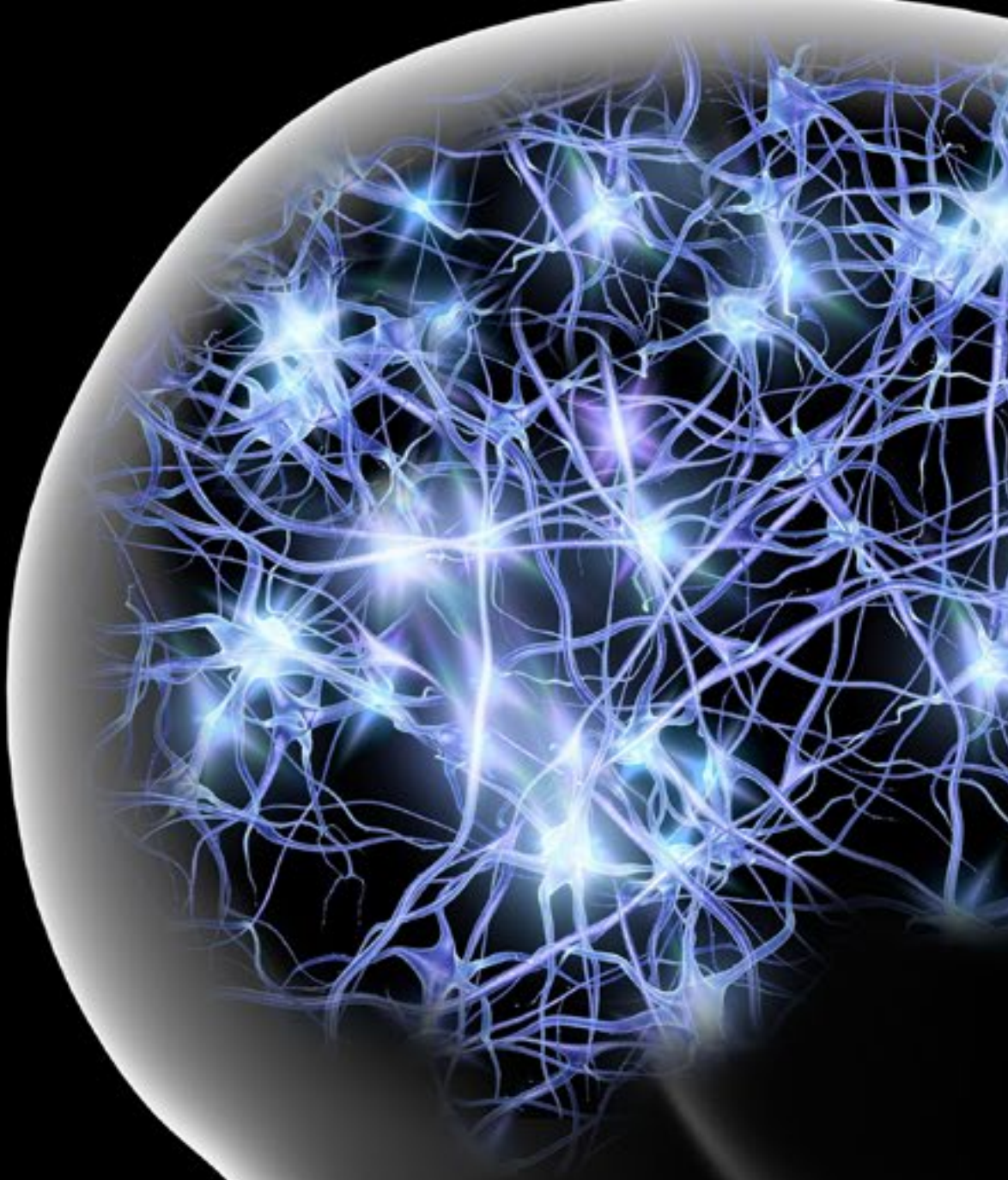

MICRONUTRIENTS

Food for the mind

A balanced diet has an effect on both the body and the brain. But a lot of people do not manage to get enough of the right foods in their daily diet and fail to meet the minimum daily requirements for many vital micronutrients. Nutritional supplements can help in such situations. Using state-of-the-art methods in neuroscience, Australian researchers have demonstrated the beneficial effects of the supplement Berocca Performance™ on the brain and its function.

Complex interactions: some 100 billion neurons ensure that our brains are constantly active. Micronutrients can have an impact on mental performance.

Photos: Oliver Oehl/Bayer AG (1), Peter Gintner/Bayer HealthCare AG (1), mauritius images/Science Photo Library (1), private (2)

Getting through a regular day without our working memory would be virtually impossible. Thanks to the brain's structure, we can store short-term information in our memories. "For example, when we want to read a specific chapter in a book, we look up the page number in the table of contents and remember it until we've found the right place. It's our working memory that makes this possible," explains Professor Andrew Scholey, Director of the Center for Human Psychopharmacology at Swinburne University in Australia. "It's the system that goes wrong when we walk into a room and forget what we came in for or pick up the phone then forget who we were about to call."

When our ability to remember things deteriorates, coping with everyday life becomes a real challenge, something very common to an Alzheimer's patient but also, to a lesser extent, during non-clinical age-related cognitive decline. The causes of this decline and ultimately Alzheimer's are extremely com- ▶

"We gave study subjects sophisticated cognitive tests to solve and measured the activity of their brains while they did them."

Professor Andrew Scholey,
neuroscientist at Swinburne University in Australia

Neuroscience and nutrition: Bayer manager Karl Wishart is collaborating with Australian neuroscientists to investigate the influence that essential nutrients such as B-vitamins have on mental performance.

plex. Research has focused on genetic and, more recently, lifestyle factors. "For a long time, neuroscientists believed that an imbalance in specific chemical signaling molecules called neurotransmitters were responsible for diseases of the brain. Treatments therefore often focused on one of these transmitters. Today many researchers believe that the relationships are more complex and that interventions with only one target are unlikely to be effective," says Scholey.

One decisive factor in cognitive decline with ageing and possibly even the development of Alzheimer's is lifestyle. A person's lifestyle impacts their entire body, including the brain. Each and every one of us has an influence on how well our minds will function at an advanced age. "Researchers repeatedly demonstrate positive effects of a balanced diet," emphasizes Karl Wishart, Global Senior Medical Manager in Bayer's Consumer Health Division. "It sounds so easy, but it's difficult for most people to adhere to the basic elements of a good diet. An optimal diet is not necessarily the same for everyone. But it's the really basic elements, like eating enough fruit and vegetables, that people just don't keep up with." These foods contain specific nutrients and vitamins. Of particular importance for optimum brain function are the B-vitamins. These molecules are produced by a variety of plants, with the exception of B12, which is produced by bacteria and is found in animal-derived foods such as meat, seafood and cheese. Multivitamin and mineral supplements usually contain these nutrients in quantities that are confirmed as being safe. "Berocca supplies all B-vitamins and other essential micronutrients in one formulation, which – due to their interdependence – makes a lot of sense, and ensures that they work together optimally," explains Wishart. But how does this supplement influence brain performance? Professor Scholey and his team in Australia investigated this very question using Berocca Performance™.

Researchers use magnetic resonance imaging to measure brain activity. The technology visualizes the metabolic activity in various areas of the brain when subjects solve mental tests.

The researchers measured the effect of micronutrients in the brain by assessing cognitive function in healthy adults. "We gave study subjects sensitive tests of working memory and measured the activity of their brains while they completed the test," says Scholey. For example, the psychopharmacologists use screens to present study participants with 100 different numbers per minute in rapid succession. The participants' task consists of recognizing three consecutive even or uneven numbers. The study subjects completed these and other tests before and after taking Berocca Performance™ for four weeks.

"We measured the activity of the brain using a range of methods," explains Scholey. For instance, they place several electrodes on a participant's head to record brain waves to generate an electroencephalogram (EEG). They also use modern imaging methods, such as functional magnetic resonance imaging (fMRI). The basic assumption of this technique is that the amount of oxygenated blood increases in active areas of the brain. "fMRI measures blood flow and oxygen usage by active regions of the brain allowing us to draw conclusions about brain activity in these regions during specific mental functions," says Scholey.

In the study subjects, various regions of the cerebral cortex showed elevated activity, specifically the frontal and parietal lobes. The frontal cortex is located behind the forehead; the parietal lobe is directly underneath the cranial bone, at the top, rear region of the head (it begins roughly on a level with the ears). "These regions are associated with working memory, and were precisely where we found Berocca Performance to have a positive effect," summarizes Scholey. "There was also a positive association between brain activity and performance on the tasks."

Based on blood work, the researchers also confirmed the absorption of the micronutrients in Berocca Performance™. "Levels of vitamin B6, vitamin B12 and folic acid improved after subjects consumed the supplement, while homocysteine levels dropped," explains Wishart. High levels of this neurotoxic amino acid can damage blood vessels and have been linked to cognitive decline and other chronic diseases such as cardiovascular disease.

This novel research on Berocca™ has helped shed some light on how micronutrients may affect cognitive performance and is contributing to the broader scientific knowledge in this area. At the same time it has shown that Berocca Performance™ can help people manage every day mental challenges. ■

Interview

"Making brain activity visible"

Dr. David White is an expert on non-invasive techniques for recording human brain activity at Professor Scholey's Centre for Human Psychopharmacology. research *spoke with the neuroscientist from Swinburne University in Australia about measuring the function of the brain.*

David White

What is the future of imaging methods in the neurosciences?

Neuroscientists are always trying to link brain structures to functions: it's a trend that repeats itself every so often, most recently with magnetic resonance imaging. In the 1980s, MRI only enabled us to identify the architecture of various organs, including the brain. Resourceful researchers soon improved on this new tool so that roughly ten years later we were also able to measure signal fluctuations related to activity in these regions. This brought about the explosion of research exploring brain activity by studying changes in this signal while a person carries out a given task inside the MRI scanner. I expect to see this kind of gradual advancement in virtually every new technology. With existing imaging methods, we are producing increasingly large data records that are stored in central databases. In the near future, the information provided by these large datasets and increasingly complex analysis methods will drive developments and increase our understanding of brain function.

Are there any new applications in diagnostics or treatment?

Several experimental forms of treatment for neurological diseases are currently being tested, including approaches involving brain stimulation, for example using magnetic fields amongst other methods. But what I find even more exciting is neurofeedback, which is a special form of training for the brain. Study subjects see measures of their own brain activity, and in the next step try to control this activity. In this way, they learn to control aspects of their own brain activity, rather than other methods where stimulation is coming from the outside.

What do you find most fascinating about the neurosciences?

There is still a lot we don't know about the brain. I have been interested in the function of the human body's most complex organ ever since I was a kid at school. As an undergraduate in psychology, I learned a lot of new things about our brain, and my enthusiasm grew. Since then I have been focused on the various methods that enable us to study brain function from the outside. Studying these complex functions based on data fascinates me anew every day.