

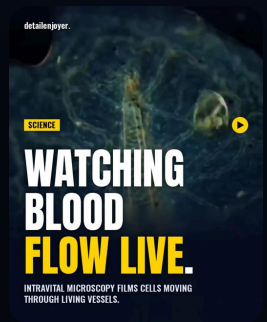
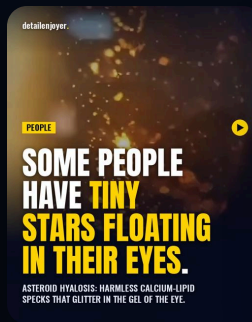
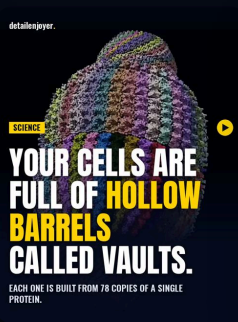


COLLECTION · COL-03

INSIDE THE BODY

Cells, organelles, bacteria-eating immune cells, the things floating in your eyes, blood moving through living vessels, veins sealed shut from the inside, red cells bent into sickles, heart pumps that work from outside a child's chest, lungs that give way to sudden pressure and the scanners that image you.

Emotions, mood and brain chemistry now have their own collection, COL-13 The Brain.



INSIDE

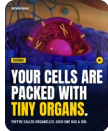
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| 02 The Vault | 16 Articulated Prosthesis |
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ABOUT THIS COLLECTION

27 case files on what is working, floating and hiding inside you. Eukaryotic cells contain specialized organelles, each with its own job. **DD-003** Vaults are hollow, barrel-shaped particles in most of our cells (about 10,000 per cell), each built from 78 copies of one protein, and nobody knows for sure what they do. **DD-015**

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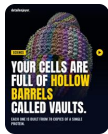
01



Eukaryotic

DD-003 · Science / Nature · Your cells are packed with tiny organs.

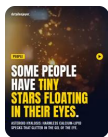
02



The Vault

DD-015 · Science / Nature · Your cells are full of hollow barrels called vaults.

03



Starry Eyed

DD-001 · People / Science · Some people have tiny stars floating in their eyes.

04



Macrophagia

DD-044 · Science · Some of your cells eat bacteria whole.

05



Blood Watch

DD-649 · Science / Tech · Watching blood flow live.

06



Sclerotherapy

DD-597 · Science / People · Closing veins from the inside.

07



Sickled Cells

DD-613 · Science / Nature · One swapped amino acid, one bent cell.

08



Berlin Heart

DD-577 · Science / Tech · A child's heart pump, outside the body.

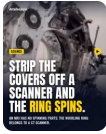
09



Imploder

DD-593 · Science / Dark Facts · Air spaces are the body's weak point.

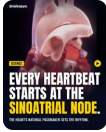
10



An MRI's Skeleton

DD-290 · Science / Tech · Strip the covers off a scanner and the ring starts spinning.

11



I Wanted You to Know...

DD-265 · Science / People · Every heartbeat starts with a spark from the sinoatrial node.

12



Bacteria Hunters

DD-309 · Science / Nature · Phages are the most numerous biological entities on Earth, yet the idea of using them as medicine was largely sidelined in the West by antibiotics; rising antibiotic resistance is why that century-old idea is back.

13



Your Heart in a Glass

DD-315 · Science / People · Heart muscle cells can beat on their own in a dish.

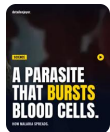
14



Embryonic Development

DD-333 · Science / People · The earliest stage of an embryo involves a lot of division with no growth at all, and the real reorganization comes later, when cells sort themselves into layers.

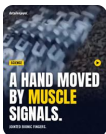
15



Blood Destruction

DD-395 · Science · Malaria remains one of the deadliest infectious diseases, concentrated overwhelmingly in Africa, and its long fight with humans has reshaped both medicine and the human genome.

16



Articulated Prosthesis

DD-438 · Science / Tech · Myoelectric hands read electrical signals from the user's muscles.

17



Rabies Crazies

DD-420 · Science / Nature · Rabies travels along nerves from a bite to the brain.

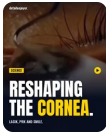
18



Root of the Problem

DD-448 · Science · A root canal removes infected pulp to save a tooth.

19



Seeing Things Differently

DD-454 · Science · Laser eye surgery reshapes the cornea to fix blurry vision.

20



Face Creator

DD-465 · Science · The human face starts as separate pieces that grow together.

21



MAiD

DD-487 · People · Some countries let eligible patients get medical help to end their lives.

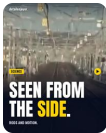
22



Lens Crafter

DD-492 · Tech · Many contact lenses are cast in molds; custom ones are cut on a lathe.

23



Shifty Periphery

DD-502 · Science · You often notice movement out of the corner of your eye first.

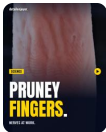
24



Cell Death

DD-523 · Science · Your cells are built to self-destruct when needed.

25



Wet Response

DD-525 · Science · Prune fingers are your nervous system at work.

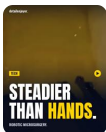
26



HHS

DD-539 · People · HHS runs Medicare, Medicaid and oversees the CDC, FDA and NIH.

27



AI Surgery II

DD-549 · Tech / Science · Robotic microsurgery systems filter out a surgeon's hand tremor.



Collection Quiz and Answer Key

54 questions from every case file

Every quick fact has a stable ID (for example DD-003-F01) and comes from a case file with its sources listed. Online edition with videos and slides: <https://detailenjoyer.com/collections/inside-the-body/>



EUKARYOTIC

Your cells are packed with tiny organs: a tour of the specialized organelles inside every eukaryotic cell.

QUICK FACTS

DD-003-F01

Eukaryotic cells contain specialized organelles, each with its own job.

DD-003-F02

In a eukaryotic cell, the nucleus holds the cell's DNA and controls gene expression.

DD-003-F03

The endoplasmic reticulum makes proteins (rough ER) and lipids (smooth ER).

DD-003-F04

The Golgi apparatus modifies, sorts and ships molecules to where they're needed in the cell.

DD-003-F05

Mitochondria produce a cell's energy through cellular respiration.

DD-003-F06

Lysosomes and peroxisomes break down a cell's waste and toxins.

DD-003-F07

Ribosomes are the organelles that assemble proteins.

THE WRITE-UP

Nucleus. Holds the cell's DNA and controls gene expression.

Rough & smooth ER. The endoplasmic reticulum makes proteins (rough ER) and lipids (smooth ER).

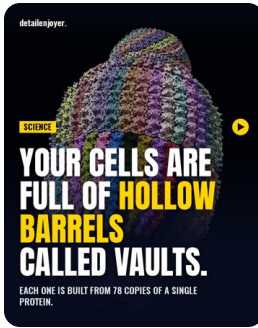
Golgi apparatus. Modifies, sorts and ships molecules to where they're needed.

Mitochondria. Produce energy through cellular respiration.

Lysosomes & peroxisomes. Break down waste and toxins.

Ribosomes. Assemble proteins.

Permalink: <https://detailenjoyer.com/case/eukaryotic/> · Last updated Apr 15, 2026



THE VAULT

Vaults are giant, hollow, barrel-shaped particles made of protein and RNA. They're found in the cytoplasm of most eukaryotic cells, with about 10,000 in a typical human cell. Each one is a 12.9-megadalton shell made of 78 copies of the major vault protein, built as two identical 39-protein halves. It also carries smaller partners (VPARP, TEP1 and vault RNA). Nearly 40 years after their discovery in 1986, nobody knows for sure what vaults do.

QUICK FACTS

DD-015-F01

Vaults are hollow, barrel-shaped particles in most of our cells (about 10,000 per cell), each built from 78 copies of one protein, and nobody knows for sure what they do.

DD-015-F02

A vault weighs about 12.9 megadaltons and is made of two identical halves of 39 major vault proteins each.

THE WRITE-UP

Found by accident in 1986. UCLA's Nancy Kedersha and Leonard Rome found vaults in 1986 while trying to purify coated vesicles from rat liver. Under the microscope the particles looked like the arches of a cathedral's vaulted ceiling, which gave them their name.

Big and everywhere. Vaults measure about 35×65 nm, much larger than ribosomes. Most human cells hold roughly 10,000 of them, and some immune cells may have up to 100,000.

One protein does most of the work. The shell is made of the ~100 kDa major vault protein (MVP). Vaults also carry two minor proteins, VPARP (vault poly(ADP-ribose) polymerase, 193 kDa) and TEP1 (telomerase-associated protein 1), plus small vault RNAs.

12.9 megadaltons. Vaults have a molecular mass of about 12.9 MDa. Measured at roughly 670 Å long and 400 Å wide, the hollow interior is big enough to hold most objects found in a cell.

78 copies in two halves. The X-ray structure (3.5 Å) shows the shell is 78 MVP molecules. Two identical halves of 39 MVPs each join at the 'waist', giving the particle 39-fold dihedral (D39) symmetry.

Paper-thin walls, protruding caps. The barrel wall is only about 15–25 Å thick. Each end has a protruding cap, formed by MVP's own cap-helix and cap-ring domains. The 39-fold symmetry breaks in that cap region.

Still a mystery. Despite decades of work, the vault's function is unknown. Proposed roles include intracellular transport, signalling, immunity and drug resistance, and researchers are now engineering synthetic vaults to deliver therapies.

REEL VS. RECORD

- **Incomplete:** the component list leaves out TEP1 (telomerase-associated protein 1), the second minor vault protein alongside VPARP. Mammalian vaults contain MVP, VPARP, TEP1 and vault RNA. [Kato et al. 2008; SPring-8; van Zon et al. 2003]
- **Imprecise:** 'flexible "cap" proteins'. The caps aren't separate proteins. They're the cap-helix and cap-ring domains at the end of each MVP molecule. The cap region is dynamic, and the 39-fold symmetry breaks there. [SPring-8; RCSB 4HL8]
- **Minor:** 12.9 MDa is the classic STEM measurement. Some structural papers round to 'about 10 MDa' for the protein shell. [Kato et al. 2008; RCSB 4HL8]

SOURCES

1. Isolation and characterization of a novel ribonucleoprotein particle (Kedersha & Rome, J. Cell Biol. 1986): <https://doi.org/10.1083/jcb.103.3.699>
2. The vault complex (van Zon et al., Cell Mol Life Sci 2003, via PMC): <https://pmc.ncbi.nlm.nih.gov/articles/PMC11138885/>
3. A vault ribonucleoprotein particle exhibiting 39-fold dihedral symmetry (Kato et al., Acta Cryst D 2008): <https://doi.org/10.1107/s09074444908004277>
4. Structure of Rat Liver Vault at 3.5 Å Resolution (SPring-8 Research Frontiers 2009): https://spring8.jp/archive/pdf/en/res_fro/09/028-029.pdf
5. RCSB PDB 4HL8: Re-refinement of the vault ribonucleoprotein particle: <https://www.rcsb.org/structure/4HL8>
6. How a scientist's lifelong obsession with vaults could transform medicine (UCLA Health): <https://www.uclahealth.org/news/publication/how-scientists-lifelong-obsession-with-vaults-could>
7. The key to 'the vault' (California NanoSystems Institute, UCLA, May 27, 2024): <https://cnsi.ucla.edu/may-27-2024-the-key-to-the-vault/>

Permalink: <https://detailenjoyer.com/case/the-vault/> · Last updated Aug 5, 2026



STARRY EYED

Asteroid hyalosis fills the eye's vitreous gel with hundreds of tiny yellow-white spheres ('asteroid bodies') made of calcium, phosphate and lipids. To an eye doctor they glitter like stars in a night sky, but most people who have them never notice. It affects roughly 1 in 100–130 people, becomes far more common with age, is more common in men, and usually affects only one eye. It needs no treatment unless it hides the retina during an exam or, rarely, blurs vision.

QUICK FACTS

DD-001-F01

Asteroid hyalosis is a condition in which harmless calcium-lipid bodies float inside the eye.

DD-001-F02

Asteroid hyalosis fills the eye's vitreous gel with tiny calcium-phosphate-lipid spheres that glitter like stars but rarely affect vision.

DD-001-F03

About 1 in 100 people have asteroid hyalosis. It becomes much more common with age, is more common in men, and usually affects only one eye.

THE WRITE-UP

Stars in the vitreous. Asteroid hyalosis is a condition of the vitreous, the clear gel that fills the eyeball. It's marked by many small yellow-white spheres called asteroid bodies, scattered at random or strung in chains and sheets.

What they're made of. The asteroid bodies are lipids bound up with calcium, phosphate and oxygen. Electron microscopy shows a crystalline, apatite-like (bone-mineral-like) structure.

They move with your eye. The bodies are anchored in the gel, so they sway when the eye or head moves and then settle back. They don't drift freely like ordinary floaters.

About 1 in 100 people. A meta-analysis of about 105,000 people found a prevalence of 0.75%. Large eye studies report about 1–1.2%, and an autopsy series about 2%.

Age, men and one eye. Prevalence rises from about 0.3% under age 40 to about 3% at 80 and over. Men are about 1.8 times as likely to have it, and in most cases only one eye is affected.

Diabetes? Probably not. A link to diabetes is often cited but controversial. Large population studies, including Blue Mountains, Beaver Dam and Beijing, found no significant association.

Usually harmless. Asteroid hyalosis usually affects vision less than other vitreous opacities and doesn't need treatment. It matters mostly because the glittering bodies can make it hard for doctors to see and image the retina behind them.

REEL VS. RECORD

- **Confirmed:** an eye condition; calcium/lipid 'asteroid bodies' in the vitreous gel; white-yellowish and sparkling; usually harmless, rarely affecting vision. [EyeWiki; Beijing Eye Study; IOVS 2001]
- **Nuance:** 'float in the vitreous'. The bodies are suspended in, and attached to, the vitreous gel, so they swing with eye movement and return to place. They aren't free-floating like typical floaters, which is why most people don't notice them. [Beijing Eye Study; EyeWiki]
- **Precision:** the composition is specifically calcium phosphate (apatite-like) complexed with phospholipids, not just 'calcium/lipid'. [IOVS 2001; Acta Ophthalmologica 2020]
- **Update · earlier version of this page:** its one-line summary is accurate but had no sources. This update adds 5 sources, and the quiz grows from 3 to 5 questions.

SOURCES

1. Asteroid Hyalosis (EyeWiki, American Academy of Ophthalmology): [https://eyewiki.aao.org/Asteroid_Hyalosis_\(AH\)](https://eyewiki.aao.org/Asteroid_Hyalosis_(AH))
2. Asteroid hyalosis: pathogenesis and prospects for prevention (Eye, 2008): <https://www.nature.com/articles/eye200835>
3. Ultrastructure and composition of asteroid bodies (Winkler & Lünsdorf, IOVS 2001; PubMed): <https://pubmed.ncbi.nlm.nih.gov/11274065/>
4. Global prevalence of asteroid hyalosis: systematic review and meta-analysis (Acta Ophthalmologica, 2020): <https://doi.org/10.1111/aos.14465>
5. Prevalence and associations of asteroid hyalosis: the Beijing Eye Study (BMC Ophthalmology, 2022): <https://link.springer.com/article/10.1186/s12886-022-02586-6>

Permalink: <https://detailenjoyer.com/case/starry-eyed/> · Last updated Oct 17, 2026



MACROPHAGIA

Macrophages ('big eaters') are immune cells found in every tissue. They recognize microbes in two ways: directly, through receptors for microbial surface patterns, or indirectly, through receptors for antibodies and complement proteins that coat a microbe. The cell then wraps its membrane around the target and pinches it off into a phagosome. Over the next steps the phagosome fuses with endosomes and then lysosomes, becoming an acidic phagolysosome (pH as low as about 4.5) filled with digestive enzymes. NADPH oxidase pumps in superoxide, and nitric oxide from the enzyme iNOS can combine with it to form peroxynitrite. Élie Metchnikoff discovered the process in starfish larvae in 1882 and shared the 1908 Nobel Prize for it. Some pathogens, including the tuberculosis bacterium, survive by blocking the process.

QUICK FACTS

DD-044-F01

Macrophages ('big eaters') swallow bacteria whole and digest them in an acidic compartment that can reach about pH 4.5.

DD-044-F02

Élie Metchnikoff discovered phagocytosis in 1882 by sticking a rose thorn into a starfish larva, and shared the 1908 Nobel Prize.

THE WRITE-UP

Big eaters. 'Macrophage' comes from the Greek for 'big eater'. These cells live in every tissue, where they engulf microbes, debris and dying cells.

Two ways to spot a target. Non-opsonic receptors (such as mannose, scavenger and C-type lectin receptors) bind microbial surface patterns directly. Opsonic receptors bind antibodies or complement proteins that coat the microbe and tag it for ingestion.

Swallowed whole. Receptor signals rebuild the cell's actin skeleton so its membrane extends around the particle and seals it inside a phagosome.

From phagosome to phagolysosome. The phagosome matures through repeated fusion with endosomes, and then fuses with lysosomes to become a phagolysosome. It can be as acidic as pH 4.5 and is packed with proteases, lipases and lysozymes.

Chemical weapons. NADPH oxidase on the phagosome membrane makes superoxide, which becomes hydrogen peroxide and, in some phagocytes, hypochlorous acid. Nitric oxide made by iNOS can combine with superoxide to form peroxynitrite.

A starfish discovery. In 1882 Élie Metchnikoff saw mobile cells in transparent starfish larvae swarm a rose thorn. He named them phagocytes and shared the 1908 Nobel Prize for his work on immunity.

REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about macrophage phagocytosis (captions at 0.8–8.8 s). Receptors trigger engulfment into a phagosome, which fuses with lysosomes, where enzymes and reactive oxygen and nitrogen species kill the bacteria. [StatPearls; Frontiers 2020]
- **Only half the story:** macrophages don't detect bacteria only through receptors for 'specific bacterial molecules'. Many targets are first coated with the host's own antibodies or complement, and Fc and complement receptors bind those coatings. [Frontiers 2017; StatPearls]
- **Simplified:** phagosomes don't go straight to lysosomes. They mature through repeated fusion with endosomes and grow more acidic before forming a phagolysosome. [Frontiers 2020; Frontiers 2017]
- **Confirmed:** 'reactive oxygen and nitrogen species' is accurate. NADPH oxidase makes superoxide, and iNOS makes nitric oxide, which can form peroxynitrite. [Frontiers 2020; Antioxidants]
- **Not always:** some bacteria escape the process. Pathogens such as *Mycobacterium tuberculosis* interfere with phagosome maturation and survive inside macrophages. [Frontiers 2017]

SOURCES

1. Phagocytosis (StatPearls, NCBI Bookshelf): <https://www.ncbi.nlm.nih.gov/books/NBK556043/>
2. Uribe-Querol & Rosales, Phagocytosis: Our Current Understanding of a Universal Biological Process (Frontiers in Immunology, 2020): <https://pmc.ncbi.nlm.nih.gov/articles/PMC7280488/>
3. Uribe-Querol & Rosales, Control of Phagocytosis by Microbial Pathogens (Frontiers in Immunology, 2017): <https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2017.01368/full>
4. Reactive Oxygen and Nitrogen Species on Monocyte and Macrophage Biology (Antioxidants): <https://doi.org/10.3390/antiox15030389>
5. Ilya Mechnikov, Facts (NobelPrize.org): <https://www.nobelprize.org/prizes/medicine/1908/mechnikov/facts/>
6. Origins, Biology, and Diseases of Tissue Macrophages (PMC): <https://pmc.ncbi.nlm.nih.gov/articles/PMC10786183/>

Permalink: <https://detailenjoyer.com/case/macrophagia/> · Last updated Jul 16, 2025



BLOOD WATCH

Intravital microscopy means looking at living tissue inside a living animal, and blood flow was one of the first things it revealed. In 1661, Marcello Malpighi used a microscope on a frog's lung and described capillaries, the tiny vessels linking arteries and veins. In 1839, Rudolph Wagner watched white blood cells roll slowly along vessel walls in a frog's webbed foot. Thin, transparent tissues such as a frog's web, a tadpole's tail or a fish's fin let ordinary bright-field microscopes show red blood cells streaming through capillaries in real time. Plasma, the liquid part of blood, is transparent, so it can't be seen directly. Researchers make it visible by injecting fluorescent tracers, such as FITC-dextran, that stay in the bloodstream and light up the vessels. Modern intravital imaging relies on fluorescence. Labeled antibodies, dyes or genetically encoded fluorescent proteins mark particular cells, and confocal and two-photon microscopes take sharp optical sections. Two-photon microscopy reaches deeper into tissue with less light damage, which is why it's widely used to film immune cells in living mice. In mammals, the small cells that help blood clot are platelets. Fish, amphibians and birds have nucleated thrombocytes instead, and their red blood cells also keep a nucleus. The footage shows transparent tissue with dark pigment cells and branching vessels where blood cells can be seen moving. The source doesn't identify the animal.

QUICK FACTS

DD-649-F01

Malpighi described capillaries in 1661.

DD-649-F02

Two-photon microscopy images deeper into living tissue.

THE WRITE-UP

Malpighi's capillaries. In 1661, Marcello Malpighi looked through a microscope at a frog's lung and described capillaries.

Rolling white cells. In 1839, Rudolph Wagner watched white blood cells roll along vessel walls in a frog's foot.

Lighting up plasma. Plasma is transparent, so researchers inject fluorescent tracers that stay in the bloodstream.

Deeper and sharper. Confocal and two-photon microscopes take sharp optical sections, and two-photon imaging reaches deeper into tissue.

Not always platelets. Fish, amphibians and birds have nucleated thrombocytes instead of platelets.

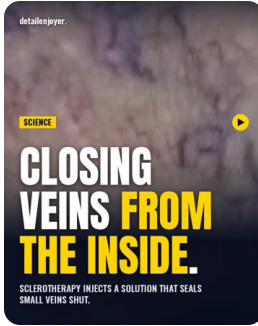
REEL VS. RECORD

- **Note:** 'Track... plasma': plasma is transparent and can't be seen directly. Researchers make it visible with injected fluorescent tracers such as FITC-dextran.
- **Note:** 'Platelets': only mammals have platelets. Fish, amphibians and birds, often used for transparent-tissue imaging, have nucleated thrombocytes instead.
- **Note:** 'High-resolution imaging techniques': watching red blood cells move doesn't need anything advanced. Malpighi saw capillaries in a frog's lung in 1661, and simple bright-field microscopes show flow in thin, transparent tissue.
- **Note:** 'Confocal microscopy': confocal imaging only works near the surface. Two-photon microscopy is the usual way to image deeper into living tissue with less light damage.
- **Title:** despite the name 'Blood Watch', the Reel is about microscopy, not a wearable device.

SOURCES

1. Hwa & Aird (2007): The history of the capillary wall, doctors, discoveries, and debates, American Journal of Physiology: <http://journals.physiology.org/doi/full/10.1152/ajpheart.00704.2007>
2. Granger & Senchenkova: Inflammation and the Microcirculation, Historical Perspectives (NCBI Bookshelf): <https://www.ncbi.nlm.nih.gov/books/NBK53379/>
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5. Visualization of nucleated erythrocytes and thrombocytes in the circulation with two-photon microscope, Experimental Hematology: [https://www.exphem.org/article/S0301-472X\(16\)30383-6/fulltext](https://www.exphem.org/article/S0301-472X(16)30383-6/fulltext)

Permalink: <https://detailenjoyer.com/case/blood-watch/> · Last updated Sep 9, 2025



SCLEROTHERAPY

Sclerotherapy treats unwanted veins by injecting a solution (a sclerosant) that damages the vein's inner lining, the endothelium. The vein then becomes inflamed, scars and closes, and over weeks to months the body clears it and it fades. It's used for spider veins (telangiectasias), small reticular veins and some varicose veins. For larger varicose veins, the sclerosant is often whipped into a foam and injected under ultrasound guidance, a technique NICE has assessed in its guidance. The sclerosants in widest use are detergents such as polidocanol and sodium tetradecyl sulfate, which break down the cell membranes of the lining. Hypertonic saline, a concentrated salt solution, works by drawing water out of the cells. It's one option, but not the usual one, and ordinary saline wouldn't close a vein. Several sessions may be needed. Clinical sources list common effects such as pain at the injection site, bruising, temporary lumps, brown staining of the skin and new tiny red veins ('matting'). They list rare complications including skin ulcers, allergic reactions, and clots in deeper veins. This case is general information, not medical advice. The footage shows a needle injecting into small purple veins on a leg.

QUICK FACTS

DD-597-F01

Sclerotherapy closes veins by damaging their lining.

DD-597-F02

Polidocanol is a detergent-type sclerosant.

THE WRITE-UP

Damage on purpose. A sclerosant injures the vein's inner lining, so the vein scars, closes and fades.

Detergents lead. Polidocanol and sodium tetradecyl sulfate are detergents that break down the lining's cells.

Salt is the alternative. Hypertonic saline works by drawing water out of the lining's cells.

Foam for bigger veins. For larger varicose veins, sclerosant foam is injected under ultrasound guidance.

Known side effects. Clinical sources list bruising, staining and new tiny veins, and rarely ulcers or clots.

REEL VS. RECORD

- **Note:** 'Typically a saline solution': the most widely used sclerosants are detergents such as polidocanol and sodium tetradecyl sulfate. When salt is used, it's concentrated (hypertonic) saline, not ordinary saline.
- **Note:** 'Varicose and spider veins': the classic needle injections suit spider and small reticular veins. Larger varicose veins are often treated with foam sclerosant guided by ultrasound, or with other procedures.
- **Note:** 'Gradually reabsorbed': clinical sources say treated veins fade over weeks to months, and several sessions may be needed.
- **Missing:** clinical sources list side effects such as bruising, brown staining of the skin and new tiny red veins, and rare complications including skin ulcers and clots.
- **Note:** 'Irritates the vein's inner lining': correct in principle. Detergents break down the lining's cell membranes, while hypertonic saline draws water out of the cells. Either way, the vein scars and closes.

SOURCES

1. StatPearls (NCBI Bookshelf): Sclerotherapy: <https://www.ncbi.nlm.nih.gov/books/NBK599526/>
2. Sclerotherapy for lower limb telangiectasias, Cochrane review (PMC): <https://pmc.ncbi.nlm.nih.gov/articles/PMC7389636/>
3. DermNet: Sclerotherapy: <https://dermnetnz.org/topics/sclerotherapy>
4. NICE HTG301: Ultrasound-guided foam sclerotherapy for varicose veins, the procedure: <https://www.nice.org.uk/guidance/htg301/chapter/2-The-procedure>
5. Cleveland Clinic: Sclerotherapy: <https://my.clevelandclinic.org/health/treatments/6763-sclerotherapy>

Permalink: <https://detailenjoyer.com/case/sclerotherapy/> · Last updated Jun 16, 2025



SICKLED CELLS

Sickle cell disease is a group of inherited red blood cell disorders caused by a mutation in the beta-globin gene, which helps make hemoglobin. According to the US National Heart, Lung, and Blood Institute (NHLBI), normal red blood cells are disc-shaped and flexible, so they move easily through large and small vessels. The mutation swaps a single amino acid, valine for glutamic acid, producing hemoglobin S. When hemoglobin S gives up its oxygen in the tissues, it links into long, rigid strands inside the cell. A 2019 review in the Annual Review of Pathology by Prithu Sundd and colleagues describes how these polymers stiffen and distort the cell. The sickled cells are inflexible and can stick to vessel walls, slowing or blocking blood flow. That starves nearby tissue of oxygen and can cause sudden episodes of severe pain, called pain crises. NHLBI also notes that sickle cells break apart early, lasting only 10 to 20 days compared with 90 to 120 for normal red cells. The body may not keep up, which leads to anemia. Other complications NHLBI lists include acute chest syndrome, stroke, eye problems and infections. The disease is autosomal recessive: a person must inherit the mutation from both parents. The FDA says it affects about 100,000 people in the US. Chicago physician James B. Herrick first described it in the medical literature in 1910. On December 8, 2023, the FDA approved the first cell-based gene therapies for it, Casgevy and Lyfgenia, for patients 12 and older. The footage is a medical animation of red cells flowing through a vessel, then sickled cells clumping.

QUICK FACTS

DD-613-F01

Sickle hemoglobin forms rigid strands when it releases oxygen.

DD-613-F02

Sickle cells last only 10 to 20 days, compared with 90 to 120 for normal red cells.

THE WRITE-UP

One swap. A single amino acid change in beta-globin produces hemoglobin S.

Strands form. When hemoglobin S releases oxygen, it links into rigid strands that bend the cell into a sickle.

Blocked flow. Stiff, sticky sickle cells can slow or block blood flow, causing pain crises.

Short-lived. Sickle cells last 10 to 20 days instead of 90 to 120, which leads to anemia.

Gene therapy. On December 8, 2023, the FDA approved the first gene therapies for the disease.

REEL VS. RECORD

- **Note:** 'Due to abnormal hemoglobin': the cause is a single amino acid swap (valine for glutamic acid) in beta-globin, inherited from both parents. The disease is autosomal recessive.
- **Note:** 'Under low oxygen': specifically when hemoglobin S has given up its oxygen in the tissues. The strands then form inside the cell and distort it.
- **Note:** 'Prone to clumping and blocking blood flow': NHLBI describes sickled cells as inflexible and sticky. They can stick to vessel walls and block flow, depriving tissue of oxygen.
- **Note:** 'Complications like anemia': the anemia comes mainly from sickle cells breaking apart early, after 10 to 20 days instead of 90 to 120.
- **Missing:** sickle cell disease affects about 100,000 people in the US (FDA), and the first gene therapies were approved on December 8, 2023.

SOURCES

1. NHLBI (NIH): Sickle Cell Disease (archived overview, 2022): <https://web.archive.org/web/20220309204600/https://www.nhlbi.nih.gov/health-topics/sickle-cell-disease>
2. NHLBI (NIH): Sickle Cell Disease, Causes and Risk Factors: <https://www.nhlbi.nih.gov/health/sickle-cell-disease/causes>
3. Sundd, Gladwin & Novelli (2019), Pathophysiology of Sickle Cell Disease, Annual Review of Pathology: <https://doi.org/10.1146/annurev-pathmechdis-012418-012838>
4. FDA: FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease (December 8, 2023): <https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease>
5. Wikipedia: Sickle cell disease: https://en.wikipedia.org/wiki/Sickle_cell_disease

Permalink: <https://detailenjoyer.com/case/sickled-cells/> · Last updated Jul 12, 2025



BERLIN HEART

The Berlin Heart EXCOR Pediatric is a pulsatile, air-driven ventricular assist device (VAD) that keeps infants and children with severe heart failure alive, usually while they wait for a heart transplant. It's paracorporeal: one or two blood pumps sit outside the body on the chest wall, connected by cannulas (tubes) through the skin to the heart's atrium or ventricle and to the great arteries. Each pump is a clear chamber split by a flexible membrane. A driving unit pushes and pulls air behind the membrane, so blood is drawn in and pushed out, and valves keep it flowing one way. Pumps come in small sizes for babies. The device grew out of the German Heart Institute Berlin. In 1990, its surgeons kept an 8-year-old boy alive on an adult-sized 50 mL pump until a transplant, and in 1992 an infant system with a 10 mL pump was implanted there for the first time. On December 16, 2011, the US FDA approved the EXCOR Pediatric under a Humanitarian Device Exemption as a bridge to transplant, after a 17-hospital study led by Texas Children's Hospital. The approved system uses the stationary Ikus driver. The smaller, battery-powered EXCOR Active driver weighs about 15 kg and runs at least 5 hours on batteries. In the US it's still an investigational device used under an FDA-approved study that began in November 2022. A 2026 JACC report found no major device malfunctions among its first 40 study patients. The footage shows a red blood pump with its connectors and a clear pump chamber lying on a hospital blanket.

QUICK FACTS

DD-577-F01

The Berlin Heart EXCOR's blood pumps sit outside the body and are driven by air pressure.

DD-577-F02

The FDA approved the Berlin Heart EXCOR Pediatric on December 16, 2011.

THE WRITE-UP

Pumps outside the body. The EXCOR's blood pumps sit outside the chest, connected to the heart and great arteries by cannulas.

Driven by air. Air pulses flex a membrane inside each pump, drawing blood in and pushing it out through one-way valves.

Born in Berlin. In 1990, Berlin surgeons bridged an 8-year-old to transplant with the device, and miniature pumps followed.

US approval. The FDA approved the EXCOR Pediatric on December 16, 2011, as a bridge to heart transplant.

A portable driver. The 15 kg EXCOR Active driver runs on batteries. In the US it's still in an FDA-approved study.

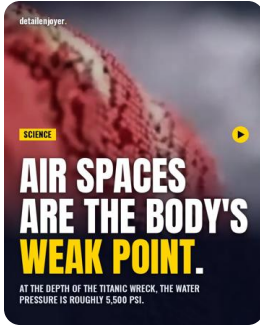
REEL VS. RECORD

- **Note:** 'Designed specifically for infants and children': the pediatric pumps were. The first child, in 1990, was supported with an adult-sized 50 mL pump, and miniature pumps (from 10 mL) followed. It's mainly a bridge to heart transplant.
- **Note:** 'Such as the stationary Ikus, or the portable EXCOR® Active': both drivers exist, but their status differs by country. In the US, the Ikus is the FDA-approved driver, and EXCOR Active is still an investigational device used in an FDA-approved study. Berlin Heart says both are for use in healthcare facilities.
- **Note:** 'Applies positive and negative air pressure': correct. The air pushes and pulls a flexible membrane inside each pump, and valves keep the blood flowing one way.
- **Missing:** the FDA approved the EXCOR Pediatric under a Humanitarian Device Exemption on December 16, 2011, after a 17-hospital US study led by Texas Children's Hospital.

SOURCES

1. FDA: HDE approval letter and summary, Berlin Heart EXCOR Pediatric VAD (H100004), December 16, 2011: https://www.accessdata.fda.gov/cdrh_docs/pdf10/h100004a.pdf
2. Hetzer et al., 'Paediatric mechanical circulatory support with Berlin Heart EXCOR: development and outcome of a 23-year experience', European Journal of Cardio-Thoracic Surgery (2016): <https://doi.org/10.1093/ejcts/ezw011>
3. Texas Children's Hospital via PR Newswire: FDA approval of EXCOR Pediatric (December 16, 2011): <https://www.prnewswire.com/news-releases/texas-childrens-hospital-lead-study-center-announces-us-food-and-drug-administration-approval-of-excor-pediatric-ventricular-assist-device-for-use-in-united-states-132801873.html>
4. Berlin Heart: EXCOR Active: <https://www.berlinheart.de/en/medical-professionals/excorr-active/>
5. ClinicalTrials.gov: EXCOR Active Driving System for the EXCOR Pediatric VAD IDE Study (NCT05610787): <https://clinicaltrials.gov/study/NCT05610787>
6. JACC (2026): Prospective Multicenter Evaluation of a Novel Active Driving System for Pediatric Ventricular Assist Device Support: <https://www.jacc.org/doi/10.1016/j.jacc.2026.03.080>

Permalink: <https://detailenjoyer.com/case/berlin-heart/> · Last updated May 22, 2025



IMPLODER

The human body is mostly water, and water barely compresses. Divers survive great depths because the pressure on them rises gradually and evenly. The weak points are air-filled spaces such as the lungs, middle ears, sinuses and bowel, where gas can be squeezed or forced to expand, a kind of injury called barotrauma. Explosions cause harm in a related way. Blast injury medicine classes the pressure wave itself as primary blast injury, and gas-filled organs, especially the lungs, ears and gut, are the most vulnerable. Underwater, a blast wave travels farther and faster than in air, so it is more dangerous at a given distance. Deep-sea pressure is immense: it rises by about one atmosphere for every 10 meters of seawater, so at the roughly 3,800-meter depth of the Titanic wreck it is about 380 atmospheres, or around 5,500 psi. If a pressure hull fails at that depth, the surrounding water rushes in within milliseconds. That happened to the submersible Titan on June 18, 2023, killing all five people aboard. The US Coast Guard's Marine Board of Investigation reported on August 5, 2025, that the disaster was preventable and blamed mainly OceanGate's design, testing and safety practices. The footage is a stylized CGI figure made of red beads breaking apart, not real injury footage.

QUICK FACTS

DD-593-F01

Air-filled organs like the lungs are the body's most vulnerable parts to blast and pressure injury.

DD-593-F02

Ocean pressure rises by about one atmosphere for every 10 meters of seawater.

THE WRITE-UP

Water doesn't squeeze. The body is mostly water, which barely compresses, so slow, even pressure isn't crushing.

Air is the weak point. Air-filled spaces like the lungs, ears and gut are where pressure injuries happen.

Blast waves. The pressure wave of an explosion damages gas-filled organs first, and water carries it farther.

One atmosphere per 10 meters. Seawater pressure rises by about one atmosphere for every 10 meters of depth.

Titan, 2023. The submersible Titan imploded on June 18, 2023. The Coast Guard called it preventable.

REEL VS. RECORD

- **Note:** 'The body experiences forces exceeding thousands of pounds per square inch': at great depth, the pressure really is in the thousands of psi, about 5,500 psi at the depth of the Titanic. I'd add that pressure alone isn't the danger. Divers handle high pressure because it rises gradually. What hurts is a sudden change and the body's air spaces.
- **Note:** 'This collapses air-filled cavities, notably the lungs, causing severe barotrauma': consistent with blast injury medicine, where the lungs, ears and gut are the most vulnerable.
- **Note:** My Reel vs. Record note: the footage is a stylized CGI figure, not real injury footage. I kept the case factual and left out graphic detail.

SOURCES

1. NOAA National Ocean Service: How does pressure change with ocean depth?: <https://oceanservice.noaa.gov/facts/pressure.html>
2. Wikipedia: Blast injury: https://en.wikipedia.org/wiki/Blast_injury
3. BBC News: Titan submersible implosion was 'preventable', says report (2025): <https://www.bbc.com/news/articles/cwy57pnjw4wo>

Permalink: <https://detailenjoyer.com/case/imploder/> · Last updated Jun 10, 2025



AN MRI'S SKELETON

The machine in the footage is almost certainly a CT (computed tomography) scanner with its covers off, not an MRI. In a CT scanner, an X-ray tube and detector array are mounted on a ring-shaped gantry that spins rapidly around the patient, and a computer turns the measurements into cross-sectional images. An MRI works differently and has no spinning parts. A strong static magnet lines up hydrogen nuclei in the body, radio-frequency pulses tip them, and stationary gradient coils briefly vary the magnetic field so the signals can be located in space. The nuclei give off radio signals as they relax, and a computer builds images in which tissues differ by how fast they relax. The Reel's description of magnets, radio waves and gradient fields fits MRI; only the 'spinning' parts and the footage belong to CT.

QUICK FACTS

DD-298-F01

MRI uses magnets and radio waves and has no spinning parts.

DD-298-F02

A CT scanner's X-ray tube spins on a ring gantry.

THE WRITE-UP

Magnets and radio. MRI uses a strong magnet and radio-frequency pulses to get signals from hydrogen nuclei.

Gradient coils. Stationary gradient coils vary the field so signals can be located.

Tissue contrast. Tissues differ by how fast their nuclei relax after each pulse.

CT spins. A CT scanner's X-ray tube and detectors spin on a ring around the patient.

The footage. The spinning ring in the footage matches an uncovered CT gantry.

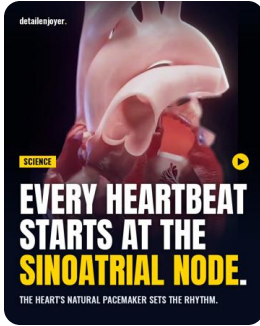
REEL VS. RECORD

- **Note:** 'Spinning gradient coil assembly': I'd correct this. MRI gradient coils are stationary; they vary the field electrically. The spinning ring in the footage looks like a CT scanner's gantry with its covers off.
- **Note:** 'The spinning component aids in differentiating tissues': in MRI, contrast comes from how tissues' nuclei relax, not from rotation. In CT, the rotation lets the computer build cross-sections from X-ray measurements.
- **Note:** Footage vs. record: I'm treating the footage as a CT scanner shown in place of an MRI, so I covered both machines.

SOURCES

1. NIBIB (NIH): Magnetic Resonance Imaging (MRI): <https://www.nibib.nih.gov/science-education/science-topics/magnetic-resonance-imaging-mri>
2. NIBIB (NIH): Computed Tomography (CT): <https://www.nibib.nih.gov/science-education/science-topics/computed-tomography-ct>
3. US FDA: Computed Tomography (CT): <https://www.fda.gov/radiation-emitting-products/medical-x-ray-imaging/computed-tomography-ct>
4. Wikipedia: CT scan: https://en.wikipedia.org/wiki/CT_scan

Permalink: <https://detailenjoyer.com/case/an-mris-skeleton/> · Last updated Aug 5, 2024



I WANTED YOU TO KNOW...

The cardiac cycle is the sequence of contraction and relaxation that pumps blood. It starts in the sinoatrial node, the heart's natural pacemaker, which fires an electrical impulse. The two atria contract and push blood into the ventricles. The impulse then passes through the atrioventricular node and down the bundle of His, and the ventricles contract, pumping blood to the lungs and the rest of the body. The familiar 'lub dub' sound comes from the heart valves closing. The footage is an animated 3D heart.

QUICK FACTS

DD-265-F01

The sinoatrial node is the heart's natural pacemaker.

DD-265-F02

The atria contract first.

THE WRITE-UP

Pacemaker. The sinoatrial node is the heart's natural pacemaker.

Atria first. The atria contract first.

AV node. The impulse passes through the atrioventricular node.

Bundle of His. It travels down the bundle of His.

Lub dub. Valves closing make the sound.

REEL VS. RECORD

- **Note:** The Reel says the cycle creates the 'lub dub' sound; more precisely, the sound comes from the heart valves closing.

SOURCES

1. Wikipedia: Cardiac cycle: https://en.wikipedia.org/wiki/Cardiac_cycle
2. Wikipedia: Sinoatrial node: https://en.wikipedia.org/wiki/Sinoatrial_node

Permalink: <https://detailenjoyer.com/case/i-wanted-you-to-know/> · Last updated Jul 6, 2024



BACTERIA HUNTERS

Bacteriophages are the most abundant biological entities on Earth, discovered independently by Frederick Twort in 1915 and Félix d'Hérelle in 1917. Phage therapy faded in the West with antibiotics but continued in Georgia and Russia, and drug-resistant infections have revived interest in it despite the challenge of matching each phage to a specific strain.

QUICK FACTS

DD-309-F01

Phages are viruses of bacteria.

DD-309-F02

They inject genetic material.

THE WRITE-UP

Outnumbering all life. There are an estimated 10^{31} bacteriophages on the planet, more than every other organism on Earth, bacteria included, combined.

Discovered twice. British bacteriologist Frederick Twort described a bacteria-killing agent in 1915, and Félix d'Hérelle at the Pasteur Institute independently announced his discovery on 3 September 1917 and coined the name 'bacteriophage', meaning bacterium-eater.

Kept alive in Georgia. George Eliava, who met d'Hérelle in Paris, founded the institute in Tbilisi in 1923 that now bears his name, and phages are still used against antibiotic-resistant infections particularly in Russia and Georgia.

Precision is the catch. Because a phage targets only one or a few bacterial strains, it causes fewer side effects than antibiotics, but finding a phage that matches a given infection is a major practical obstacle.

A modern case. In 2017 doctors at Great Ormond Street Hospital in London used a cocktail of two engineered phages and one natural phage to treat an antibiotic-resistant *Mycobacterium abscessus* infection in a young woman with cystic fibrosis.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Bacteriophage: <https://en.wikipedia.org/wiki/Bacteriophage>
2. Wikipedia: Phage therapy: https://en.wikipedia.org/wiki/Phage_therapy

Permalink: <https://detailenjoyer.com/case/bacteria-hunters/> · Last updated Aug 26, 2024



DD-315 SCIENCE / PEOPLE · 13 OF 27

YOUR HEART IN A GLASS

Cardiomyocytes are the muscle cells of the heart. They can generate and conduct electrical impulses, and their myofibrils of actin and myosin let them contract. Neighboring cells are joined by intercalated discs, which pass electrical signals quickly so the heart contracts together. Lab-grown cardiomyocytes can beat by themselves in a dish. The footage shows beating heart cells under a microscope.

QUICK FACTS

DD-315-F01

Heart muscle cells are cardiomyocytes.

DD-315-F02

They conduct electrical impulses.

THE WRITE-UP

Cardiomyocytes. Heart muscle cells are cardiomyocytes.

Impulses. They conduct electrical impulses.

Myofibrils. Actin and myosin let them contract.

Discs. Intercalated discs link them.

In a dish. They can beat in a dish.

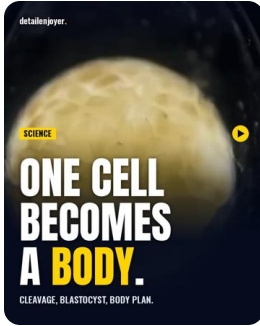
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Cardiac muscle cell: https://en.wikipedia.org/wiki/Cardiac_muscle_cell
2. Wikipedia: Intercalated disc: https://en.wikipedia.org/wiki/Intercalated_disc

Permalink: <https://detailenjoyer.com/case/your-heart-in-a-glass/> · Last updated Sep 1, 2024



DD-333 SCIENCE / PEOPLE · 14 OF 27

EMBRYONIC DEVELOPMENT

Early embryos split into many cells without getting bigger, and the pattern of those divisions depends largely on how much yolk the egg holds.

Gastrulation then sorts cells into three germ layers, and genes such as the Hox family help give each body segment its identity.

QUICK FACTS

DD-333-F01

Development starts with a zygote.

DD-333-F02

Rapid divisions are called cleavage.

THE WRITE-UP

Dividing without growing. The zygotes of many species go through rapid cell cycles with no significant overall growth, producing a cluster of cells the same size as the original zygote.

Yolk sets the pattern. Depending mostly on how much yolk is in the egg, cleavage can be holoblastic (complete) or meroblastic (partial).

Three germ layers. Gastrulation turns the single-layered blastula into a gastrula, organized into the ectoderm, mesoderm and endoderm.

Body-plan genes. Somites along the body axis have distinct positional values that are thought to be specified by the Hox homeotic genes.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Embryonic development: https://en.wikipedia.org/wiki/Embryonic_development
2. Wikipedia: Cleavage (embryo): [https://en.wikipedia.org/wiki/Cleavage_\(embryo\)](https://en.wikipedia.org/wiki/Cleavage_(embryo))

Permalink: <https://detailenjoyer.com/case/embryonic-development/> · Last updated Sep 29, 2024



DD-395 SCIENCE · 15 OF 27

BLOOD DESTRUCTION

Malaria still causes hundreds of thousands of deaths a year, about 95% of them in the WHO African Region. Ronald Ross's proof of the mosquito cycle won the 1902 Nobel Prize, inherited traits like sickle cell show how the disease has shaped human genes, and two vaccines are now in use.

QUICK FACTS

DD-395-F01

Plasmodium parasites.

DD-395-F02

Female Anopheles mosquitoes.

THE WRITE-UP

The current toll. In 2024 an estimated 282 million malaria cases worldwide led to about 610,000 deaths, and the WHO African Region accounted for about 94% of cases and 95% of deaths.

Nobel-winning detective work. Ronald Ross proved the parasite's life cycle in mosquitoes in 1897 in Calcutta and received the 1902 Nobel Prize, while Tu Youyou received the 2015 Nobel Prize for her work on malaria.

Written in our genes. Several inherited traits give some resistance to malaria, including sickle cell trait, thalassaemia traits, G6PD deficiency and the absence of Duffy antigens on red blood cells.

Two vaccines in use. As of February 2026, two malaria vaccines, RTS,S and R21/Matrix-M, had completed clinical trials and were in use, with R21 showing 77% efficacy in initial trials.

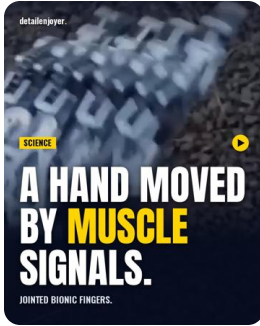
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Malaria: <https://en.wikipedia.org/wiki/Malaria>

Permalink: <https://detailenjoyer.com/case/blood-destruction/> · Last updated Nov 27, 2024



DD-438 SCIENCE / TECH · 16 OF 27

ARTICULATED PROSTHESIS

Articulated prosthetic hands have multiple jointed fingers to mimic a natural hand. Many are myoelectric: electrodes on the skin pick up electrical signals from muscles in the residual limb, and motors turn them into grips, pinches or pointing. The footage shows a prosthetic hand moving its fingers.

QUICK FACTS

DD-438-F01

Multiple jointed fingers.

DD-438-F02

Reads muscle signals.

THE WRITE-UP

Joints. Multiple jointed fingers.

Myoelectric. Reads muscle signals.

Sensors. Electrodes on the skin.

Grips. Grip, pinch, point.

Motors. Motors move fingers.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Prosthesis: <https://en.wikipedia.org/wiki/Prosthesis>

2. Wikipedia: Myoelectric prosthesis: https://en.wikipedia.org/wiki/Myoelectric_prosthesis

Permalink: <https://detailenjoyer.com/case/articulated-prosthesis/> · Last updated Dec 24, 2024



DD-420 SCIENCE / NATURE · 17 OF 27

RABIES CRAZIES

Rabies is a viral infection usually spread by bites or scratches from infected animals. The virus travels along peripheral nerves to the brain, where it causes encephalitis. Animals may show furious rabies, with aggression, drooling and lack of fear, or paralytic rabies, with weakness and paralysis. Once symptoms appear it is nearly always fatal, though vaccination soon after exposure prevents it. The footage shows animals with behavior changes.

QUICK FACTS

DD-420-F01

Bites or scratches.

DD-420-F02

Along nerves to the brain.

THE WRITE-UP

Spread. Bites or scratches.

Route. Along nerves to the brain.

Encephalitis. Brain inflammation.

Forms. Furious and paralytic.

Prevention. Vaccination after exposure.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Rabies: <https://en.wikipedia.org/wiki/Rabies>

Permalink: <https://detailenjoyer.com/case/rabies-crazies/> · Last updated Dec 12, 2024



DD-448 SCIENCE · 18 OF 27

ROOT OF THE PROBLEM

Root canal treatment addresses infection or damage in a tooth's pulp, the soft tissue with nerves and blood vessels. A dentist removes the pulp, cleans, shapes and disinfects the canals, then fills and seals them, usually with a rubbery material called gutta-percha, and often adds a crown. It can save teeth that would otherwise be extracted. The footage shows an animation of the procedure.

QUICK FACTS

DD-448-F01

Nerves and vessels.

DD-448-F02

Infected pulp removed.

THE WRITE-UP

Pulp. Nerves and vessels.

Removal. Infected pulp removed.

Cleaning. Canals disinfected.

Filling. Gutta-percha.

Goal. Save the tooth.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Root canal treatment: https://en.wikipedia.org/wiki/Root_canal_treatment

Permalink: <https://detailenjoyer.com/case/root-of-the-problem/> · Last updated Jan 5, 2025



DD-454 SCIENCE · 19 OF 27

SEEING THINGS DIFFERENTLY

Laser vision correction aims to reduce dependence on glasses or contacts by reshaping the cornea. The main procedures are LASIK (laser-assisted in situ keratomileusis), PRK (photorefractive keratectomy) and SMILE (small incision lenticule extraction). They treat refractive errors such as myopia, hyperopia and astigmatism. The footage, credited to life_withmedical, shows an eye during laser surgery.

QUICK FACTS

DD-454-F01

Less need for glasses.

DD-454-F02

The cornea.

THE WRITE-UP

Goal. Less need for glasses.

Target. The cornea.

LASIK. Keratomileusis.

PRK. Photorefractive keratectomy.

SMILE. Lenticule extraction.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: LASIK: <https://en.wikipedia.org/wiki/LASIK>

Permalink: <https://detailenjoyer.com/case/seeing-things-differently/> · Last updated Jan 10, 2025



DD-465 SCIENCE · 20 OF 27

FACE CREATOR

Facial development begins around the fourth week of pregnancy, when neural crest cells migrate into the head region. The face starts as five tissue swellings, the facial prominences, that grow toward each other and fuse. Between weeks six and eight the nose, mouth and eyes take shape, and the palate forms from two shelves that grow inward and join at the midline. The footage, credited to DamnThatsInteresting, shows an animation of the face forming.

QUICK FACTS

DD-465-F01

Around week four.

DD-465-F02

Neural crest cells.

THE WRITE-UP

Start. Around week four.

Cells. Neural crest cells.

Pieces. Five prominences.

Weeks 6-8. Nose, mouth, eyes.

Palate. Two shelves fuse.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Human embryonic development: https://en.wikipedia.org/wiki/Human_embryonic_development

Permalink: <https://detailenjoyer.com/case/face-creator/> · Last updated Jan 22, 2025



DD-487 PEOPLE · 21 OF 27

MAID

Medical assistance in dying (MAiD) is legal in several jurisdictions, including Canada, Belgium and the Netherlands, and some U.S. states, where it is usually limited to terminally ill adults. A physician or nurse practitioner administers or prescribes medication under strict legal criteria, such as a grievous and irremediable condition, intolerable suffering and informed consent. Laws and eligibility differ widely and remain debated.

QUICK FACTS

DD-487-F01

Medical assistance in dying.

DD-487-F02

Canada, Belgium, Netherlands, some U.S. states.

THE WRITE-UP

Term. Medical assistance in dying.

Legal in. Canada, Belgium, Netherlands, some U.S. states.

Provider. Physician or nurse practitioner.

Criteria. Grievous condition, consent.

Debate. Ongoing.

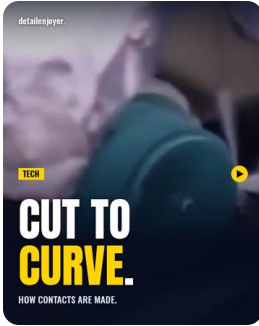
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Medical assistance in dying: https://en.wikipedia.org/wiki/Medical_assistance_in_dying

Permalink: <https://detailenjoyer.com/case/maid/> · Last updated Feb 14, 2025



DD-492 TECH · 22 OF 27

LENS CRAFTER

Contact lenses are made by cast molding, spin casting or lathe cutting; the Reel also mentions 3D printing. Rigid gas permeable (RGP) and custom lenses are often lathed from a solid disc to precise curvatures. Soft lenses are then hydrated, and all lenses are polished, inspected, sterilized and packaged in saline. The footage, credited to DamnThatsInteresting, shows lenses being machined.

QUICK FACTS

DD-492-F01

Molding, spin casting, lathing.

DD-492-F02

Rigid gas permeable.

THE WRITE-UP

Methods. Molding, spin casting, lathing.

RGP. Rigid gas permeable.

Lathe. Cuts a solid disc.

Finishing. Hydration, polishing.

Packaging. Sterile saline.

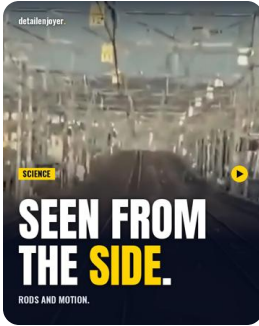
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Contact lens: https://en.wikipedia.org/wiki/Contact_lens

Permalink: <https://detailenjoyer.com/case/lens-crafter/> · Last updated Feb 19, 2025



DD-502 SCIENCE · 23 OF 27

SHIFTY PERIPHERY

Peripheral vision is especially good at detecting motion. The outer retina has a higher share of rod cells, which are very sensitive to light changes and movement, while the central fovea is packed with cones for detail and color. Motion in the wide visual field helps the brain detect movement, keep balance and judge speed, the Reel says. The footage, credited to [howeverythingworks](#), shows a motion illusion.

QUICK FACTS

DD-502-F01

Motion detection.

DD-502-F02

Rods dominate the periphery.

THE WRITE-UP

Strength. Motion detection.

Cells. Rods dominate the periphery.

Center. Cones for detail.

Uses. Balance, speed.

Sensitivity. Light changes.

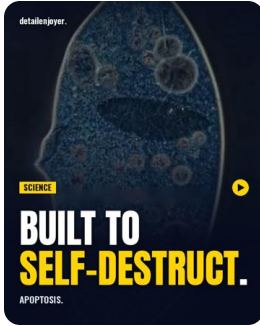
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Rod cell: https://en.wikipedia.org/wiki/Rod_cell

Permalink: <https://detailenjoyer.com/case/shifty-periphery/> · Last updated Mar 1, 2025



DD-523 SCIENCE · 24 OF 27

CELL DEATH

Apoptosis is programmed cell death, a tightly regulated process that removes damaged or unneeded cells. Unlike necrosis, which is uncontrolled and inflammatory, apoptosis is triggered by internal stress such as DNA damage or oxidative stress, or by external signals such as death ligands and immune cells, and proceeds through caspases, enzymes that dismantle the cell. The footage, credited to [michaeloftiktokofficial](#), shows a cell breaking apart under a microscope.

QUICK FACTS

DD-523-F01

Programmed death.

DD-523-F02

Necrosis.

THE WRITE-UP

Type. Programmed death.

Contrast. Necrosis.

Triggers. DNA damage, signals.

Enzymes. Caspases.

Effect. No inflammation.

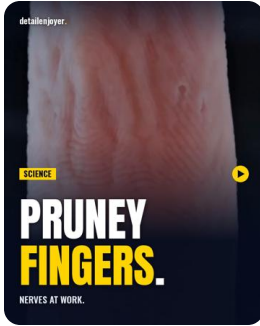
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Apoptosis: <https://en.wikipedia.org/wiki/Apoptosis>

Permalink: <https://detailenjoyer.com/case/cell-death/> · Last updated Mar 23, 2025



DD-525 SCIENCE · 25 OF 27

WET RESPONSE

Fingers and toes wrinkle after soaking because the autonomic nervous system constricts blood vessels under the skin, reducing volume and pulling the skin into folds; it does not happen if the finger's nerves are cut. Some studies suggest the pattern improves grip on wet objects. The footage, credited to photoowlsocial, shows a fingertip wrinkling in water.

QUICK FACTS

DD-525-F01

Vasoconstriction.

DD-525-F02

Autonomic nerves.

THE WRITE-UP

Cause. Vasoconstriction.

Control. Autonomic nerves.

Nerves. Needed.

Pattern. Folds.

Benefit. Possibly grip.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Wrinkle: <https://en.wikipedia.org/wiki/Wrinkle>

Permalink: <https://detailenjoyer.com/case/wet-response/> · Last updated Mar 26, 2025



DD-539 PEOPLE · 26 OF 27

HHS

The U.S. Department of Health and Human Services (HHS) protects Americans' health and provides human services. It traces to the Department of Health, Education, and Welfare, created in 1953 and renamed HHS in 1979. It oversees Medicare, Medicaid and Affordable Care Act programs and agencies including the CDC, FDA and NIH. The Reel was posted in April 2025, shortly after HHS announced a major restructuring and staff cuts. The footage, credited to New York Post, shows HHS leaders and offices.

QUICK FACTS

DD-539-F01

Health and human services.

DD-539-F02

1953, HEW.

THE WRITE-UP

Role. Health and human services.

Origin. 1953, HEW.

Renamed. 1979.

Programs. Medicare, Medicaid, ACA.

Agencies. CDC, FDA, NIH.

REEL VS. RECORD

- **Note:** The Reel says HHS was established in 1953; its predecessor, HEW, was, and it became HHS in 1979.

SOURCES

1. Wikipedia: United States Department of Health and Human Services: https://en.wikipedia.org/wiki/United_States_Department_of_Health_and_Human_Services

Permalink: <https://detailenjoyer.com/case/hhs/> · Last updated Apr 9, 2025



DD-549 TECH / SCIENCE · 27 OF 27

AI SURGERY II

Robotic microsurgery systems assist surgeons with procedures on nerves, blood vessels and eye tissue. They use real-time imaging, motion scaling, which turns large hand movements into tiny instrument motions, and tremor filtering; some research systems add AI to assist or partly automate steps. The footage, credited to Innovology, shows a robotic arm operating at small scale.

QUICK FACTS

DD-549-F01

Microsurgery.

DD-549-F02

Real-time.

THE WRITE-UP

Scale. Microsurgery.

Imaging. Real-time.

Scaling. Motion scaling.

Tremor. Filtered.

AI. Assists, per the Reel.

REEL VS. RECORD

- **Note:** The Reel says the machines 'assist or perform' procedures; current clinical systems are surgeon-controlled.

SOURCES

1. Wikipedia: Robot-assisted surgery: https://en.wikipedia.org/wiki/Robot-assisted_surgery

Permalink: <https://detailenjoyer.com/case/ai-surgery-ii/> · Last updated Apr 20, 2025

COLLECTION QUIZ

Test Your Knowledge: 54 questions from Inside the Body. Answers are on the next page.

1. Which organelle holds the cell's DNA and controls gene expression? (DD-003 · Eukaryotic)

- A. Golgi apparatus
- B. Ribosome
- C. Nucleus
- D. Lysosome

2. Which organelles produce energy through cellular respiration? (DD-003 · Eukaryotic)

- A. Mitochondria
- B. Peroxisomes
- C. Ribosomes
- D. Golgi apparatus

3. Why are vaults called 'vaults'? (DD-015 · The Vault)

- A. They lock away the cell's DNA
- B. Under the microscope they look like the arches of a cathedral's vaulted ceiling
- C. They were found inside bank-vault-like membranes
- D. They store the cell's energy reserves

4. Roughly how many vaults does a typical human cell contain? (DD-015 · The Vault)

- A. About 10
- B. About 10,000
- C. About 10 million
- D. Exactly one

5. Where in the eye are asteroid bodies found? (DD-001 · Starry Eyed)

- A. The cornea
- B. The lens
- C. The vitreous gel
- D. The tear film

6. What are asteroid bodies mainly made of? (DD-001 · Starry Eyed)

- A. Iron and protein
- B. Calcium, phosphate and lipids
- C. Ice crystals
- D. Cholesterol only

7. What does 'macrophage' mean? (DD-044 · Macrophagia)

- A. Small cell
- B. Big eater
- C. White blood
- D. Fast mover

8. What are antibodies and complement proteins that tag a microbe for eating called? (DD-044 · Macrophagia)

- A. Opsonins
- B. Lysosomes
- C. Ribosomes
- D. Hormones

9. Who described capillaries in 1661? (DD-649 · Blood Watch)

- A. Marcello Malpighi
- B. Louis Pasteur
- C. Robert Koch
- D. Marie Curie

10. What did Rudolph Wagner see in 1839? (DD-649 · Blood Watch)

- A. White blood cells rolling along vessel walls
- B. The first virus
- C. DNA
- D. A heart transplant

11. What does a sclerosant damage? (DD-597 · Sclerotherapy)

- A. The vein's inner lining
- B. The skin's surface
- C. The bone
- D. The nerve

12. What kind of agent is polidocanol? (DD-597 · Sclerotherapy)

- A. A detergent
- B. An antibiotic
- C. A painkiller
- D. A vitamin

13. What is the abnormal hemoglobin in sickle cell disease called? (DD-613 · Sickled Cells)

- A. Hemoglobin S
- B. Hemoglobin A
- C. Hemoglobin F
- D. Hemoglobin C

14. When does hemoglobin S form rigid strands? (DD-613 · Sickled Cells)

- A. After it releases oxygen
- B. Only in the lungs
- C. When it's cold
- D. After eating

15. Where do the EXCOR's blood pumps sit? (DD-577 · Berlin Heart)

- A. Outside the body
- B. Inside the chest
- C. In the abdomen
- D. Inside the heart

16. What drives the EXCOR's pumps? (DD-577 · Berlin Heart)

- A. Air pressure
- B. Magnets
- C. A hand crank
- D. Springs

17. Why doesn't slowly rising pressure crush a diver? (DD-593 · Imploder)

- A. The body is mostly water, which barely compresses
- B. Wetsuits hold back the pressure
- C. Pressure doesn't rise underwater
- D. Divers hold their breath

18. Which parts of the body are most vulnerable to pressure injury? (DD-593 · Imploder)

- A. Air-filled spaces like the lungs
- B. Bones
- C. Fingernails
- D. Hair

19. What does MRI use to image the body? (DD-290 · An MRI's Skeleton)

- A. A strong magnet and radio waves
- B. X-rays
- C. Ultrasound
- D. Visible light

20. Do MRI gradient coils spin? (DD-290 · An MRI's Skeleton)

- A. No, they're stationary
- B. Yes, rapidly
- C. Only during startup
- D. Only in old models

21. What is the heart's natural pacemaker? (DD-265 · I Wanted You to Know...)

- A. The sinoatrial node
- B. The aorta
- C. The lungs
- D. The bundle of His

22. Which chambers contract first? (DD-265 · I Wanted You to Know...)

- A. The atria
- B. The ventricles
- C. The lungs
- D. The valves

23. What do phages infect? (DD-309 · Bacteria Hunters)

- A. Bacteria
- B. Humans
- C. Plants only
- D. Rocks

24. What do they inject? (DD-309 · Bacteria Hunters)

- A. Genetic material
- B. Oxygen
- C. Sugar
- D. Water

25. What are heart muscle cells called? (DD-315 · Your Heart in a Glass)

- A. Cardiomyocytes
- B. Neurons
- C. Erythrocytes
- D. Osteocytes

26. Which proteins contract? (DD-315 · Your Heart in a Glass)

- A. Actin and myosin
- B. Keratin
- C. Collagen
- D. Insulin

27. What is the first cell? (DD-333 · Embryonic Development)

- A. A zygote
- B. A neuron
- C. A blastocyst
- D. A gamete

28. What are early divisions called? (DD-333 · Embryonic Development)

- A. Cleavage
- B. Mitosis only
- C. Meiosis
- D. Fusion

29. What causes malaria? (DD-395 · Blood Destruction)

- A. Plasmodium parasites
- B. A virus
- C. Bacteria
- D. Fungi

30. Which mosquitoes spread it? (DD-395 · Blood Destruction)

- A. Female Anopheles
- B. Male Aedes
- C. All flies
- D. Ticks

31. What controls a myoelectric hand? (DD-438 · Articulated Prosthesis)

- A. Muscle signals
- B. Voice
- C. Eye blinks
- D. Breath

32. Where are sensors placed? (DD-438 · Articulated Prosthesis)

- A. On the skin
- B. In the bone
- C. On the shoe
- D. In the mouth

33. How does rabies spread? (DD-420 · Rabies Crazies)

- A. Bites or scratches
- B. Air
- C. Water
- D. Food

34. How does it reach the brain? (DD-420 · Rabies Crazies)

- A. Along nerves
- B. Through blood only
- C. Via lungs
- D. Through skin

35. What is removed? (DD-448 · Root of the Problem)

- A. The pulp
- B. The enamel
- C. The gum
- D. The jaw

36. What fills the canals? (DD-448 · Root of the Problem)

- A. Gutta-percha
- B. Gold
- C. Cement only
- D. Wax

37. What is reshaped? (DD-454 · Seeing Things Differently)

- A. Cornea
- B. Retina
- C. Lens
- D. Iris

38. LASIK stands for laser-assisted in situ...? (DD-454 · Seeing Things Differently)

- A. Keratomileusis
- B. Keratitis
- C. Myopia
- D. Lenticule

39. Which cells migrate? (DD-465 · Face Creator)

- A. Neural crest
- B. Red blood
- C. Muscle
- D. Fat

40. How many segments? (DD-465 · Face Creator)

- A. Five
- B. Two
- C. Ten
- D. One

41. MAiD stands for? (DD-487 · MAiD)

- A. Medical assistance in dying
- B. Medical aid insurance deal
- C. Mandatory aid
- D. None

42. Country using the term? (DD-487 · MAiD)

- A. Canada
- B. Japan
- C. Brazil
- D. Egypt

43. RGP means? (DD-492 · Lens Crafter)

- A. Rigid gas permeable
- B. Really good plastic
- C. Red glass pane
- D. None

44. Custom lenses are often? (DD-492 · Lens Crafter)

- A. Lathed
- B. Painted
- C. Blown
- D. Woven

45. Which cells dominate the periphery? (DD-502 · Shifty Periphery)

- A. Rods
- B. Cones
- C. Neurons only
- D. Lens cells

46. Center of retina has? (DD-502 · Shifty Periphery)

- A. Cones
- B. Only rods
- C. No cells
- D. Blood

47. Programmed cell death? (DD-523 · Cell Death)

- A. Apoptosis
- B. Necrosis
- C. Mitosis
- D. Osmosis

48. Key enzymes? (DD-523 · Cell Death)

- A. Caspases
- B. Amylases
- C. Lipases
- D. Kinases only

49. Controlled by? (DD-525 · Wet Response)

- A. Autonomic nervous system
- B. Bones
- C. Muscles only
- D. Hair

50. What constricts? (DD-525 · Wet Response)

- A. Blood vessels
- B. Bones
- C. Nails
- D. Hair

51. Program it runs? (DD-539 · HHS)

- A. Medicare
- B. Social Security
- C. NASA
- D. Amtrak

52. Agency it oversees? (DD-539 · HHS)

- A. CDC
- B. FBI
- C. EPA
- D. IRS

53. What is filtered? (DD-549 · AI Surgery II)

- A. Tremor
- B. Light
- C. Sound
- D. Blood

54. Motion scaling does? (DD-549 · AI Surgery II)

- A. Shrinks movements
- B. Speeds them
- C. Stops them
- D. Records them

ANSWER KEY

1. **C. Nucleus** Now You Know: The nucleus holds the cell's DNA and controls gene expression. *(DD-003)*
2. **A. Mitochondria** Now You Know: Mitochondria produce the cell's energy through cellular respiration. *(DD-003)*
3. **B. Under the microscope they look like the arches of a cathedral's vaulted ceiling** Now You Know: Kedersha and Rome named them for their resemblance to the multiple arches of cathedral vaults. *(DD-015)*
4. **B. About 10,000** Now You Know: Most human cells have around 10,000 vaults; some immune cells may have up to 100,000. *(DD-015)*
5. **C. The vitreous gel** Now You Know: They sit in the vitreous humor, the gel that fills the eyeball. *(DD-001)*
6. **B. Calcium, phosphate and lipids** Now You Know: They're lipids complexed with calcium, phosphate and oxygen, with an apatite-like structure. *(DD-001)*
7. **B. Big eater** Now You Know: From the Greek makros (big) and phagein (to eat). *(DD-044)*
8. **A. Opsonins** Now You Know: Opsonic receptors bind these tags. *(DD-044)*
9. **A. Marcello Malpighi** Now You Know: He looked at a frog's lung. *(DD-649)*
10. **A. White blood cells rolling along vessel walls** Now You Know: In a frog's webbed foot. *(DD-649)*
11. **A. The vein's inner lining** Now You Know: The endothelium. *(DD-597)*
12. **A. A detergent** Now You Know: It breaks down the lining's cell membranes. *(DD-597)*
13. **A. Hemoglobin S** Now You Know: It forms rigid strands. *(DD-613)*
14. **A. After it releases oxygen** Now You Know: In the tissues, where oxygen is delivered. *(DD-613)*
15. **A. Outside the body** Now You Know: That's what paracorporeal means. *(DD-577)*
16. **A. Air pressure** Now You Know: Air pulses flex a membrane in each pump. *(DD-577)*
17. **A. The body is mostly water, which barely compresses** Now You Know: The danger is in sudden changes and air spaces. *(DD-593)*
18. **A. Air-filled spaces like the lungs** Now You Know: This is called barotrauma. *(DD-593)*
19. **A. A strong magnet and radio waves** Now You Know: The signals come from hydrogen nuclei. *(DD-290)*
20. **A. No, they're stationary** Now You Know: They vary the field electrically. *(DD-290)*
21. **A. The sinoatrial node** Now You Know: It fires the first impulse. *(DD-265)*
22. **A. The atria** Now You Know: Then the ventricles. *(DD-265)*
23. **A. Bacteria** Now You Know: Only bacteria. *(DD-309)*
24. **A. Genetic material** Now You Know: DNA or RNA. *(DD-309)*
25. **A. Cardiomyocytes** Now You Know: Cardiac cells. *(DD-315)*
26. **A. Actin and myosin** Now You Know: In myofibrils. *(DD-315)*
27. **A. A zygote** Now You Know: Fertilized. *(DD-333)*

- 28. **A. Cleavage** Now You Know: Rapid. *(DD-333)*
- 29. **A. Plasmodium parasites** Now You Know: Protozoa. *(DD-395)*
- 30. **A. Female Anopheles** Now You Know: Vector. *(DD-395)*
- 31. **A. Muscle signals** Now You Know: Electrodes. *(DD-438)*
- 32. **A. On the skin** Now You Know: Residual limb. *(DD-438)*
- 33. **A. Bites or scratches** Now You Know: Saliva. *(DD-420)*
- 34. **A. Along nerves** Now You Know: Peripheral nerves. *(DD-420)*
- 35. **A. The pulp** Now You Know: Soft tissue. *(DD-448)*
- 36. **A. Gutta-percha** Now You Know: Rubbery. *(DD-448)*
- 37. **A. Cornea** Now You Know: Front of eye. *(DD-454)*
- 38. **A. Keratomileusis** Now You Know: Term. *(DD-454)*
- 39. **A. Neural crest** Now You Know: Embryo. *(DD-465)*
- 40. **A. Five** Now You Know: Prominences. *(DD-465)*
- 41. **A. Medical assistance in dying** Now You Know: Term. *(DD-487)*
- 42. **A. Canada** Now You Know: Canada. *(DD-487)*
- 43. **A. Rigid gas permeable** Now You Know: Type. *(DD-492)*
- 44. **A. Lathed** Now You Know: Machined. *(DD-492)*
- 45. **A. Rods** Now You Know: Light-sensitive. *(DD-502)*
- 46. **A. Cones** Now You Know: Fovea. *(DD-502)*
- 47. **A. Apoptosis** Now You Know: Controlled. *(DD-523)*
- 48. **A. Caspases** Now You Know: Dismantlers. *(DD-523)*
- 49. **A. Autonomic nervous system** Now You Know: Automatic. *(DD-525)*
- 50. **A. Blood vessels** Now You Know: Volume. *(DD-525)*
- 51. **A. Medicare** Now You Know: Health. *(DD-539)*
- 52. **A. CDC** Now You Know: Public health. *(DD-539)*
- 53. **A. Tremor** Now You Know: Steadiness. *(DD-549)*
- 54. **A. Shrinks movements** Now You Know: Precision. *(DD-549)*

NOW YOU KNOW!