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FOR IMMEDIATE RELEASE

NOVA UNLOCKS THE SECRETS OF HUMAN MEMORY AND THE LATEST SCIENCE OF IMPLANTING, EDITING AND ERASING MEMORIES TO CONQUER FEARS, PTSD AND MORE

NOVA: MEMORY HACKERS

Premieres Wednesday, February 10, 2016 at 9PM/8C on PBS

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BOSTON, MA – Memory is the key to our identity. It's the glue that binds our mental lives. Without it, we'd be prisoners of the present, unable to use the lessons of the past to change our future. From our first kiss to where we put our keys, memory represents who we are, how we learn and how we navigate the world. But how does it actually work? In ***MEMORY HACKERS***, NOVA explores the cutting edge frontiers of cognitive science and molecular biology, where neuroscientists are probing our brains to unlock the secrets of human memory. The new one-hour documentary, a production of WGBH Boston, examines how memories are formed, what encompasses the act of remembering and the new technologies being used to implant, edit and even erase memories—a process that could delete our worst fears and, one day, may help us to re-write our past with the flip of a switch.

NOVA's *MEMORY HACKERS* premieres Wednesday, February 10, 2016 at 9PM/8C on PBS (check local listings).

In the last 20 years, a wealth of new imaging tools—from PET scanners and TMS to fMRI—have enabled a generation of explorers to chart memory in the human brain. For the first time, neuroscientists are uncovering the precise mechanisms of memory at the molecular level and have uncovered a provocative and alarming idea. For much of human history, memory has been seen as a tape recorder that faithfully registers information and replays it intact. Today, however, mounting evidence suggests that memory is far more malleable, constantly changing over time. It is always being written and rewritten, not just by us, but by others. Any time we recall an old memory, we essentially disrupt it. And the idea that even the simple act of remembering could make our memories vulnerable to change has transformed our entire understanding of memory.

"Memory is hugely important because it helps us understand ourselves and our lives and makes us who we are. But your memory is not as accurate as you think and far more changeable than you know," said **Paula S. Apsell**, Senior Executive Producer for NOVA. "This absorbing new NOVA film looks at one of the biggest mysteries in science and captivates viewers as it looks at stories of the latest breakthroughs in human memory and the implications of manipulating human memory."

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In ***MEMORY HACKERS***, NOVA takes viewers on a journey to try to discover exactly what memory is, how a memory is formed in the brain and how science has transformed our understanding of memory. The documentary dissects what happens in our brains each time we recollect a past experience and explores how the act of recalling a memory makes it vulnerable to change. A handful of experts are already using the malleability of memory to treat a variety of human disorders. Although the research is in its infancy, early results have been promising. This leads researchers to question whether our memories are more modifiable than we think, and, if we can already change them, will we be able to turn memories on and off one day, at the push of a button? The film highlights the latest in optogenetics, a revolutionary technique allowing researchers to map a specific memory and manipulate it with lasers. This could be one of the most important new developments in memory research, as it suggests a level and precision of control over memory that scientists have never before seen.

NOVA travels around the globe to meet the scientists working at the forefront of memory research and introduces viewers to the remarkable individuals whose exceptional memories and unique abilities are helping to unlock the secrets of memory. NOVA cameras capture firsthand as researchers test patients trying new reconsolidation therapies to try to overcome extreme fears, and more. Among the most notable memory hacking studies and experiments and fascinating stories explored in the film are the following:

- Neuropsychologist **Brenda Milner** gives a candid interview about her early strides in the field with Patient Zero in the study of memory. Her groundbreaking work in the 1950s with "H.M.," a man who was unable to form new memories following a surgery to remove part of his hippocampus, contributed tremendously to what we now know about the science of memory and paved the way for many researchers.

- **Karim Nader** is a neuroscientist who is working to understand what neurobiological processes are involved in acquiring, storing and recalling memories, especially relating to fear, to treat anxiety disorders. Nader designed a simple experiment that immediately resulted in a remarkable breakthrough. Rather than each memory being like a book filed in a library archive, it appears to be more like a computer file that can be modified. His astonishing findings revealed that every time a memory is recalled, it is vulnerable to alteration, a notion that spurred hundreds of subsequent studies and may have inspired the film *Eternal Sunshine of the Spotless Mind**.***

- In Amsterdam, NOVA viewers meet experimental clinical psychologist **Merel Kindt**, who is working with people suffering from phobias and anxiety disorders. Kindt has developed a treatment based on Nader's findings to abate the life-long fears of patients by administering a common blood-pressure medication, which works by blocking the action of adrenaline in the amygdala—the fear center of the brain. It's not a "forget pill." The original fear memory must be reactivated for it to work. NOVA viewers will see firsthand highly nervous spider-phobes vanquish their fears and calmly pet a big hairy tarantula after undergoing a treatment that destabilizes memories and then interferes with the restabilization of the original fear memory. Kindt is now among a handful of scientists using reconsolidation to treat a variety of human disorders, from drug addiction to post-traumatic stress disorder.

- NOVA viewers will also meet **Jake Hausler**, a 12-year-old boy who is the youngest person ever discovered with HSAM (Highly Superior Autobiographical Memory), and will see his unique ability to remember incredible details from almost every day of his life since age eight. Researchers at Washington University—including **Dr. Nico Dosenbach,** pediatric neurologist and systems neuroscientist at Washington University School of Medicine, and **Henry L. "Roddy" Roediger** and **Kathleen McDermott,** professors in the Psychology Department and part of the Memory Lab, are mapping Jake's brain with new imaging technologies to uncover what makes his memory so powerful and to see if he holds the key to understanding our memory.

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- Neurobiologist **James McGaugh**, one of the pioneers in human learning and memory science, discovered HSAM 15 years ago. So far, out of 15,000 candidates tested, he's discovered 55 adults who have this amazing ability—including actress **Marilu Henner**, who appears in the film to share her lifelong capacity for a phenomenal memory. "They called me Ms. Memory, Ms. Univac, The Memory Kid, things like that," says Henner. Hers is one of the best memories ever tested by McGaugh.

- Psychologist **Julia Shaw** has designed perhaps the most comprehensive studies ever on false memory. In an eye-opening experiment, Shaw implants false memories in participants and convinces 70% of her participants that they have committed a crime that never happened. The ramifications of fabricated memory studies like this are enormous, since they question one of the cornerstones of the criminal justice system. In hundreds of cases where DNA testing has proven wrongful conviction, about three-quarters of those convictions were based on faulty eyewitness testimony.

- Renowned neuroscientist, biomedical engineer and entrepreneur **André Fenton** is researching how brains coordinate knowledge to selectively activate and suppress information. "Forgetting is probably one of the most important things that brains will do," says Fenton, who believes a simple injection can erase a painful memory. He hopes that his work can help people struggling with dementia and Alzheimer's and one day illuminate the biological root of memory. "We understand only the tip of the iceberg when it comes to human memory," he adds.

- Questions about how long-term memory gets written on the brain have driven **Nobel Prize-winning scientist Eric Kandel** for the past 60 years. The American neuropsychiatrist discovered that memory involves a structural physical change in the brain, and his breakthrough findings have helped reveal what happens biologically to give rise to the phenomenon of memories.

The practical and positive applications for the breakthroughs in memory research are potentially huge. Understanding the basic mechanisms of memory could have a profound effect on our everyday lives—from staving off age-related memory loss, to improving learning and education, to amending the criminal justice system and finding cures for loved ones struggling with PTSD or Alzheimer's. Our increased understanding also gives rise, however, to the question of whether or not we are prepared for a world in which we can modify our memories in remarkable ways. What does it really mean if science can implant, change and even erase human memories?

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About NOVA

Now in its 43rd season, NOVA is the most-watched primetime science series on American television, reaching an average of five million viewers weekly. The series remains committed to producing in-depth science programming in the form of hour-long (and occasionally longer) documentaries, from the latest breakthroughs in technology to the deepest mysteries of the natural world. NOVA is a production of WGBH Boston. NOVA airs Wednesdays at 9pm ET/PT on WGBH Boston and most PBS stations. The Director of the WGBH Science Unit and Senior Executive Producer of NOVA is Paula S. Apsell.

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About PBS
PBS, with 350 member stations, offers all Americans the opportunity to explore new ideas and new worlds through television and online content. Each month, PBS reaches more than 103 million people through television and over 33 million people online, inviting them to experience the worlds of science, history, nature and public affairs; to hear diverse viewpoints; and to take front row seats to world-class drama and performances. PBS' broad array of programs has been consistently honored by the industry's most coveted award competitions. Teachers of children from pre-K through 12th grade turn to PBS for digital content and services that help bring classroom lessons to life. PBS' premier children's TV programming and its website, pbskids.org, are parents' and teachers' most trusted partners in inspiring and nurturing curiosity and love of learning in children. More information about PBS is available at www.pbs.org, one of the leading dot-org websites on the Internet, or by following PBS on Twitter, Facebook or through our apps for mobile devices. Specific program information and updates for press are available at pbs.org/pressroom or by following PBS Pressroom on Twitter.

About WGBH
WGBH Boston is America's preeminent public broadcaster and the largest producer of PBS content for TV and the Web, including *Frontline, Nova, American Experience, Masterpiece, Antiques Roadshow, Arthur, Curious George* and more than a dozen other prime-time, lifestyle, and children's series. WGBH also is a major supplier of programming for public radio, and oversees Public Radio International (PRI). As a leader in educational multimedia for the classroom, WGBH supplies content to PBS LearningMedia, a national broadband service for teachers and students. WGBH also is a pioneer in technologies and services that make media accessible to those with hearing or visual impairments. WGBH has been recognized with hundreds of honors. More info at www.wgbh.org.

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