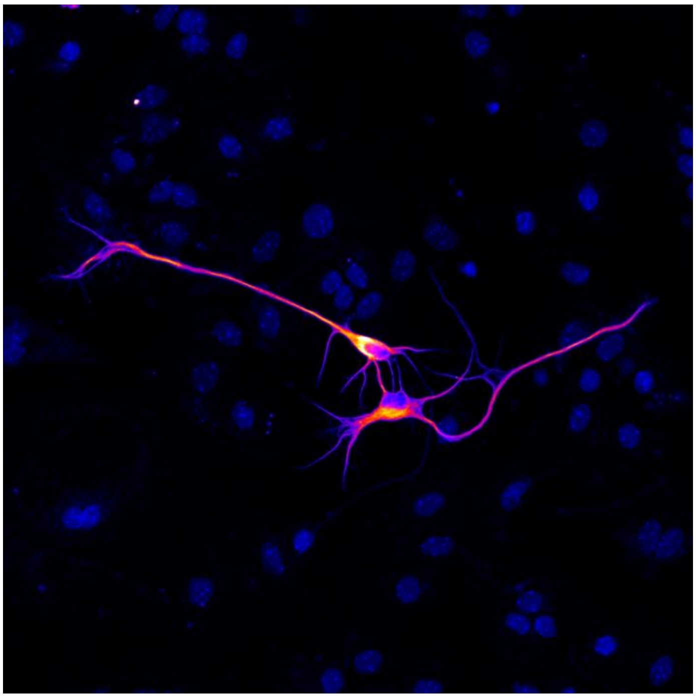
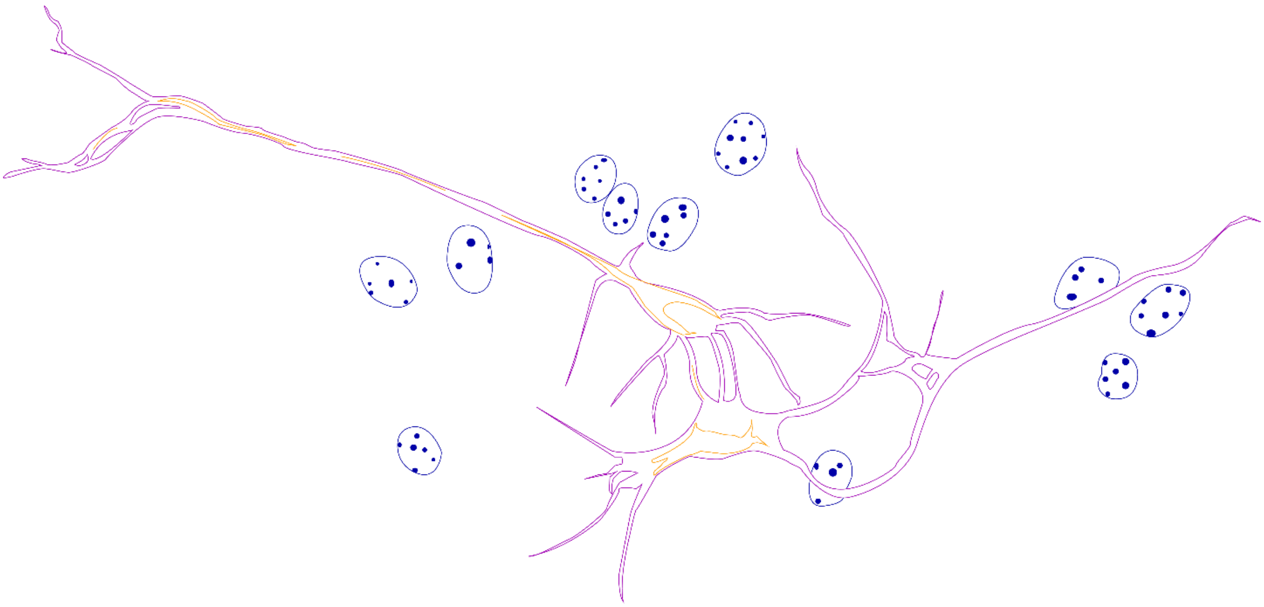


Image by Ieva Berzanskyte

These nerve cells (**neurons**) were grown from human embryonic **stem cells**. They have been stained to show that they are a specific type of nerve cell: interneurons. Interneurons act as the cell which communicates messages between sensory **neurons** (those that sense the outside world) and **motor neurons** (**neurons** that respond to senses and tell **muscles** to move). By growing these cells in the lab, they may one day be used to repair damaged nervous systems of patients with paralysis.



Skin Cells

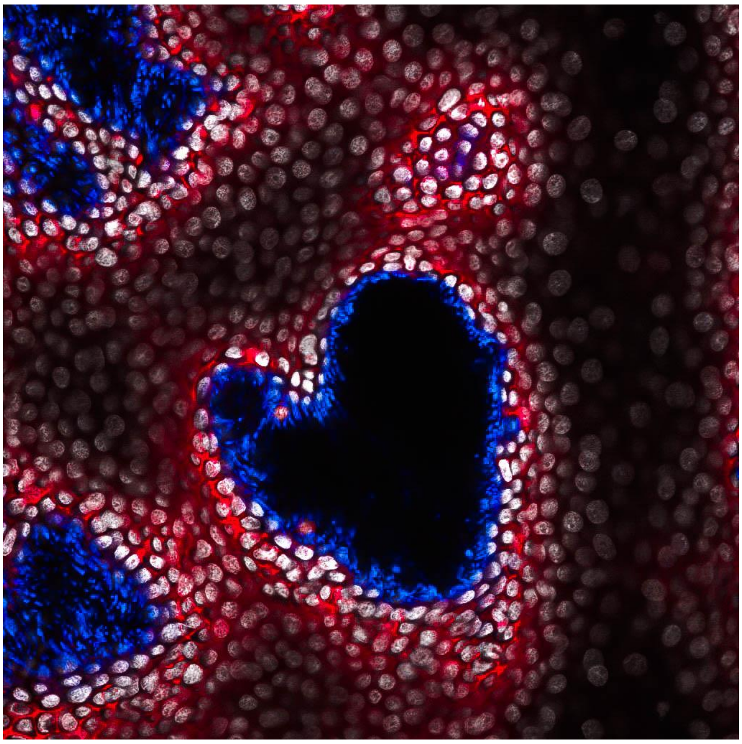
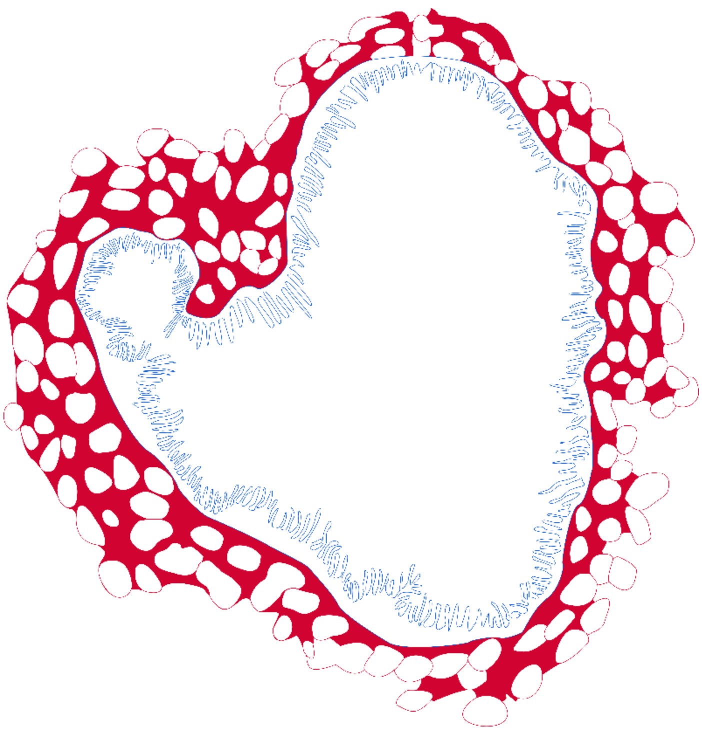
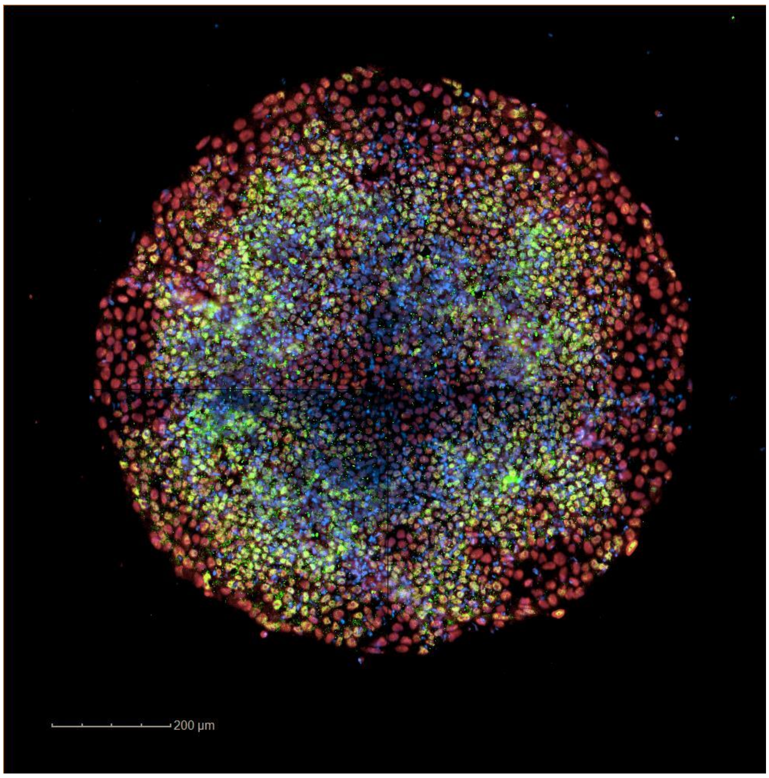


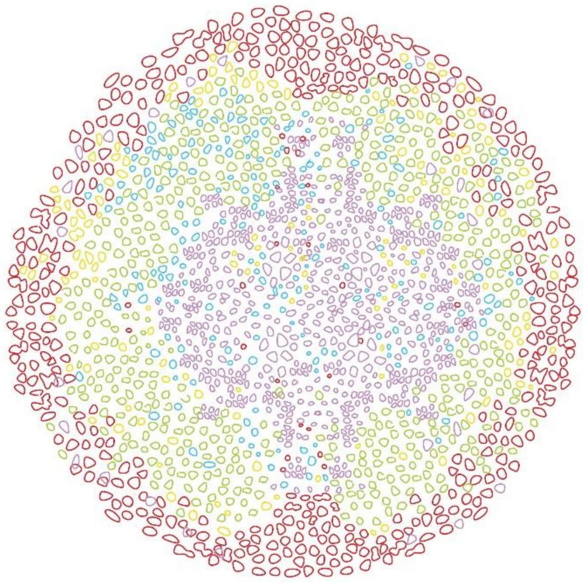
Image by Benedicte Oules

Image of the cells of the epidermis. The cells were labelled with tags that glow under the light of a special microscope. The white colour has tagged the nucleus of each cell, the red identifies a **protein** called keratin which is made by epidermal cells in response to skin injury, and the blue labelled structures are a **protein** that holds together various layers of the skin.



Developing embryo

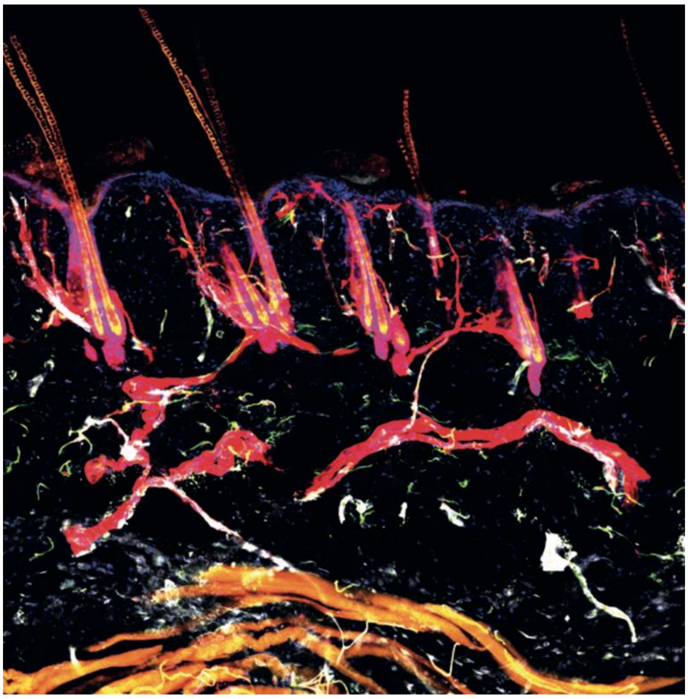




This beautiful cluster of cells is called a gastruloid, which is an early stage of a developing **embryo**. **Stem cells** derived from donor tissue (induced **pluripotent stem cells**) were grown in conditions to recreate human embryonic development. They were then stained to show the presence of **proteins** that are typically observed in the three germ layers (**endoderm**, **mesoderm** and ectoderm), which are the first distinct cell types that come from **stem cells** in a developing **embryo**. Cells stained red are endodermal, and go on to form tissues such as the lung and **pancreas**; the cells labelled green are mesodermal, which will form red **blood cells** and cardiac cells; and the blue colour labels the cell nuclei.

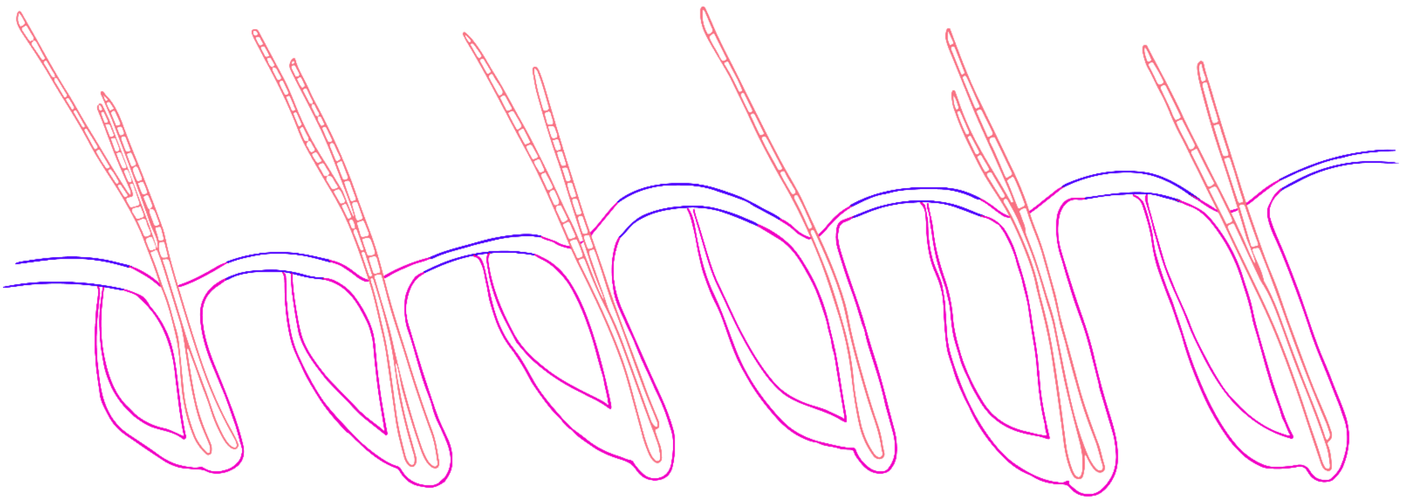
Image by Alice Vickers

Mouse skin



This is a section of mouse skin 10 days after acute UV radiation. The aim of the experiment was to view how the micro **blood vessels** beneath the epidermis which are associated with the hair follicles change in response to UV exposure.

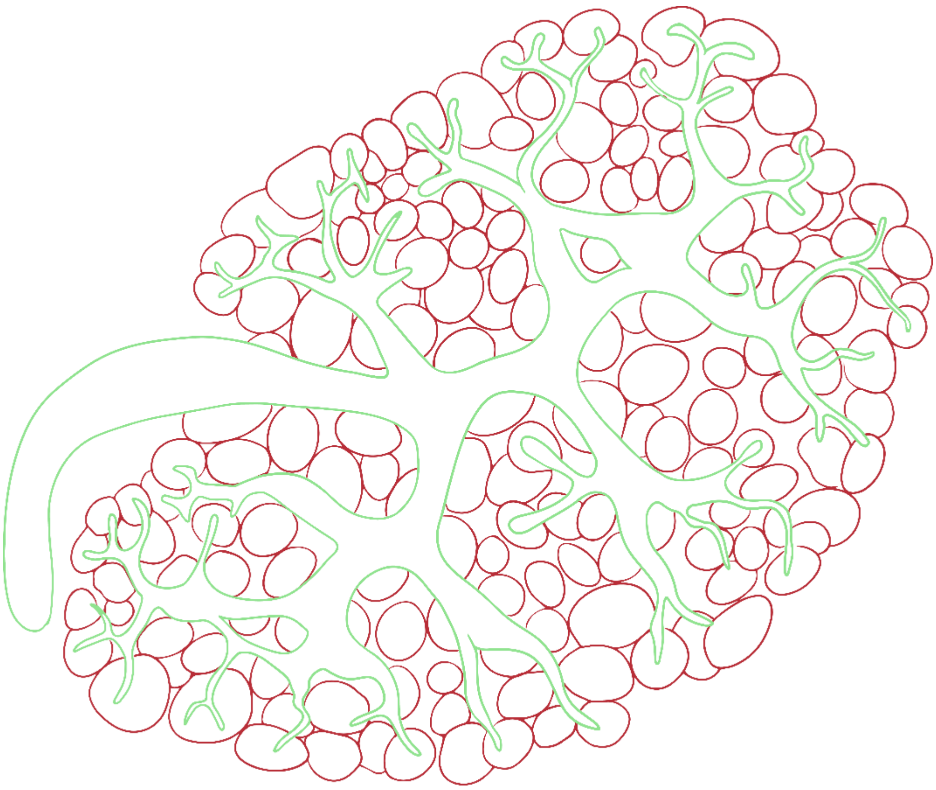
Image by Georgina Goss



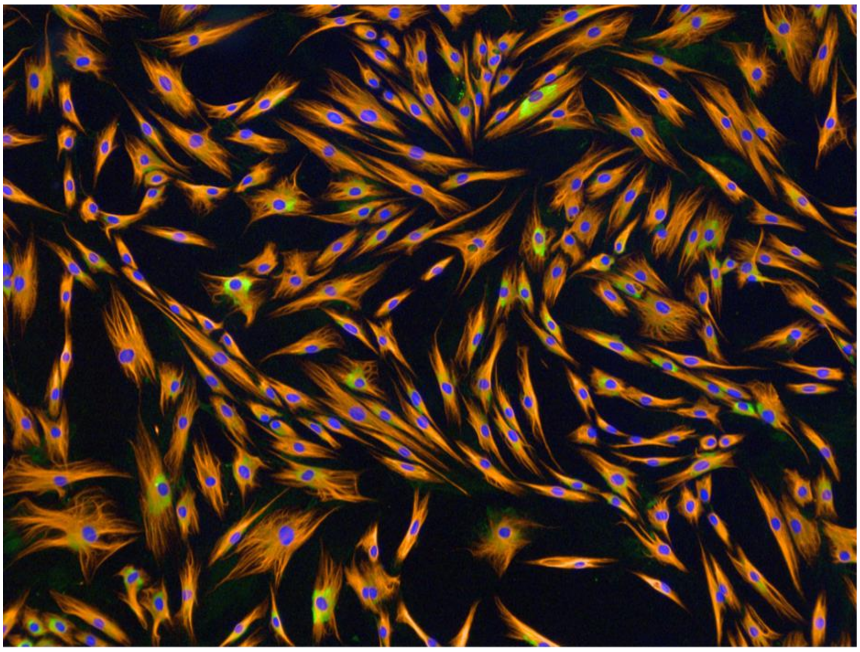
Developing mouse kidney

This image is a section of a developing mouse **kidney** at day 14.5 of **embryonic development**. The image was taken with a confocal microscope.

Image by Chloe Hurling

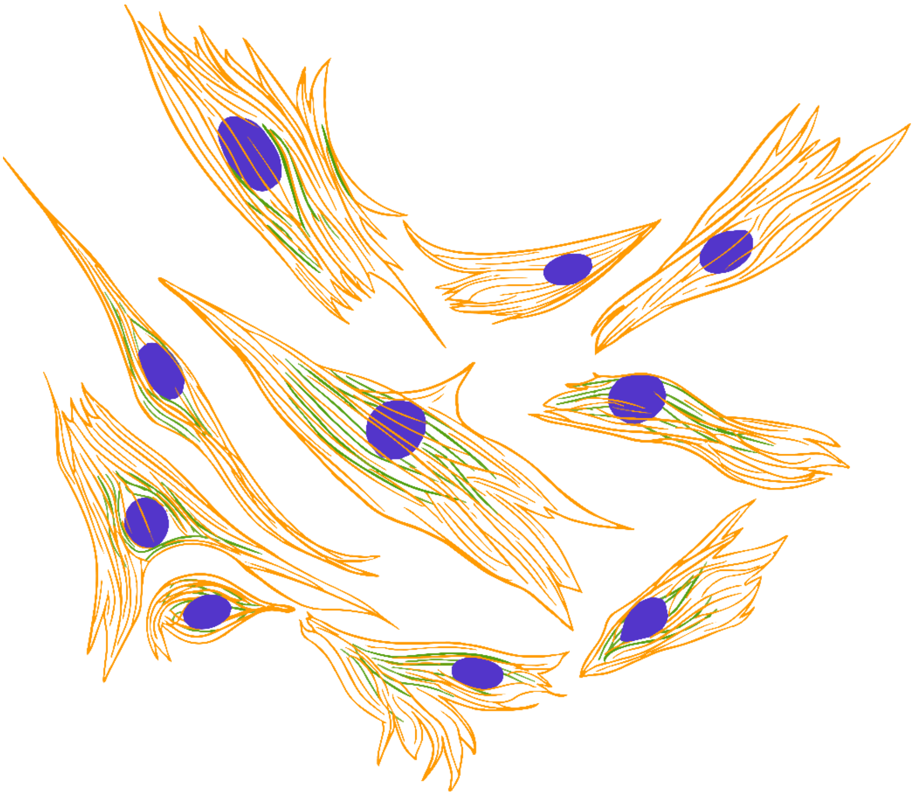


Skin Cells

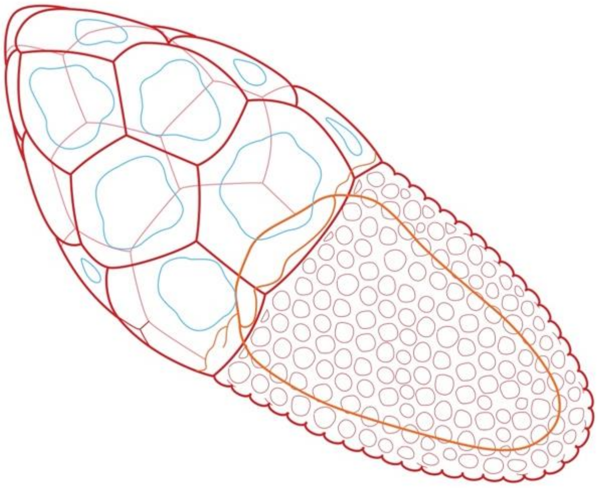


The cells in this image are human dermal **fibroblasts**. These are the cells found in the dermal layer of the skin and are responsible for creating **connective tissue** which maintains the skin's structure and heal skin when it gets damaged.

Image by Oliver Culley

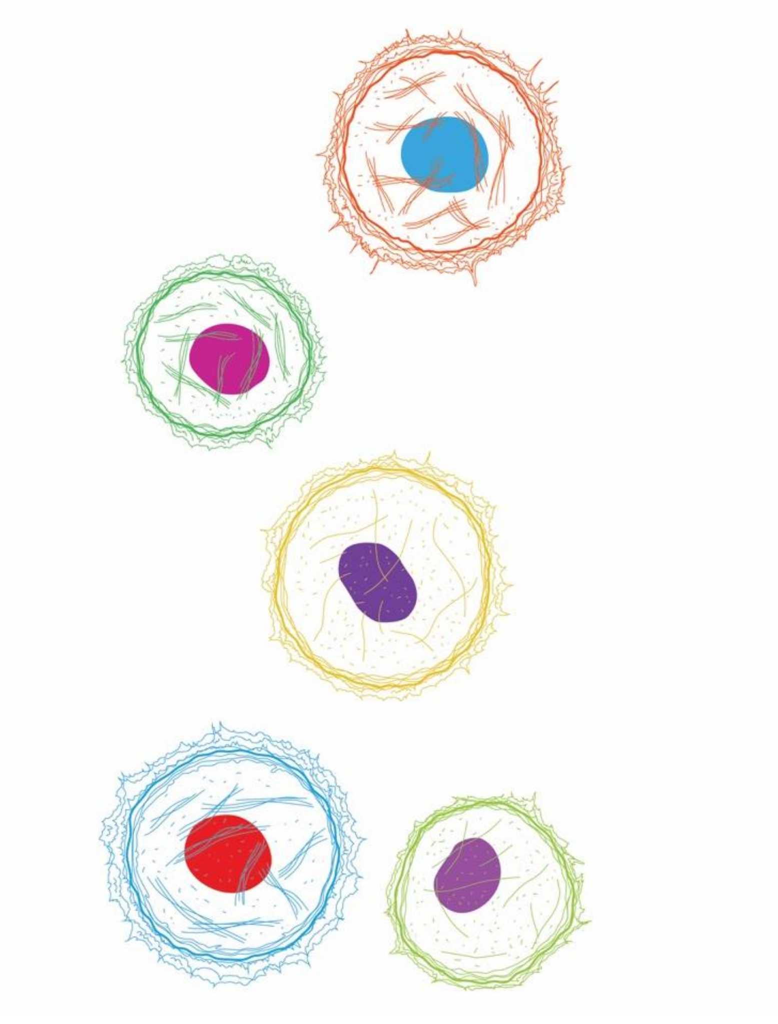


Fruit fly egg chamber



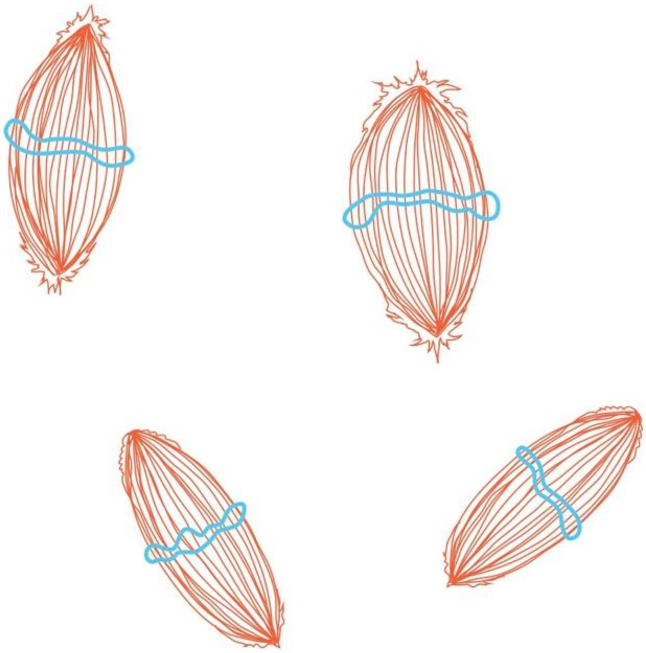
The egg chamber is a simple organ-like structure within flies' ovaries that gives rise to a single egg. Shown in red is the **actin cytoskeleton** of the epithelial cells that cover the egg, providing mechanical **protection** and supplying nutrients required for the egg development. Cell nuclei are in blue. The organ is ~ 300 microns along its long axis. Interestingly, actin filaments in the egg chamber epithelial cells can be contracted by myosin-II motors, these contractions are translated into motion. This motion in turn helps **rotating the entire egg chamber**

Rat liver stem cells



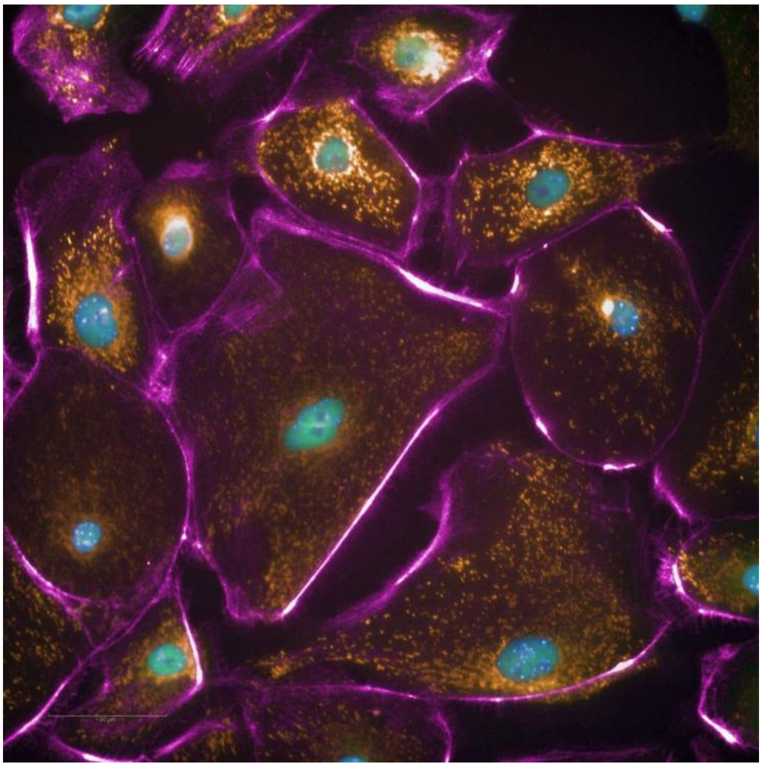
The cells can recover liver tissue integrity **in response to damage**. To do so, the stem cells convert into highly specialized cells of the liver called hepatocytes. To function properly, the cells must maintain certain shapes and sizes. To this end, the cells rely on their **internal skeleton** or the cytoskeleton. One key element of the cytoskeleton is actin filaments assembling the prominent system of circumferential bundles at the cell periphery of hepatic stem cells. The actin cytoskeleton is pseudocolored in different colors. Individual cells on a glass surface are shown. A large ovoid structure in the cell center is the nucleus that stores cellular genetic information. Each nucleus is ~ 10 microns in diameter.

Cell skeleton (Microtubules)



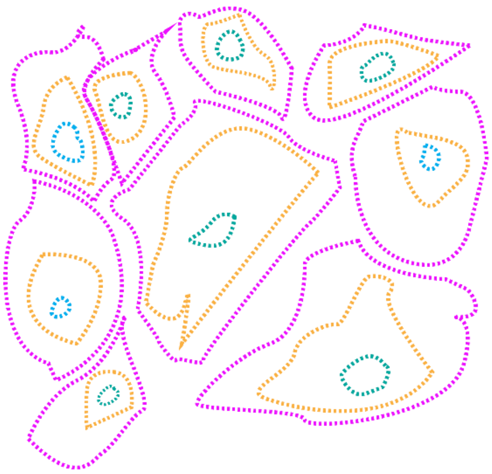
Microtubules, a cytoskeleton element in the cell, create a scaffold that helps to capture and **segregate chromosomes** (the genetic material of the cell) during mitosis (aka cell division). The scaffold is made of many different microtubules and has a spindle-like shape; this is why it is also known as the mitotic spindle. Interestingly, a functional mitotic spindle can be reconstituted outside living cells using purified genetic material (chromatin) from African clawed frog (X*enopus laevis cells*) (shown in blue) and tubulin (shown in red) from *Xenopus* egg extracts. Each spindle is ~ 10 microns along its long axis.

Mouse mouth skin cells

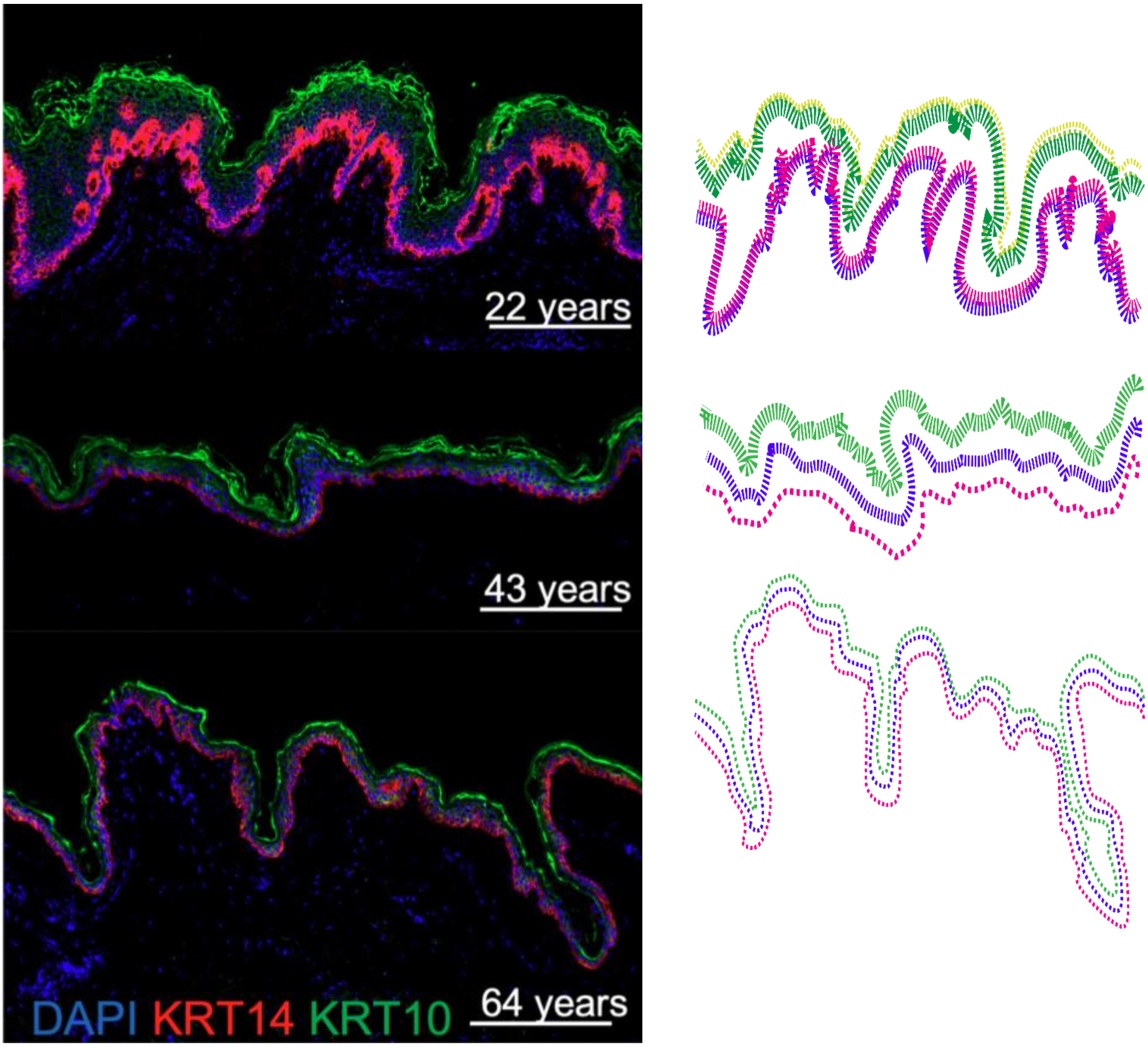


Oral keratinocytes make up the oral mucosal epithelium of the mouth, which provides an important **barrier against bacterial infection and invasion**. We use these cells to study Oral squamous cell carcinoma (OSCC), which is one of the most common cancers worldwide.

Image by Priyanka Bohsale



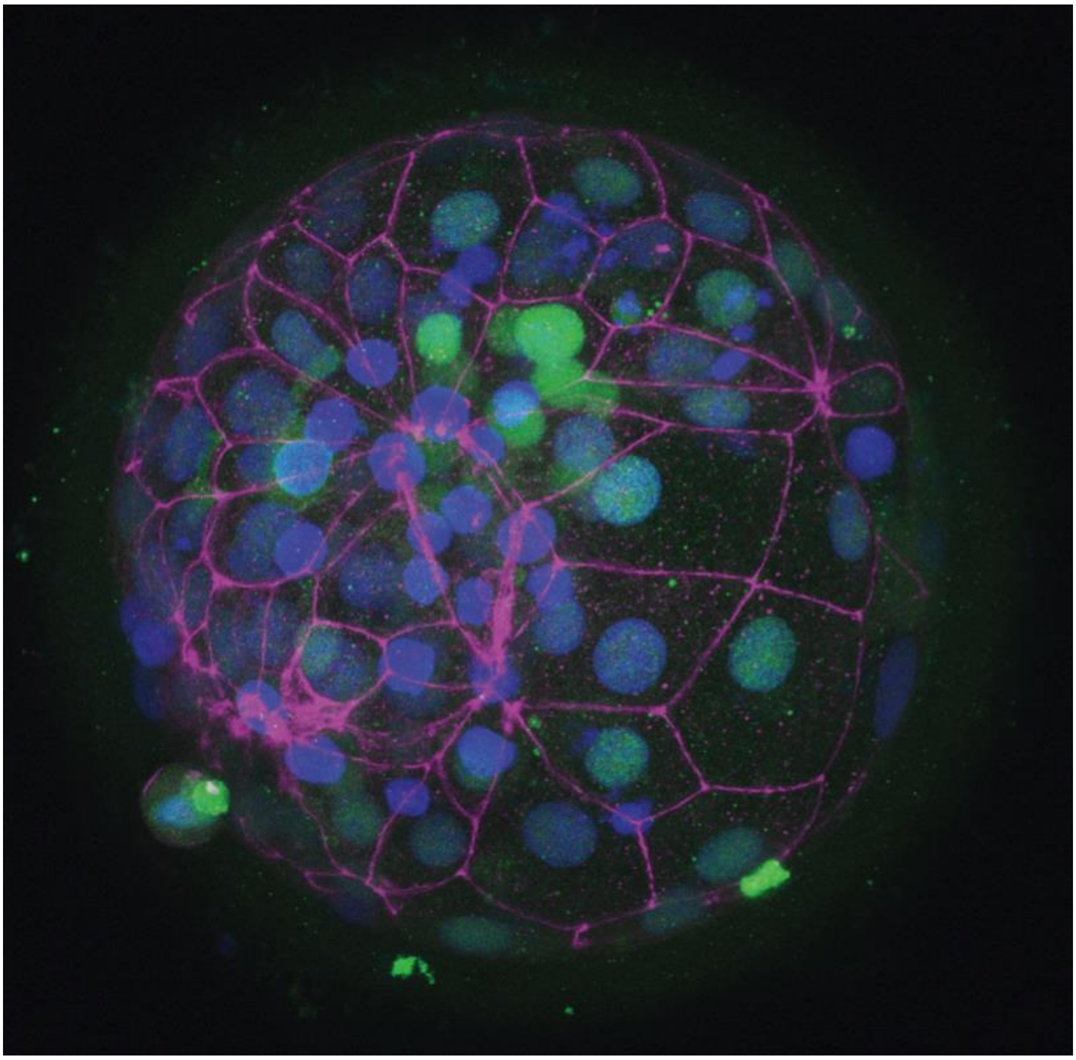
Skin sections



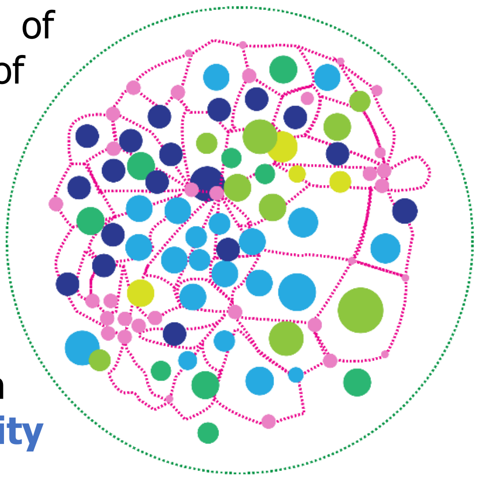
Skin sections from the abdomen of 3 individuals of different ages (22-64 years old). Blue indicates the cell nuclei. Red and green indicate different forms of the protein keratin. The images show how **stem cells (red) are reduced upon ageing**.

Image by Vasiliki Salameti

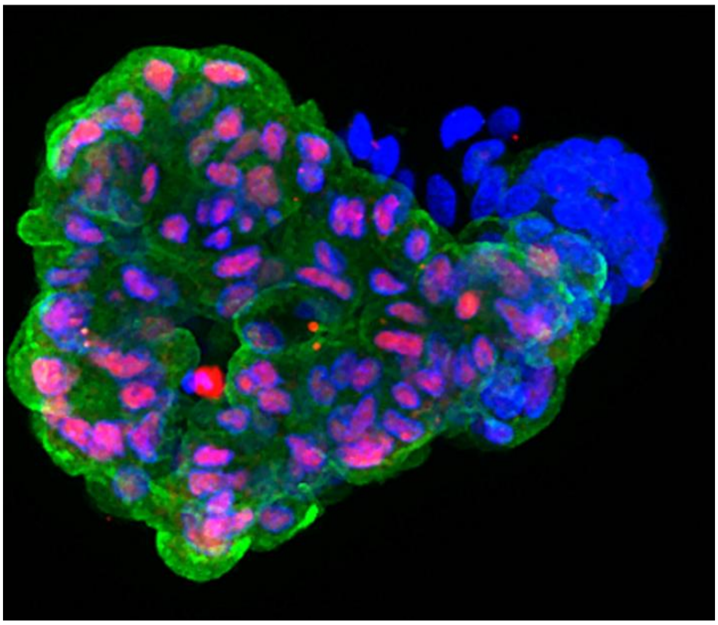
Human embryo



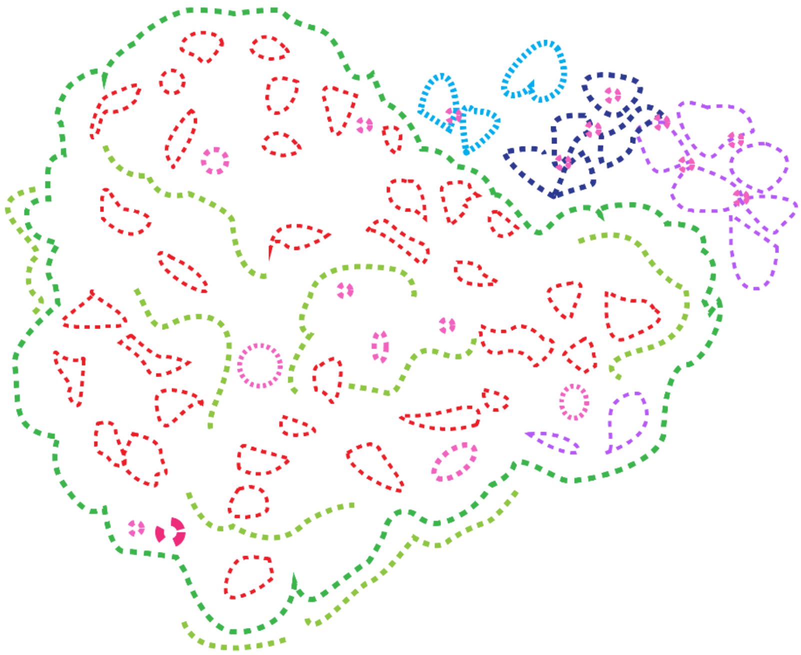
A human embryo. In the first days of development, the early embryo is made up of hundreds of pluripotent stem cells. **Pluripotency** is the ability for a cell to turn into most other cell types in the body, meaning stem cells from the embryo hold incredible potential. We use embryos directly to understand the processes involved in development of the placenta which could help us understand and **treat infertility** and diseases related to the placenta.



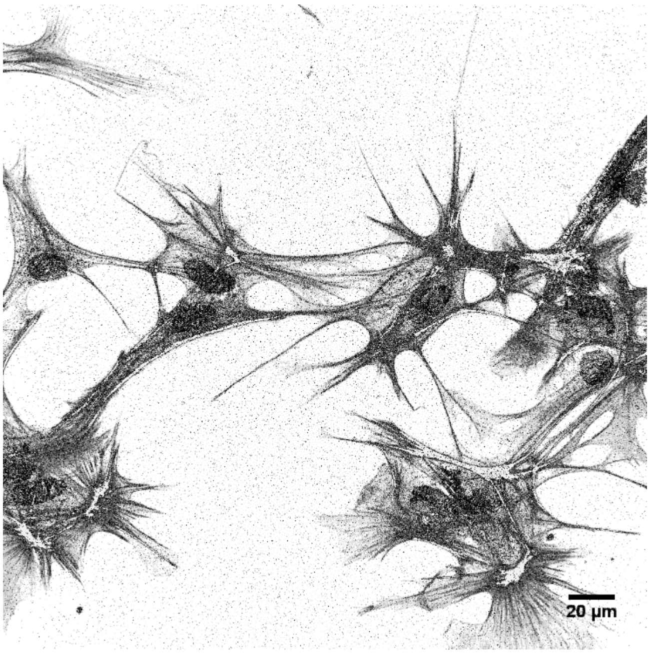
Pancreatic Organoid

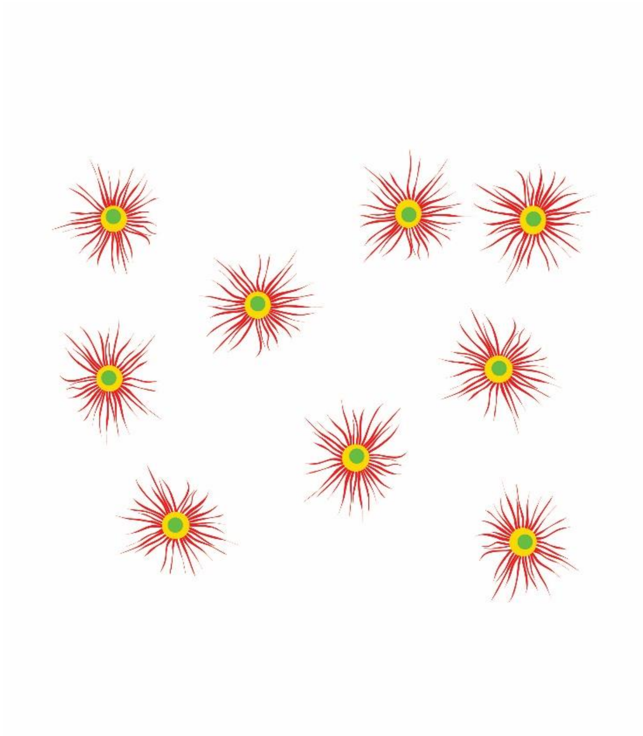


A **pancreatic organoid** is a miniature, three-dimensional model of the pancreas that scientists create from **human stem cells**. These tiny organoids mimic the structure and function of the actual pancreas, allowing researchers to study how this vital organ works in a controlled laboratory setting. By using pancreatic organoids, scientists can investigate various diseases, such as **diabetes** and pancreatic cancer, and test new treatments in a way that closely resembles real human biology.



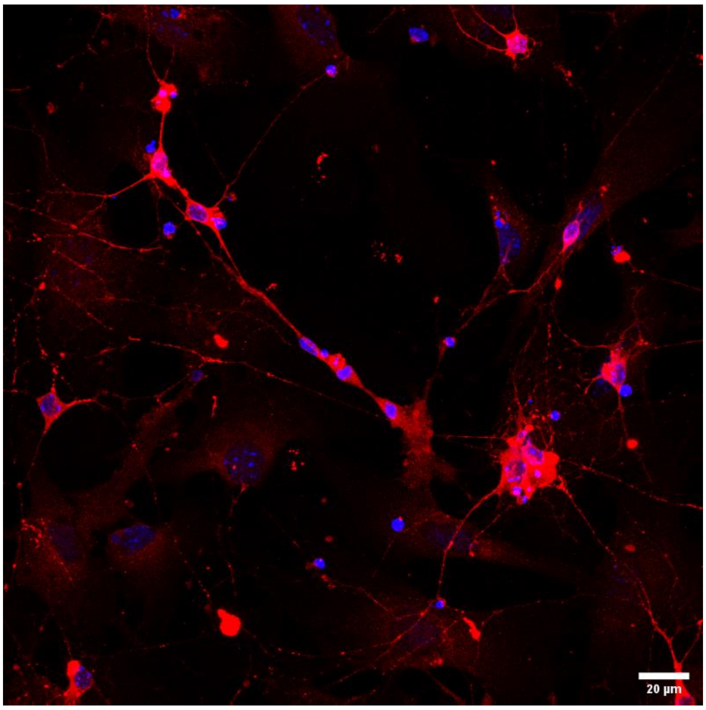
Astrocytes



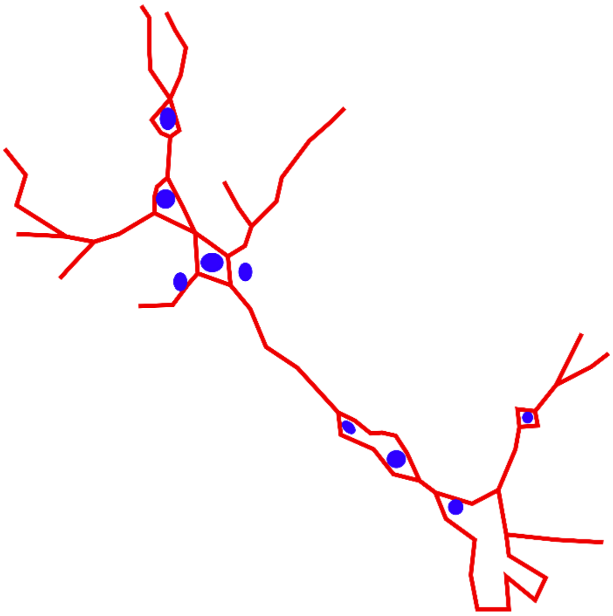


An astrocyte is a type of **star-shaped cell** found in the brain and spinal cord, playing a crucial role in supporting and protecting neurons, which are the cells responsible for transmitting information throughout the nervous system. Astrocytes help maintain a healthy environment for neurons by supplying them with **nutrients**, regulating the flow of blood, and cleaning up waste products. They also contribute to the formation of the **blood-brain barrier**, which protects the brain from harmful substances in the bloodstream. Beyond their supportive functions, astrocytes are involved in communication between neurons, influencing how signals are transmitted and processed in the brain. Their multifaceted roles make astrocytes essential for maintaining overall brain health and function.

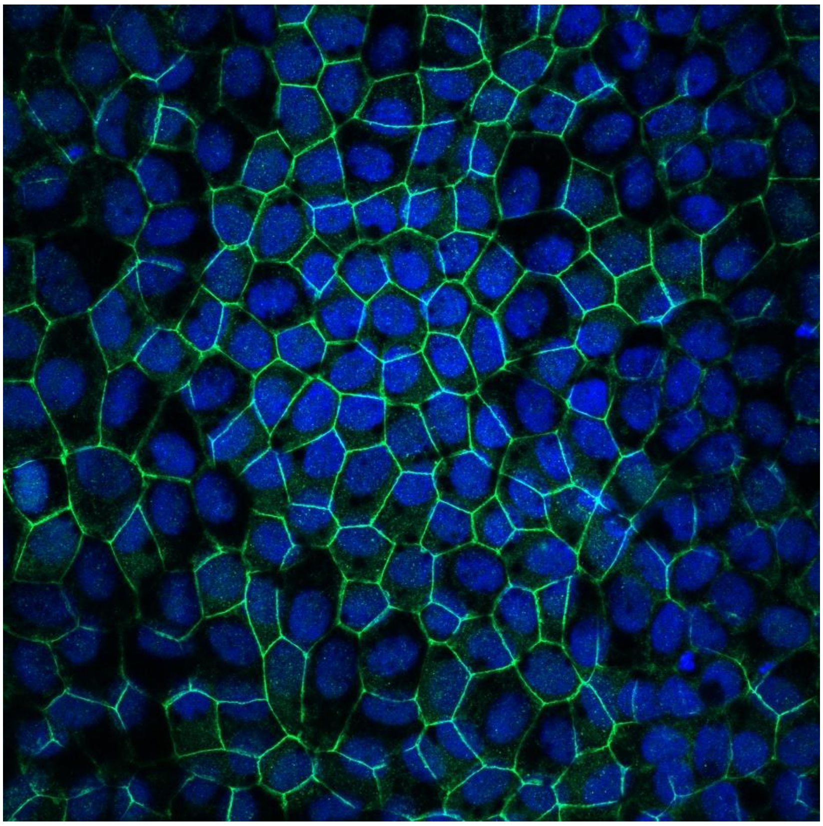
Bipolar cells



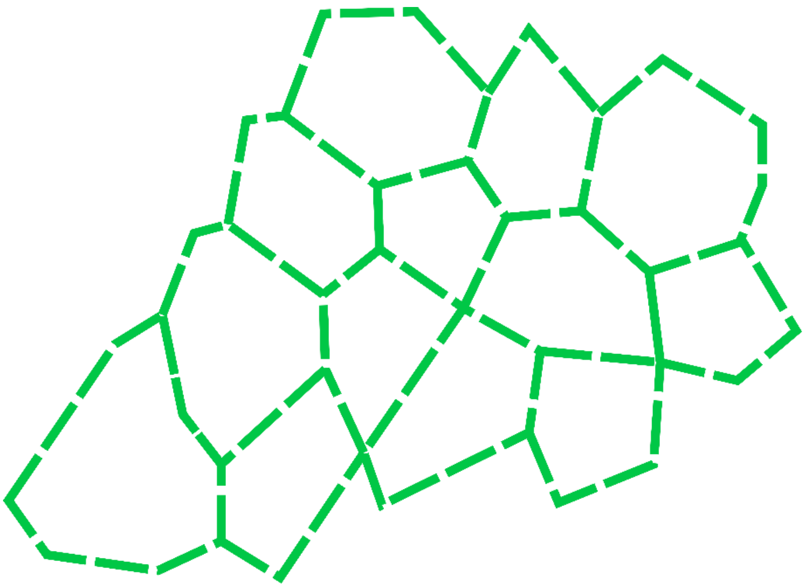
Bipolar cells are a type of **nerve cell** found in the retina of the eye that play a crucial role in vision. They act as a **bridge** between the photoreceptors, which detect light, and the ganglion cells, which send visual information to the brain. When light hits the photoreceptors, they convert it into electrical signals, and bipolar cells process these signals before passing them along to the ganglion cells. This connection helps the **brain interpret** what we see, including colours and shapes. By studying these cells, we can improve cell therapy treatments, which allow us to treat blindness by transplanting healthy photoreceptor cells into a patient's eye.



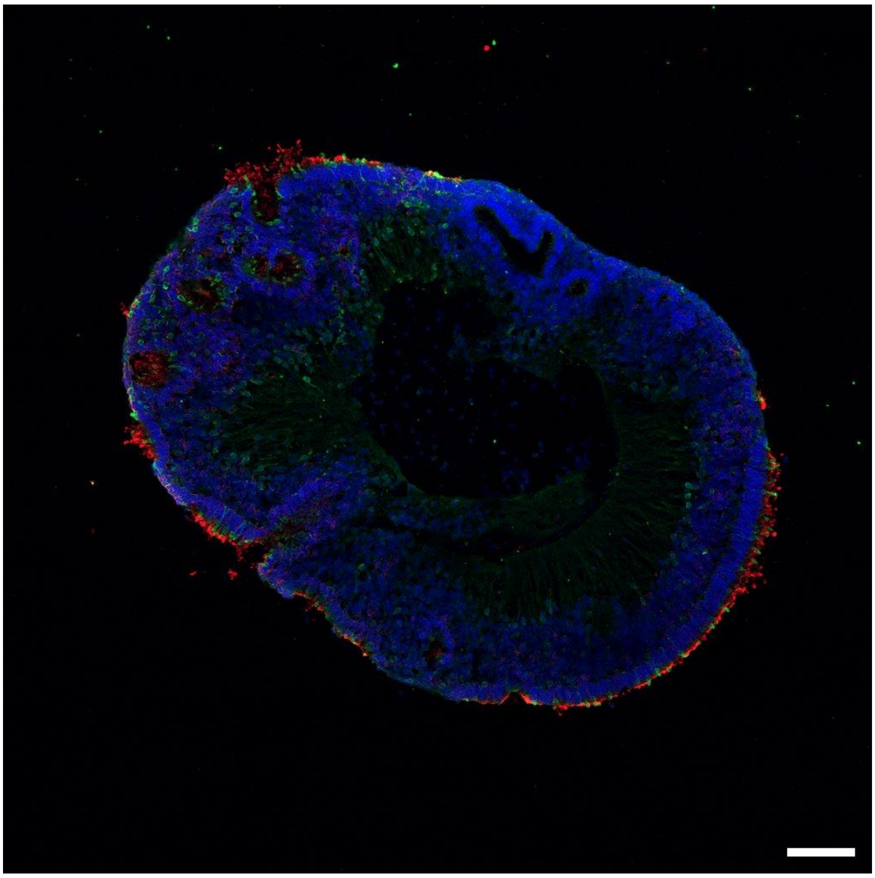
Retinal Pigmented Epithelium



The **retinal pigmented epithelium (RPE)** is a layer of cells located just behind the retina, which is the light-sensitive part of the eye. These cells play a vital role in supporting vision by **nourishing** the photoreceptors, the cells that detect light. The RPE helps to absorb excess light, preventing it from scattering and ensuring that images are clear. It also **removes waste** products and helps regenerate visual pigments, which are essential for our ability to see. Overall, the retinal pigmented epithelium is crucial for maintaining the health of the retina and ensuring that we can see properly. These cells are grown in a dish in the lab so we can **study their behaviour** and use them for **cell therapies** to treat diseases which cause break down of RPE cells.

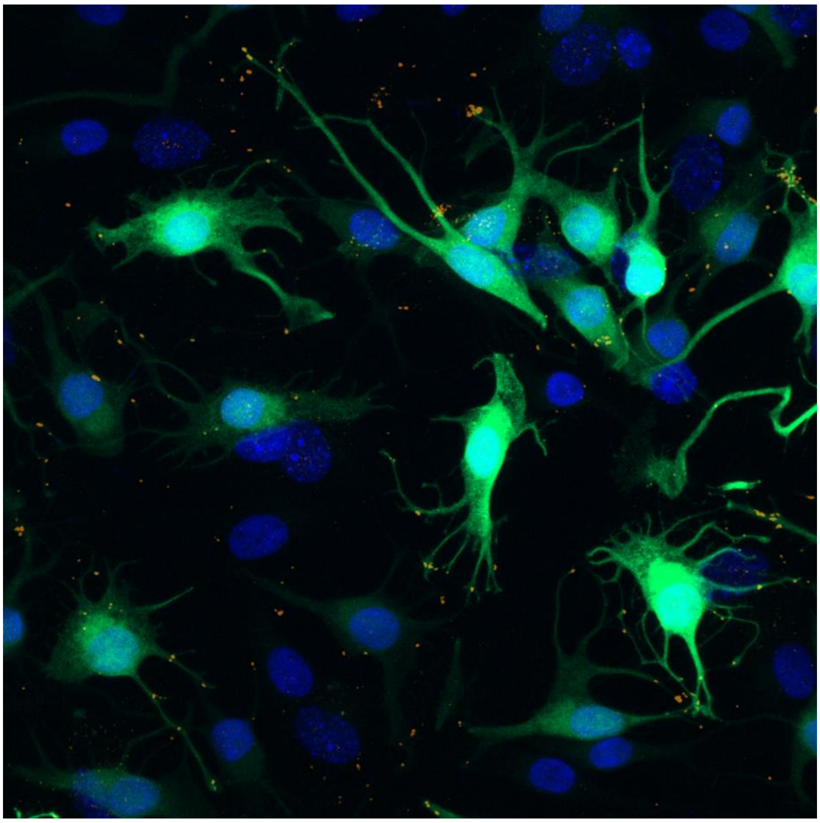


Retinal Organoid



Retinal organoids are tiny, **lab-grown** structures that mimic the human retina, the light-sensitive layer at the back of the eye. Scientists create these organoids from **stem cells**. By studying retinal organoids, researchers can better understand how the retina develops and functions, as well as how **diseases** affect vision. These miniaturized retinas also provide a platform for **testing new treatments** in a controlled environment that closely resembles real human tissue. We can also use these healthy cells for **cell therapies** to treat blindness.

Cone cells

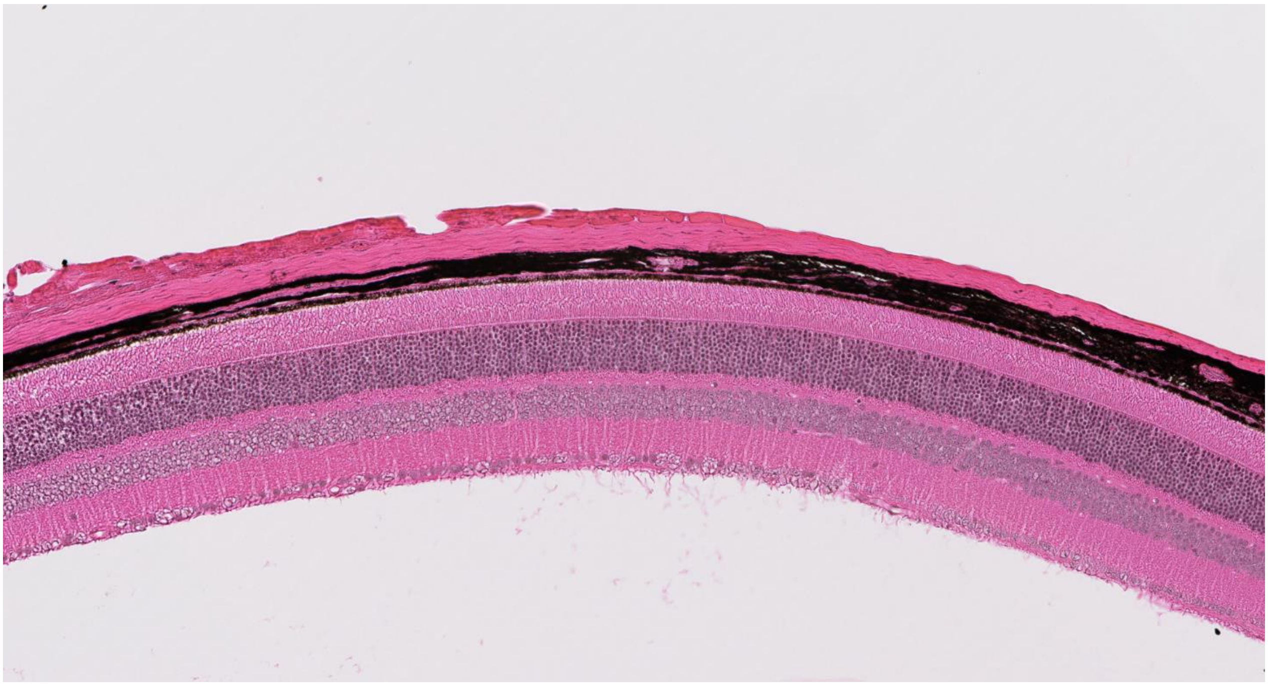


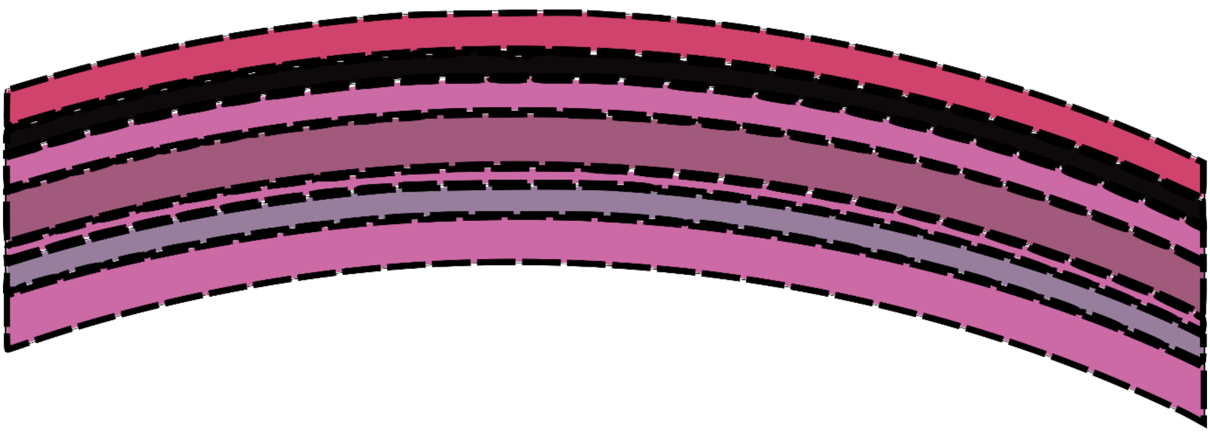
Human cone cells are the cells in your eye which allow you to see **colours** and fine details. Unlike another type of cell called rod cells, which help us see in dim light, cone cells work best in **bright light** conditions. There are three types of cone cells, each sensitive to different wavelengths of light (red/green/blue).

These cone cells have been grown in a dish from stem cells and given a virus which turns them green when cone **genes are switched on**. These healthy cells can then be **transplanted** into retinas of patients whose cone cells have stopped working to treat their sight loss.

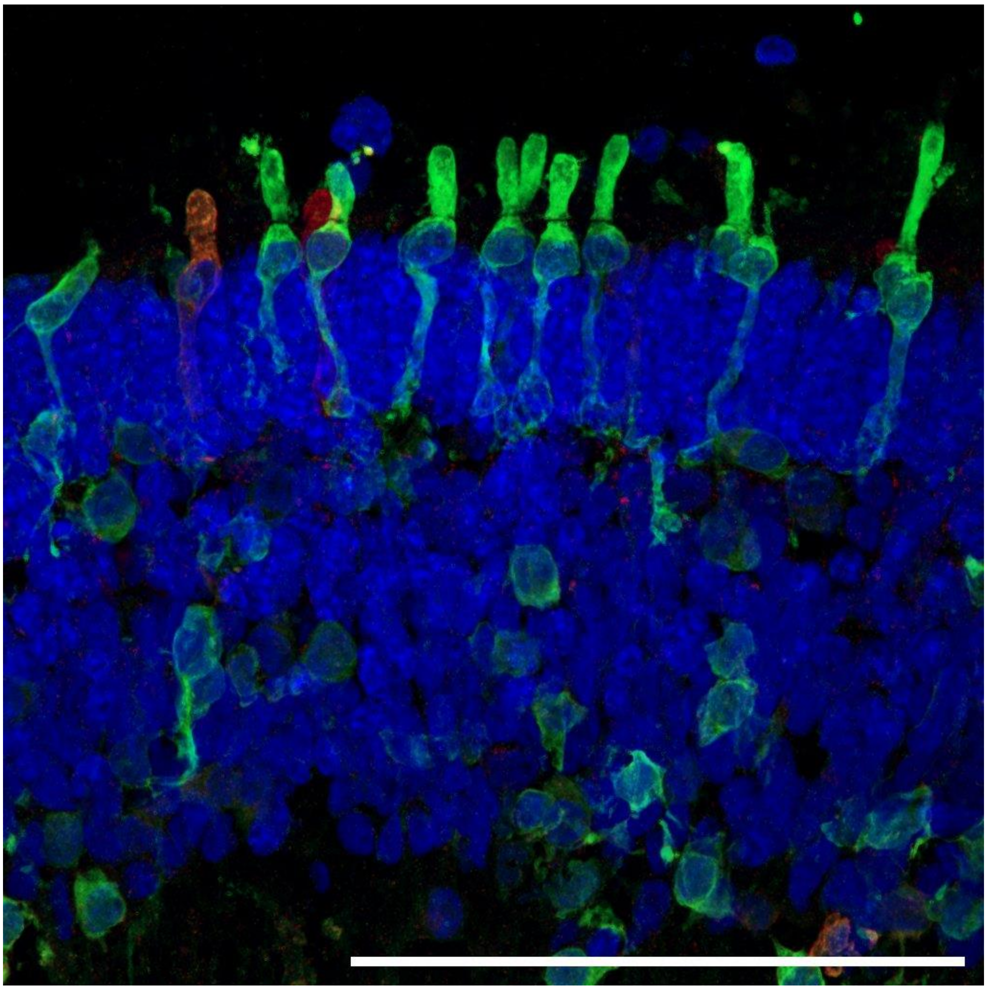
Mouse Retina

The retina is a thin layer of tissue located at the back of the eye that plays a vital role in **vision**. When light enters the eye, it passes through the lens and focuses on the retina, where cells detect different colours. The retina then sends these signals to the brain via the optic nerve, allowing us to see and interpret the world around us. We can study the eyes of mice to investigate **how eyes work**, and how they can go wrong in people with eye diseases, such as **glaucoma** and **retinal degeneration**. We can also test new treatments in mice, like **cell therapies**, which aim to repair or replace damaged cells in the eye using healthy cells grown from **stem cells**.





Cone cells in retinal organoid



These are cone cells in a retinal organoid. By taking stem cells and growing them into tiny lab-grown models of the retina (retinal organoids), we can make new, healthy cone cells, which can be used to replace damaged cells in people with vision loss. These cells have been stained with red and green fluorescent proteins so we can see the cells.