

• This week in science...

Scientists work to change brain functions

BY TALMO PEREIRA
Science Columnist

Scientists grow a small functional “brain” in a dish from reprogrammed stem cells.

Technically termed “cerebral organoids,” these small lumps of neural tissue define another milestone in stem cell and developmental biology. Scientists at the Institute of Molecular Biotechnology in Vienna reveal details regarding their new technique.

By reprogramming skin cells into stem cells and then into neurons with the same developmental growth signals that our own neurons receive when growing, the team was able to grow pea-sized brains of up to 4 millimeters.

Their biggest surprise was that the artificial tissue formed discrete structures that actually interacted with each other.

Although the structures formed in these mini-brains do not resemble real human brains, their functionality makes them good models for studying neurological diseases on a small scale. Scientists hope to use parts of this technique to one day grow whole human brains in a dish.

A convincing study demonstrates that specially tailored video games can reverse cognitive deficits with unprecedented effectiveness.

Researchers at the University of California, San Francisco have just published their findings in the journal, *Nature*. In a series of large trials, participants played a racing video game aimed at improving their ability to multitask.

In the first set of trials, the scientists recruited 30 people to represent each decade between the age ranges of 20 to 70 and proceeded to evaluate their performance in a racing game where they also had to shoot down obstacles. They observed a linear decrease in performance with age.

In the second set of trials, they recruited 46 participants between ages 60 and 85 and trained them for an hour, three times a week, for four weeks. After the training, they achieved even better performance than the untrained 20 year olds.

Further, the effects of the training were noticed even six months after the start of the trial. Other evaluations demonstrated that the study participants saw improvements in their cognitive abilities such as sustained attention and working memory.



Due to scientific research, it will not be unusual to see grandparents playing video games. Research shows games help with multitasking.

Mice no longer have to worry about jet lag and treatment for humans is hopefully coming soon.

A team of researchers at Oxford University demonstrate how a particular protein acts in the brain to create the pesky effect known as jet lag.

Owing to an inability to adjust to a new time zone, jet lag is a result of the brain's mechanism for maintaining a biological clock that controls hunger, mood, blood pressure and others. Adjusting to a new time zone often leads to several days of fatigue as the body struggles to reset that clock.

Aware that a part of the brain called the suprachiasmatic nuclei was responsible for resetting that internal clock, the scientists tried to find out why exposure to light was not enough to overcome jet lag.

They discovered that a protein called SIK1 prevented the expression of the genes that would adjust the biological clock to a new time zone immediately.

They confirmed their findings by suppressing SIK1 in mice and found that they were quickly able to adjust their internal clock even when faced with a six hour time zone shift. There is now hope that new treatments can be discovered that target this protein, making international travel a slightly more bearable ordeal.

talmo.pereira@umbc.edu

UMBC student wins Microsoft essay contest

BY DENMARK LUCERIAGA
Contributing Writer

Andrew Shiffer, a graduate student enrolled in the cybersecurity program, won 3rd place in the Microsoft Cybersecurity 2020 Student Essay Contest. His entry, “A Cybersecurity Triumvirate: Policies, Outcomes, and Emerging Trends,” earned him a \$2,000 cash prize from the Microsoft Global Security Strategy and Diplomacy team.

The international competition sought original research from university students focusing on how to measure the security impact of policies around the world. Cybersecurity is a policy priority for many governments, but there is a limited understanding of how policy choices impact cyber risk outcomes.

While cybersecurity policy development has received significant attention and investment in many countries, cybercriminals still persist and forge ahead.

Policymakers all over the world are left to question the impact of their decisions, and struggle to choose policies that will have the greatest positive outcome in managing cyber risk.

In the contest, Microsoft posed two questions to contest participants. First, “which cybersecurity policy choices have the most impact on cybersecurity outcomes and, based upon your answer, are there ‘actionable’ recommendations for policymakers?”

Second, “Given the growth in people, devices and data connected to the Internet, how should policymakers adapt current approaches, and are there elements missing from the current policy landscape that should be created, or existing instruments that should be deprecated?”

A panel of judges selected winners with preference to responses that integrated quantitative analysis using publicly available cybersecurity data and research, such as the Microsoft

Security Intelligence Report (SIR). Microsoft received entries from 17 different countries and regions around the world, and Shiffer was the only contest winner from the United States.

Shiffer’s essay featured a quantitative analysis of international cybersecurity policies and proposed several recommendations for enhancing the security of computing devices while considering emerging trends such as ubiquitous computing and the rapid growth of online users.

Shiffer proposed that “countries with international agreements, policies and partnerships, coupled with their own domestic policies, have better cybersecurity outcomes than those without.”

To conduct his research, he began by looking for policies and publications that were relevant to the overall research topic. He then broke his findings down into domestic policy, international policy and agreements and transnational organizations that focus on cybersecurity. After finding common denominators between these different groups, Shiffer was able to formulate his recommendation.

Shiffer double-majored as an undergraduate in history and political science, and he is interested in developing a career in cybersecurity, perhaps in policy making or cyber security management. While attending graduate school at UMBC, he is also working for a government contractor, focusing on contracts that provide technical solutions for the U.S. Federal Government.

For a UMBC student who aspires to triumph in an essay contest, Shiffer offers the following advice: “Enter an essay contest only if you have a drive and passion for the subject you are writing about. If you have this, it will show and hopefully make a lasting impression on the contest judges.”

dlu2@umbc.edu



Paul Nicholas is the Senior Director of Global Security, Strategy & Diplomacy at Microsoft. He says, “At Microsoft, we are always excited to hear fresh ideas from some of the brightest minds entering the industry. The winning entries most certainly rose to the challenge.”