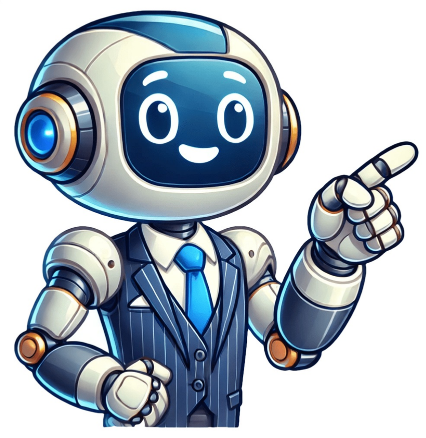

[Part I Fixed Brain][Part II Fresh Brain] What is the relationship between brain and body size? Evaluation of brain and body size is important in studies about intelligence. When comparing animals and their levels of intelligence, one method is to look at respective brain sizes.On the next couple of pages will be a series of tables designed to help us visualize brain and body sizes and develop questions from them. The table below shows brains approximately proportional to the size of the animal pictured in color. Mouse over each animal picture for a silhouette of its full body. Click on the pictures of the animals to read specific information about the species. Brain Length Brain Weight Body Length Body WeightHuman15 cm1,400 g100 cm62,000 gBaboon8 cm140 g120 cm30,000 gRhesus Monkey5 cm180 g30 cm6,800 gCamel15 cm680 g200 cm529,000 gDolphin----1,700 g300 cm160,000 gKangaroo5 cm56 g150 cm35,000 gCat5 cm30 g60 cm3,300 gRaccoon5.5 cm39 g80 cm4,290 gRabbit5 cm12 g30 cm2,500 gSquirrel3 cm6 g20 cm900 gNorthern Leopard Frog2 cm0.1 g10 cm18 g(You can look at this chart to see the approximate values for brain/body lengths and weights used above) Would you rather compare brains when the animal pictures are in proportion, equalize brain size, or equalize body size? Researchers have created the largest and most detailed wiring diagram of a mammalian brain so far, by mapping cells in 1 cubic millimetre of a mouses brain tissue1. In a landmark achievement, the diagram also details the activity of individual neurons on a large scale a neuroscience first. doi: Related Articles Brain Neuroscience Databases Brain Neuroscience Databases As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice . 2023 Jul 10;12:e90017. doi: 10.7554/eLife.90017Inhibitory circuit motifs in the mouse brain and the human brain are strikingly similar.Research organism: HumanRelated research article Kim MH, Radaelli C, Thomsen ER, Monet D, Chartrand T, Jorstad NL, Mahoney JT, Taormina MJ, Long B, Baker K, Bakken TE, Campagnola L, Casper T, Clark M, Dee N, DOrazi F, Gamlin C, Kalmbach BE, Kebede S, Lee BR, Ng L, Trinh J, Cobbs C, Gwinn RP, Keene CD, Ko AL, Ojemann JG, Silbergeld DL, Sorensen S, Berg J, Smith KA, Nicovich PR, Jarsky T, Zeng H, Ting JT, Levi BP, Lein E. 2023. Target cell-specific synaptic dynamics of excitatory to inhibitory neuron connections in supragranular layers of human neocortex. eLife12:e81863. doi: 10.7554/eLife.81863.The mouse is used as a model organism in many areas of research, including neuroscience. The human brain is clearly larger than the mouse brain, and it is also more complex, but how similar are they at the level of individual neuron types and their connections (Figure 1A)? (A) The human brain is larger than the mouse brain, and also much more complex, with more neocortical invaginations and a greater number of specialized areas. (B) However, at the level of individual neuron types and their connections, mouse and human brains are similar. For example, Kim et al. found in the human brain a circuit motif that includes an excitatory neuron called a pyramidal cell, and an inhibitory interneuron either a Pvalb cell or a Sst cell. The rapid and high release of neurotransmitters at the synapse between the pyramidal cell and the Pvalb cell leads to early-onset inhibition (green trace), while the low and gradually ramped-up release of neurotransmitters at the synapse with the Sst cell leads to late-onset inhibition (blue trace). Since the mouse and human brain share these circuit motifs, the mouse brain may serve as a good model of the human brain.Figure created using BioRender.Some argue that we make too much of findings in mice. For instance, the twitter account @justsaysinmice retweets eye-catching scientific claims with the comment IN MICE (Piper, 2019). Indeed, a number of electrophysiology studies have compared mouse and human brain circuits, and many of these studies have revealed key differences (Mansvelder et al., 2019). However, it could be argued that looking for differences guarantees that they will eventually be found, even though their significance might not be clear. An alternative tactic is to explore similarities between the mouse brain and the human brain (Szegedi et al., 2020).At the level of individual neuron types and their connections, the brain is made up of repeated building blocks known as circuit motifs that contain combinations of interconnected excitatory and inhibitory neurons. A number of studies in mouse models of autism and epilepsy have found that these conditions are associated with a lack of balance between excitation and inhibition in the brain (Nelson and Valakh, 2015). Two key types of inhibitory interneurons have been well studied in mice: the parvalbumin (Pvalb) cells, which silence target neurons relatively quickly, and the somatostatin (Sst) cells, which take longer to act (Figure 1B; Blackman et al., 2013). Then again, is this just in mice, or are motifs with Pvalb or Sst cells also found in humans?Now, in eLife, Mean-Hwan Kim and colleagues who are based at the Allen Institute for Brain Science, the University of Washington, and the Swedish Neuroscience Institute report that inhibitory circuit motifs in humans and mice are strikingly similar (Kim et al., 2023). Building on recent work in which they used high-throughput transcriptomic profiling (Bakken et al., 2021), the researchers compared the transcriptomes of cells from the mouse and human cortex. This revealed over 70 genes that were differentially enriched in Pvalb and Sst cells. Many of these genes were related to the connections between neurons, suggesting that they determine the properties of the synapses of these two cell types. The similar cell-type-specific genetics seen in mice and humans suggest that these interneuron subclasses are evolutionarily conserved.To explore this idea, Kim et al. obtained human cortical tissue samples from neurosurgical resections. To make the most of these precious samples, some brain slices were used acutely, meaning right away, whereas others were kept for days as a cultured preparation. The acute slices may represent the intact brain better, but the cultured slices can be studied with a wider range of techniques. For instance, the interneurons in the cultured samples can be genetically labelled for easy identification. When the results from the acute and cultured slices were compared, there were no appreciable differences, thus validating the use of cultured slices.Kim et al. used a combination of different techniques multiple patch-clamp recording, cell morphology reconstruction, and multiplexed fluorescent in-situ hybridization (mFISH) to study the slices. They found two types of inhibitory circuit motif that worked in the same way in both mice and humans. The synaptic dynamics of the motif formed by an excitatory neuron called a pyramidal cell and a Pvalb cell promoted early early-onset inhibition, whereas that formed with a Sst cell favored late-onset inhibition (Figure 1B; Blackman et al., 2013). These findings argue that human and mouse brains are comprised of similar inhibitory circuit motifs.Two factors make it challenging to study the human brain it is difficult to obtain human brain tissue, and most experimental techniques have low throughput. For example, the mFISH procedure used for identifying patched cells was both slow and prone to failure. Kim et al. overcame this problem by using machine learning to rapidly classify cell types using only electrophysiology data, and they were able to identify Pvalb cells with ~76% accuracy. In the future, it should be possible to increase throughput even more by also using recently developed optogenetic approaches to circuit mapping (Hage et al., 2022).It should also be noted that the human tissue samples used by Kim et al. might be pathological because they came from patients with epilepsy or brain tumors. However, their similarity to healthy rodent tissue suggests that these human samples were not aberrant but representative.In summary, Kim et al. provide compelling evidence that inhibitory circuit motifs are conserved across mice and humans. This has far-reaching implications, as it argues that the knowledge generated from decades of rodent research is relevant to human neurophysiology. In addition, the methods they developed to increase experimental throughput in this study will help researchers to learn more from precious samples of human brain tissue in the future.There are many other types of inhibitory interneurons beyond the Pvalb and Sst cells discussed here (Gouwens et al., 2020). Moreover, our understanding of these interneurons and the circuit motifs they form is limited, as is our knowledge of their role in disease (McFarlan et al., 2023). It is therefore reassuring to know that future neuroscience research in mice will continue to reveal secrets pertinent to the human brain.Hovy Ho-Wai Wong is at the Centre for Research in Neuroscience, Department of Medicine, The Research Institute of the McGill University Health Centre, Montral, CanadaChristina You Chien Chou is at the Centre for Research in Neuroscience, Department of Medicine, The Research Institute of the McGill University Health Centre, Montral, Canada, and the Integrated Program in Neuroscience, McGill University, Montral, CanadaAlanna Jean Watt is in the Department of Biology, McGill University, Montral, CanadaPer Jesper Sjstrm is at the Centre for Research in Neuroscience, Department of Medicine, The Research Institute of the McGill University Health Centre, Montral, CanadaBakken TE, Jorstad NL, Hu Q, Lake BB, Tian W, Kalmbach BE, Crow M, Hodge RD, Krienen FM, Sorensen SA, Eggermont J, Yao Z, Aevermann BD, Aldridge AI, Bartlett A, Bertagnolli D, Casper T, Castanon RG, Crichton K, Daigle TL, Dalley R, Dee N, Dembrow N, Diep D, Ding SL, Dong W, Fang R, Fischer S, Goldman M, Goldy J, Graybuck LT, Herb BR, Hou X, Kancherla J, Kroll M, Lathia K, van Lew B, Li YE, Liu CS, Liu H, Lucero JD, Mahurkar A, McMillen D, Miller JA, Moussa M, Nery JR, Nicovich PR, Niu SY, Orvis J, Osteen JK, Owen S, Palmer CR, Pham T, Plongthongkum N, Poirion O, Reed NM, Rimorin C, Rivkin A, Romanow WJ, Sedeo-Corts AE, Siletti K, Somasundaram S, Sulc J, Tieu M, Torkelson A, Tung H, Wang X, Xie F, Yanny AM, Zhang R, Ament SA, Behrens MM, Bravo HC, Chun J, Dobin A, Gillis J, Hertzano R, Hof PR, Hllt T, Horwitz GD, Keene CD, Kharchenko PV, Ko AL, Lelieveldt BP, Luo C, Mukamel EA, Pinto-Duarte A, Preissl S, Regev A, Ren B, Scheuermann RH, Smith K, Spain WJ, White OR, Koch C, Hawrylycz M, Tasic B, Macosko EZ, McCarroll SA, Ting JT, Zeng H, Zhang K, Feng G, Ecker JR, Linnarsson S, Lein ES. Comparative cellular analysis of motor cortex in human, marmoset and mouse. Nature. 2021;598:111119. doi: 10.1038/s41586-021-03465-8. [DOI] [PMC free article] [PubMed] [Google Scholar]Blackman AV, Abrahamsson T, Costa RP, Lalanne T, Sjstrm PJ. Target cell-specific short-term plasticity in local circuits. Frontiers in Synaptic Neuroscience. 2013;5:11. doi: 10.3389/fnsyn.2013.00011. [DOI] [PMC free article] [PubMed] [Google Scholar]Gouwens NW, Sorensen SA, Baftizadeh F, Budzillo A, Lee BR, Jarsky T, Alfiler L, Baker K, Barkan E, Berry K, Bertagnolli D, Bickley K, Bomben J, Braun T, Brouner K, Casper T, Crichton K, Daigle TL, Dalley R, de Frates RA, Dee N, Desta T, Lee SD, Dotson N, Egdorf T, Ellingwood L, Enstrom R, Esposito L, Farrell C, Feng D, Fong O, Gala R, Gamlin C, Gary A, Glandon A, Goldy J, Gorham M, Graybuck L, Gu H, Hadley K, Hawrylycz MJ, Henry AM, Hill D, Hupp M, Kebede S, Kim TK, Kim L, Kroll M, Lee C, Link KE, Mallory M, Mann R, Maxwell M, McGraw M, McMillen D, Mukora A, Ng L, Ng L, Ngo K, Nicovich PR, Oldre A, Park D, Peng H, Penn O, Pham T, Pom A, Popovi Z, Potekhina L, Rajanbabu R, Ransford S, Reid D, Rimorin C, Robertson M, Ronellenfitch K, Ruiz A, Sandman D, Smith K, Sulc J, Sunkin SM, Szafer A, Tieu M, Torkelson A, Trinh J, Tung H, Wakeman W, Ward K, Williams G, Zhou Z, Ting JT, Arkhipov A, Smbl U, Lein ES, Koch C, Yao Z, Tasic B, Berg J, Murphy GJ, Zeng H. Integrated morphoelectric and transcriptomic classification of cortical GABAergic cells. Cell. 2020;183:935953. doi: 10.1016/j.cell.2020.09.057. [DOI] [PMC free article] [PubMed] [Google Scholar]Hage TA, Bosma-Moody A, Baker CA, Kratz MB, Campagnola L, Jarsky T, Zeng H, Murphy GJ. Synaptic connectivity to L2/3 of primary visual cortex measured by two-photon optogenetic stimulation. eLife. 2022;11:e71103. doi: 10.7554/eLife.71103. [DOI] [PMC free article] [PubMed] [Google Scholar]Kim MH, Radaelli C, Thomsen ER, Monet D, Chartrand T, Jorstad NL, Mahoney JT, Taormina MJ, Long B, Baker K, Bakken TE, Campagnola L, Casper T, Clark M, Dee N, DOrazi F, Gamlin C, Kalmbach BE, Kebede S, Lee BR, Ng L, Trinh J, Cobbs C, Gwinn RP, Keene CD, Ko AL, Ojemann JG, Silbergeld DL, Sorensen S, Berg J, Smith KA, Nicovich PR, Jarsky T, Zeng H, Ting JT, Levi BP, Lein E. Target cell-specific synaptic dynamics of excitatory to inhibitory neuron connections in supragranular layers of human neocortex. eLife. 2023;12:e81863. doi: 10.7554/eLife.81863. [DOI] [PMC free article] [PubMed] [Google Scholar]Mansvelder HD, Verhoog MB, Goriounova NA. Synaptic plasticity in human cortical circuits: Cellular mechanisms of learning and memory in the human brain. Current Opinion in Neurobiology. 2019;54:186193. doi: 10.1016/j.conb.2018.06.013. [DOI] [PubMed] [Google Scholar]McFarlan AR, Chou CYC, Watanabe A, Cherepacha N, Haddad M, Owens H, Sjstrm PJ. The plasticitome of cortical interneurons. Nature Reviews Neuroscience. 2023;24:8097. doi: 10.1038/s41583-022-00663-9. [DOI] [PubMed] [Google Scholar]Nelson SB, Valakh V. Excitatory/inhibitory balance and circuit homeostasis in autism spectrum disorders. Neuron. 2015;87:684698. doi: 10.1016/j.neuron.2015.07.033. [DOI] [PMC free article] [PubMed] [Google Scholar]Piper K. Hyped-up science is a problem. One clever Twitter account is pushing back. 2019. [July 6, 2023]. V, Paizs M, Baka J, Barz P, Molnr G, Tamas G, Lamsa K. Robust perisomatic GABAergic self-innervation inhibits basket cells in the human and mouse supragranular neocortex. eLife. 2020;9:e51691. doi: 10.7554/eLife.51691. [DOI] [PMC free article] [PubMed] [Google Scholar]Articles from eLife are provided here courtesy of eLife Sciences Publications, Ltd Sign up for CNNs Wonder Theory science newsletter.Explore the universe with news on fascinating discoveries, scientific advancements and more. Scientists have created the first precise 3D map of a mouse brain showing 84,000 neurons and more than 500 million synapses. Researchers recorded brain activity while the mouse viewed movie clips and YouTube videos of extreme sports. The mapped tissue contained 3.4 miles of neuronal wiring despite being only the size of a sand grain. The Allen Institute team sliced the brain into 28,000 layers before Princeton researchers used AI to trace each neuron. This mouse brain "connectome" could help scientists better understand human brain disorders like Alzheimer's and Parkinson's. This summary was AI-generated and reviewed by CNN editors. Using a speck of mouse brain matter the size of a grain of sand, scientists have created the first precise, three-dimensional map of a mammals brain. The map details the form, function and activity of 84,000 neurons, branched structures that fire off messages down a long arm, called an axon, and then through more than 500 million synapses, as well as 200,000 brain cells. The tiny piece of tissue contained 3.4 miles (5.4 kilometers) of neuronal wiring nearly one and a half times the length of New York Citys Central Park. The work is the culmination of almost a decade of research by 150 scientists at 22 institutions led by the Allen Institute for Brain Science, the Baylor College of Medicine and Princeton University. One byproduct of this whole project shows us just how incredibly beautiful the brain is, said Dr. Forrest Collman, associate director of data and technology at the Allen Institute, in a video shared by the organization. Just looking at these neurons shows you their detail and scale in a way that makes you appreciate the brain with a sense of awe in the way that when you look up, you know, say, at a picture of a galaxy far, far away, he added. The astonishing map represents only 1/500 of the full volume of a mouses brain yet the team ended up with 1.6 petabytes of data a staggering amount equivalent to 22 years of nonstop HD video, which the project, known as The Machine Intelligence from Cortical Networks (MICrONS) program, has already made publicly available. Researchers described the work in several papers published in the journal Nature on April 9. To make the map, scientists at Baylor College of Medicine in Houston began by using specialized microscopes to record the brain activity in a 1-cubic-millimeter portion of tissue in a lab mouses visual cortex where the animal processes what it sees over the course of a few days. The researchers made sure the mouse was awake and visually stimulated during the imaging by having the animal run on a treadmill and watch 10-second scenes from various movies, including The Matrix and Mad Max: Fury Road. YouTube clips of extreme sports such as motocross, luge and BASE jumping were also part of the viewing rotation, according to a Princeton University news release. Next, after euthanizing the mouse, researchers from the Allen Institute in Seattle took that same cubic millimeter of brain and sliced it into more than 28,000 layers, each 1/400 the width of a human hair, and took images of each slice along the way. They then reconstructed the images into a composite. That took us about 12 days and 12 nights with the team taking shifts around the clock; not because we were cutting it by hand, its a machine that is automated, said Dr. Nuno Maarico da Costa, an associate investigator at the Allen Institute. We needed to be there to stop at any point in time if we thought were going to lose more than a section in a row. If that happened, da Costa said the experiment would have to start from scratch, adding that the whole process was very stressful. A team at Princeton University in New Jersey subsequently deployed machine learning and artificial intelligence tools to trace the contour of every neuron through the slices, coloring the neurons to illuminate them individually in a process called segmentation. The AI-generated information is validated or proofread by the scientists involved, a process that is still ongoing. The work has culminated in a unified view of what scientists are calling the mouse brain connectome that shows how specific parts of the mouse brain are organized and offers insight into how different cell types work together. The connectome is the beginning of the digital transformation of brain science, said Dr. Sebastian Seung, Princeton Universitys Evnin Professor in Neuroscience and a professor of computer science. With a few keystrokes you can search for information and get the results in seconds. Some of that information would have taken a whole Ph.D. thesis to get before. And thats the power of digital transformation, he said in a news release. Mapping the brain in this way had long been thought an impossible challenge. Molecular biologist Francis Crick, who won the Nobel prize for describing the structure of DNA, suggested neuroscientists would never be able to achieve such a detailed understanding of the brain. It is no use asking for the impossible, such as, say, the exact wiring diagram for a cubic millimeter of brain tissue and the way all its neurons are firing, he wrote in Scientific American in 1979. The mouse brain connectome builds on similar work on even smaller creatures: The connectome of the nematode worm C. elegans was completed in 2019, and scientists revealed a map of all the fruit fly brain neurons in 2024. One cubic millimeter of mouse brain is about 20 times bigger than the complete fruit fly brain, and much more complex, the researchers said. Nonetheless, the goal is to be able to map the entire mice brain connectome in the near future. I think right now the answer is no, it is not feasible, but I think everyone has really clear ideas about how they could break through those barriers. Were hoping in three or four years, we can say, yes, it is possible, Collman told CNN. However, he said mapping the human brain connectome in similar synaptic resolution would be a dramatically more difficult endeavor. The human brain is another factor of 1,500 or so larger than a mouse brain, and so that brings a whole host of technical and ethical barriers to doing that, he said. However, it might be possible to trace axons throughout the human brain, if not synaptic connections, added Dr. Clay Reid, a senior investigator in brain science at the Allen Institute. The prospect of reconstructing the entire human brain at the level of all of the connections, thats something for the distant future. The neocortex is particularly interesting to study, because this region of the brain is what distinguishes mammal brains from those of other vertebrates, said Dr. Mariela Petkova, a research associate, and Dr. Gregor Schuhknecht, a postdoctoral fellow, both in the department of molecular and cellular biology at Harvard University. Petkova and Schuhknecht werent involved in the creation of the mouse brain map. The researchers focused on this region because it is generally considered to be the seat of higher cognition and plays a key part in sensory perception, language processing, planning and decision-making, they wrote in an article published alongside the research. Remarkably, these seemingly different functions are made possible by a blueprint that can be found, with some modifications, in all cortical areas and in all mammals. Lab mice are already widely used to understand human diseases, and a better comprehension of the mouse brains form and function will present new possibilities for studying human brain disorders such as Alzheimers, Parkinsons, autism and schizophrenia that involve disruptions in neural communication. If you have a broken radio and you have the circuit diagram, youll be in a better position to fix it, da Costa said in a news release. We are describing a kind of Google map or blueprint of this grain of sand. In the future, we can use this to compare the brain wiring in a healthy mouse to the brain wiring in a model of disease. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. ,the free encyclopedia that anyone can edit.117,937 active editors 7,001,149 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.GL Mk.II transmitter vanRadar, Gun Laying, MarkI, or GL Mk.I for short, was an early World WarII radar system developed by the British Army to provide information for anti-aircraft artillery. There were two upgrades, GL/EF (elevation finder) and GL Mk.II (pictured), both improving the ability to determine a target's bearing and elevation. GL refers to the radar's ability to direct the guns onto a target, known as gun laying. The first GL sets were developed in 1936 using separate transmitters and receivers mounted on gun carriages. Several were captured in 1940, leading the Germans to believe falsely that British radar was much less advanced than theirs. The GL/EF attachment provided bearing and elevation measurements accurate to about a degree: this caused the number of rounds needed to destroy an aircraft to fall to 4,100, a tenfold improvement over early-war results. The Mk.II, which was able to directly guide the guns, lowered the rounds-per-kill to 2,750. About 410 Mk.Is and 1,679 Mk.IIs were produced. (Fullarticle...)Recently featured: Andrea NavageroNosy KombaMcDonnell Douglas Phantom in UK serviceArchiveBy emailMore featured articlesAboutLieke Klaver ahead in the women's 400 metres final... that a 400-metre race in 2025 (pictured) was won by Lieke Klaver, who pretended that an absent competitor was running in front of her?... that the land snail Drymaeus poecilus is notable for the striking variety of colors and patterns on its shell?... that a forensic investigation of Signalgate has determined how a journalist was included in a group chat about Operation Rough Rider?... that two of the players involved in the 2005 Vietnamese football match-fixing scandal did not accept payment because they felt ashamed?... that a rebellion against a peace treaty with the Yuan dynasty operated out of the Historic Site of Anti-Mongolian Struggle on Jeju Island?... that Nathan Frink fled the United States with enslaved children to settle in Canada, where he was elected as a Member of the Legislative Assembly and caught in a smuggling conspiracy?... that Seattle's women's ice hockey team has an expected rival, despite not even having played their first game?... that Cave Johnson Couts was separately acquitted for shooting his foreman, firing on funeral mourners, and whipping a native laborer to death?... that characters' scars in an episode of The Last of Us were made with a paste-based appliance and a food mixer?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Phil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollySebastio SalgadoNominate an articleMay 30: Statehood Day in Croatia (1990)Johann Sebastian Bach1431 Hundred Years' War: After being convicted of heresy, Joan of Arc was burned at the stake in Rouen, France.1723 Johann Sebastian Bach (pictured) assumed the office of Thomaskantor in Leipzig, presenting the cantata Die Elenden sollen essen in St.Nicholas Church.1922 The Lincoln Memorial in Washington, D.C., featuring a sculpture of the sixteenth U.S. president Abraham Lincoln by Daniel Chester French, opened.1963 Buddhist crisis: A protest against pro-Catholic discrimination was held outside the National Assembly of South Vietnam in Saigon, the first open demonstration against President Ngô nh Dim.2008 The Convention on Cluster Munitions, prohibiting the use, transfer, and stockpiling of cluster bombs, was adopted.Ma Xifan (d.947)Colin Blythe (b.1879)Norris Bradbury (b.1909)Wynonna Judd (b.1964)More anniversaries: May 29May 30May 31ArchiveBy emailList of days of the yearAboutSeventeen performing "Oh My!" in 2018South Korean boy band Seventeen made their debut on May 26, 2015, when they performed a showcase for their debut EP 17 Carat in front of a crowd of 1,000 people. Since then, the group have held 9 concert tours, 13 fan meetings, and have performed at a number of music festivals and awards shows. Their concert tours include the Right Here World Tour, which sold over one million tickets, and the Follow Tour, which was noted by Billboard as being the top grossing K-pop tour of 2023. In 2024, Seventeen made their first appearances at festivals in Europe, when they were the first South Korean act to perform at Glastonbury Festival's Pyramid Stage and as headliners for Lollapalooza Berlin. Seventeen's live performances are well regarded by fans and critics alike, and garnered them the award for Top K-pop Touring Artist at the 2024 Billboard Music Awards. (Fulllist...)Recently featured: Accolades received by Top Gun: MaverickNational preserve76th Primetime Emmy AwardsArchiveMore featured listsIgnace Tonen (1840 or 1841 15 March 1916), also known as Nias or by his Ojibwe name Maiagizis ('right/correct sun'), was a Teme-Augama Anishnabai chief, fur trader, and gold prospector in Upper Canada. He was a prominent employee of the Hudson's Bay Company. Tonen was the elected deputy chief before being the lead chief and later the life chief of his community. In his role as deputy, he negotiated with the Canadian federal government and the Ontario provincial government, advocating for his community to receive annual financial support from both. His attempts to secure land reserves for his community were thwarted by the Ontario premier Oliver Mowat. Tonen's prospecting triggered a 1906 gold rush and the creation of Kerr Addison Mines Ltd., although one of his claims was stolen from him by white Canadian prospectors. This photograph shows Tonen in 1909.Photograph credit: William John Winter; restored by Adam CuerdenRecently featured: Australian white ibisHell Gate BridgeAnemonoides blandaArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2EP by Seventeen17 CaratEP by SeventeenReleasedMay29,2015(2015-05-29)GenreK-popdance-popHip hopLength16:48LanguageKoreanLabelPledis EntertainmentLOEN EntertainmentSeventeen chronology17 Carat(2015)Boys Be(2015)Singles from 17 Carat "Adore U"Released: May 29, 201517 Carat is the debut extended play (EP) by South Korean boy group Seventeen. It was released on May 29, 2015, by Pledis Entertainment and distributed by LOEN Entertainment. "Adore U" serves as the lead single for the EP.17 Carat features five tracks written, co-written, and co-produced by Seventeen's group members. "Adore U" was chosen as the lead single for the EP and was performed on multiple music shows by the group. "Shining Diamond" was used as a pre-single on the group's reality debut show. The group stated that the tracklist was chosen to reflect Seventeen's core concept of "boys' passion".[1] The album has two physical versions: one with a "black" themed photo card set, and the other with a "white" themed photo card set. All copies include a CD containing the songs and a fold-up poster/lyric sheet."Adore U" is the lead single of the extended play. It was written by Woozi, S.Coups, and Yeon Dong-geon.[2] The Korea Herald states "'Adore U' is a funky pop song about a teenage boy trying to navigate through puppy love."[3] It marks the beginning of the group's trilogy composed of the singles Adore U, Mansae, and Pretty U about a boy meeting, falling in love and asking out a girl. The track was composed and arranged by Woozi, Bumzu, and Yeon Dong-geon. The music video for the single was released on May 29, 2015, and was directed by Dee Shin. The dance choreography accompaniment to the song was choreographed by Hoshi and focuses on "storytelling, and on highlighting each member's strengths onstage".[4] The single has sold more than 38,000 digital copies and peaked at number 13 on the Billboard US World Chart.The EP has sold over 82,972 copies in South Korea.[5] It peaked at number 4 on the Korean Gaon Album Chart[6] and number 8 on the US World Billboard Chart.[7]Year-end listsCritic/publicationListRankRef.BillboardThe 10 Best K-pop Album of 2015Placed[8]Hoshi participated in the choreography of "Adore U" and "Shining Diamond", Dino choreographed "Jam Jam".[9]Official track list[10]No.TitleLyricsMusicArrangementsLength1."Shining Diamond"WooziVernonS.CoupsKim Min-jeongWooziMasterKeyRishiMasterKeyRishi3:242.""Adore U"" (; Akkinda)WooziVernonS.CoupsBumzuWooziBumzuYeon Dong-geonWooziBumzuYeon Dong-geon3:073."Ah Yeah" (Hip-Hop unit)S.CoupsVernonWonwooMingyuCream DoughnutRishiCream DoughnutRishi3:294."Jam Jam" (Performance unit + Vernon)WooziHoshiDinoVernonWooziCream DoughnutCream Doughnut3:255."20" (Vocal unit)WooziWooziWon Yeong-heonWon Yeong-heonDong Ne-hyeong3:23Weekly chart performance for 17 CaratChart (2015-2023)PeakpositionJapanese Albums (Oricon)[11]46South Korean Albums (Gaon)[12]4US World Albums (Billboard)[13]8Year-end chart performance for 17 CaratChart (2015)PeakpositionSouth Korean Albums (Gaon)[14]47^ "Seventeen hopes to shine like diamonds with '17 Carat'". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ "Adore U". Color Coded Lyrics. 29 May 2015. Retrieved 29 November 2016.^ "Seventeen hopes to shine like diamonds with '17 Carat". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ "Seventeen hopes to shine like diamonds with '17 Carat'". The Korea Herald. 26 May 2015. Retrieved 30 November 2016.^ Cumulative sales of 17 Carat:"2015 Album Chart"."2016 12 Album Chart"."2017 11 Album Chart".^ "2015 Albums". Gaon Music Chart. Korea Music Content Industry Association. Archived from the original on September 10, 2016. Retrieved November 29, 2016.^ "June 27, 2015". Billboard. Retrieved 29 November 2016.^ Benjamin, Jeff; Oak, Jessica (December 12, 2015). "The 10 Best K-Pop Albums of 2015". Billboard. Archived from the original on September 18, 2021. Retrieved October 31, 2021.^ , (18 June 2015). "[My Name] (3) - , , , | ". (in Korean). The Korea Economic Daily. . Retrieved 18 July 2021.^ "SEVENTEEN 1st Mini Album '17 CARAT'".^ " 20230710" [Weekly album ranking as of July 10, 2023]. Oricon News (in Japanese). Archived from the original on July 5, 2023. Retrieved February 18, 2024.^ "2015 27 Album Chart". Gaon Chart (in Korean). Archived from the original on August 7, 2016. Retrieved February 18, 2024.^ "Seventeen Chart History (World Albums)". Billboard. Retrieved February 17, 2024.^ "2015 Album Chart". Gaon Chart (in Korean). Archived from the original on May 7, 2017. Retrieved February 17, 2024.Retrieved from " 3The following pages link to 17 Carat External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Main Page (links | edit)Pledis Entertainment discography (links | edit)List of 2015 albums (links | edit)2015 in South Korean music (links | edit)Seventeen (South Korean band) (links | edit)S.Coups (links | edit)Vernon (rapper) (links | edit)Wonwoo (links | edit)List of awards and nominations received by Seventeen (links | edit)Seventeen discography (links | edit)Love & Letter (links | edit)Joshua (singer) (links | edit)Seventeen TV (links | edit)17 carat (redirect page) (links | edit)Going Seventeen (links | edit)List of Seventeen live performances (links | edit)Teen, Age (links | edit)Al1 (links | edit)Bumzu (links | edit)Boys Be (EP) (links | edit)You Make My Day (links | edit)You Made My Dawn (links | edit)Jun (Chinese entertainer) (links | edit)List of Stray Kids live performances (links | edit)The8 (links | edit)An Ode (links | edit)Seungkwan (links | edit)Fallin' Flower (links | edit)Heng:gar (links | edit)Semicolon (EP) (links | edit)Your Choice (links | edit)Going Seventeen (web series) (links | edit)Not Alone (Seventeen song) (links | edit)Attacca (EP) (links | edit)Rock with You (Seventeen song) (links | edit)Woozi (links | edit)Hoshi (South Korean singer) (links | edit)Don't Wanna Cry (Seventeen song) (links | edit)Darl+ing (links | edit)Face the Sun (links | edit)Left & Right (Seventeen song) (links | edit)24H (EP) (links | edit)We Make You (links | edit)Hot (Seventeen song) (links | edit)Dream (Seventeen EP) (links | edit)BSS (band) (links | edit)FML (EP) (links | edit)Super (Seventeen song) (links | edit)Always Yours (album) (links | edit)Seventeenth Heaven (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/17_Carat" A team of scientists at Duke University made a mouse just a bit more human. They didnt give it speech or opposable thumbs. They gave it something much smaller a tiny stretch of human DNA known as HARE5. And in return, the mouse grew a brain about 6.5% bigger than its peers. The tweak was minuscule. But the effect a thickened outer cortex teeming with new neurons could help explain one of the biggest mysteries in evolution: how our ancestors brains tripled in size after diverging from chimpanzees millions of years ago. We still do not have a definitive answer to how the human brain has tripled in size since our split from chimpanzees, said Gabriel Santpere Bar, a neuroscientist at the Hospital del Mar Medical Research Institute in Spain. This study, apparently, gets us closer to understanding. The study confirmed only a brain size enhancement, not necessarily a cognitive one as well. Further research on this subject is underway. Image generated using Sora/ChatGPT The study, published in Nature, dives into a small but powerful group of DNA sequences known as Human Accelerated Regions, or HARs. These segments are nearly identical in all mammals except us. In humans, theyve rapidly mutated since we branched off from our primate relatives. Most HARs dont code for proteins. Instead, they serve as enhancers switches that dial nearby genes up or down. Scientists have long suspected that HARs are part of the recipe that makes human brains so big and intricate, but proving that has been difficult. The team, led by developmental neurobiologist Debra Silver, focused on one particular enhancer: HARE5, which boosts a gene called Frizzled8, or Fzd8, known to play a role in early brain development. Silver had identified HARE5 over a decade ago. But now, using an arsenal of tools including genetically edited mice, chimpanzee and human brain organoids, and single-cell RNA sequencing her team has mapped out in detail how this enhancer helps build a bigger brain. The story is much more complete and convincing, said Katherine Pollard, a bioinformatician at the Gladstone Institutes who first coined the term HARs in 2006. When the researchers replaced the mouse version of HARE5 with the human version, they watched the mices brains grow not just in size, but in complexity. Under the microscope, the brains revealed more radial glia, a type of neural stem cell that multiplies early in development and gives rise to neurons. These humanized mice produced more excitatory neurons and displayed greater functional independence between brain regions, suggesting not just more cells, but more refined circuitry. To test whether the findings held beyond mice, the team grew 3D miniature brain models or organoids from human and chimpanzee stem cells. When they inserted human HARE5 into chimpanzee cells, they observed the same pattern: increased radial glial proliferation and faster maturation. Looking closer, the researchers pinpointed four mutations unique to the human HARE5. Each of these genetic changes absent in chimpanzees acted like a volume knob, turning up enhancer activity. Together, they dialed up the WNT signaling pathway, a cascade of molecular messages crucial for neural growth. These findings illustrate how small changes in regulatory DNA can directly affect critical signalling pathways to modulate brain development, the authors wrote. Still, its not yet clear whether those larger mouse brains make for smarter mice but tests are underway. HARE5 is just one of over 3,000 HARs scattered across the human genome. Each may contribute a small piece to the puzzle of human brain evolution. Together, they likely interact in complex ways amplifying, dampening, or redirecting one another. They still represent a genetic treasure trove that we must keep digging into, said Santpere Bar. Silvers lab is now developing new methods to study how these HARs function together. Its possible that entire networks of enhancers, each subtly shaping the growth and wiring of the cortex, formed the genetic scaffolding that allowed humans to outsmart every other species. In a sense, our brains may be the sum of tiny tweaks not to the genes themselves, but to the instructions that control them. Its not evolution by brute force, but by fine-tuning. There are many, many different mechanisms that are critical to making the human brain what it is, Silver said. Tags: braindnahuman accelerated regionsmouse This page may contain affiliate links. If you purchase something through one of the links, we may receive a commission at no extra charge to you. The brain size can differ greatly between animals including among species of the same animal. We wanted here to list the brain weights of many common/familiar animals on the planet. Other such lists on the internet are not that big and probably missing many important animals. This reference article will be helpful for someone writing a relevant article, comparing the brain weights of animals, comparing the intelligence of animals or just learning about brain sizes in general. AnimalBrain Weight (g)Brain Weight (oz)Brain-Body Mass Ratio Aardvark802.81:562 African bush elephant54361921:791 African wild dog1294.61:171 Aligator140.501:14560 American black bear2488.71:105 Armadillo8.50.301:323 Asian black bear2699.51:260 Asian elephant52111841:531 Baboon1525.81:87 Bald eagle190.661:249 Barn owl6.70.241:48 Beaked whale2004711:1134 Beaver521.81:530 Beluga whale1921681:259 Bison4581161:942 Blue whale69672461:8333 Bobcat652.31:98 Bottlenose dolphin1573551:108 Bowhead whale2738971:33236 Brown bear336121:390 Buffalo648231:1028 Camel762271:525 Canary0.570.021:43 Capybara752.61:380 Caracal521.81:148 Cardinal1.60.061:28 Cassowary381.31:1188 Cat260.901:129 Catfish0.160.0061:333 Cattle453161:102 Cheetah1113.91:387 Chimpanzee355131:170 Chipmunk2.20.081:43 Civet260.921:107 Cockatiel2.50.091:36 Cockatoo150.521:61 Common dolphin797281:82 Cougar1545.41:353 Coyote853.01:116 Crocodile160.551:8590 Crow7.40.261:60 Deer pig1274.51:614 Donkey434151:539 Duck5.60.201:206 Dugong2659.31:1062 Eastern grey kangaroo702.51:378 Elephant seal1205431:1665 Emu301.11:1041 Eurasian elk436151:459 Fallow deer2257.91:166 Fin whale51001801:12255 Flamingo110.381:280 Fox501.81:75 Frog0.110.0041:172 Gannet140.491:130 Giant anteater843.01:225 Giant panda2057.21:427 Giraffe700251:1727 Goat1154.11:241 Golden eagle180.631:248 Goldfish0.100.0031:98 Gorilla455161:266 Gray whale43171521:6950 Groundhog140.501:198 Guinea pig4.80.171:99 Hamster2.20.081:135 Hare140.511:136 Hedgehog3.70.131:196 Hippo720251:1876 Honey badger732.61:111 Horse693241:492 House mouse0.400.0141:38 Human1250441:52 Hummingbird0.160.0051:20 Humpback whale61002151:4926 Hyena1756.21:356 Hyrax190.691:119 Impala1756.21:29 Jackal722.51:99 Jaguar1495.31:521 Jerboa1.50.051:42 Junglefowl3.30.121:278 Koala200.711:287 Leopard1354.81:356 Lion2609.21:324 Lizard0.030.0011:114 Llama2649.31:341 Lynx692.41:251 Manatee364131:2077 Mandrill1595.61:74 Maned wolf1204.21:193 Manta ray1204.21:1352 Marmoset7.70.271:45 Marten210.741:69 Meerkat100.361:70 Minke whale28501011:1960 Mole1.40.051:56 Mongoose8.80.311:61 Moose407141:668 Mountain sheep1404.91:393 Muskrat5.00.181:226 Narwhal29941061:527 Orca60522131:541 Oryx282101:621 Ostrich421.51:2779 Otter391.41:733 Pangolin9.40.331:190 Parakeet1.60.061:18 Peafowl7.10.251:589 Pelican250.891:269 Penguin200.721:240 Peregrine falcon6.40.231:160 Pigeon2.30.081:118 Pilot whale2466871:157 Platypus100.361:138 Polar bear507181:625 Polecat7.90.281:116 Porcupine250.871:219 Porpoise1735611:82 Prairie dog5.70.201:152 Rabbit7.60.271:137 Raccoon411.41:121 Red deer409141:489 Red kangaroo622.21:741 Reindeer278101:258 Rhesus macaque883.11:52 Rhino643231:2177 Roe deer933.31:188 Salmon1.40.051:3902 Sea bass1.10.041:3131 Sea lion405141:225 Sea turtle2.70.101:2016 Seahorse0.020.0011:866 Seal315111:234 Sei whale49001731:7483 Sheep1756.21:317 Skunk100.361:195 Sloth160.571:204 Sloth bear2679.41:510 Snake0.080.0031:675 Sperm whale81832891:4572 Squirrel7.40.261:68 Stork150.541:220 Street rat8.00.281:45 Sun bear386141:117 Swan230.791:480 Tapir853.01:168 Tiger270101:723 Toad0.070.0031:610 Treeshrew3.20.111:53 Trout0.820.031:3362 Tuna4.00.141:1864 Turkey vulture100.361:138 Vervet monkey632.21:69 Vicuna2007.11:231 Walrus1410501:725 Warthog1334.71:506 Weasel2.00.071:30 White shark301.01:24628 White-tailed deer2107.41:310 Wild boar1706.01:511 Wildebeest443161:479 Wolf1304.61:239 Wolverine732.61:146 Zebra562201:471 Please note the following about the data in the table: For each animal species, we tried to use the data of male when possible If there are more than one species of the animal, we simply used the most popular one We included the brain-body mass ratio because it could be an indicator of the animals intelligence The brain sizes (in grams) were sourced from datasets of some academic journals, which are referenced below. And the brain-body mass ratio was calculated based on the body weight available in the data. To conclude, we have listed the brain weights and ratios of many common animals. This list is exclusively about vertebrates which includes mammals, birds, fish, reptiles and amphibians. And the measurements are both in metric (g) and imperial units (oz). From the elephant to crocodile to dolphin to frog, you can find and compare the brain size of over 160 different animals across several animal classes. This is one of the shortest articles we have published so far since it merely lists some animals brain sizes. But of course, compiling all these numbers took quite some time to do. Hope the information was helpful for you. Please let us know if you want the brain data of any more animals to be included in the list. Lastly, be sure to check out our article about animals with largest & smallest brain size, you will probably learn something new and interesting on that topic. What is the heaviest brain?The sperm whale has the heaviest brain on earth with a massive weight of around 8.2kg. what is the mass of human brain?The average brain of humans is about 1.25kg. How big is the brain of an African elephant?The African bush elephant has the largest brain on land with an average weight of 5.4kg. What is the brain mass of dolphin?The brain size of dolphins depends largely on the species. The bottlenose dolphin has a brain weight of around 1.6kg compared to about 0.8kg for the common dolphin (i.e. double the size). How heavy is a blue whales brain?The blue whales brain weighs around 7kg which is actually smaller than the brain of the sperm whale. Gillooly, J.F., McCoy, M.W. (2014). Brain size varies with temperature in vertebrates. PeerJ, 2:e301 . Burger, J.R., George M.A., Leadbetter C., Shaikh F. (2019). The allometry of brain size in mammals. Journal of Mammalogy, 100(2), 276-283. Stark, G., Pincheira-Donoso, D (2022). The Evolution of Brain Size in Ectothermic Tetrapods: Large Brain Mass Trades-Off with Lifespan in Reptiles. Evol Biol, 49, 180188. Jungwirth, A. (2022). Data for: The costs and benefits of larger brains in fishes. Dryad. Song, Z. (2023). Data from: Why do endothermic vertebrates have bigger brains than ectothermic ones. Dryad. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.

How big are mice brains.