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Breaking News from Society for Neuroscience 2012

For release: Wednesday, October 17, 2012

NEUROSCIENCE 2012

Hundreds of NIH-funded studies are being presented at the 2012 Society for Neuroscience annual meeting, taking place in New Orleans, Oct. 13-17.

This page highlights some of the studies and events supported by the National Institute of Neurological Disorders and Stroke, and is being updated daily throughout the meeting.

Wednesday, October 17

Signs of Lung Control and Air Breathing Found in an Ancient, Lungless Animal

M. Hoffman, B.E. Taylor, M.B. Harris
University of Alaska Fairbanks

Hoffman *et al.* have found that lampreys – which are gilled, fish-like animals – appear to have a brain respiratory control center similar to that found in air-breathing animals. Their work has implications for how air breathing and lung control evolved, and for understanding the brain circuitry that generates respiratory rhythms. The origin of rhythmic air breathing is unknown. Fish typically breathe by obtaining oxygen from water as it flows over their gills. One exception is the lungfish, which is considered a critical evolutionary link between aquatic animals and air-breathing vertebrates. But the work by Hoffman et al. suggests that the rudiments of air breathing evolved long before the lungfish did. The researchers show that lampreys, which are among the most ancient vertebrates, have a cough-like behavior that could represent a precursor of air breathing. This cough is also driven by a group of rhythmically firing neurons – or pattern generator– in the brainstem that is distinct from the pattern generator involved in gill respiration.

SfN Abstract Title & Presentation #: Lung control from lungless vertebrates – 796.04

Nanosymposium Lecture
***Omega-3 Fatty Acids May Counteract Problems in the Brain Associated with Obesity**

R. Agrawal, F. Gomez-Pinilla
University of California Los Angeles

Obesity is a growing problem in the United States. Metabolic syndrome (MetS) is a collection of obesity-related risk factors that increase the chances of coronary artery disease, stroke, and type 2 diabetes. Traditionally MetS has been thought to cause metabolic problems in the body. Here researchers demonstrate that MetS may cause metabolic problems in the brain. MetS was induced by feeding mice high fructose and varying amounts of docosahexaenoic acid (DHA), a naturally occurring omega-3 fatty acid known to reduce some MetS risk factors. Mice fed high fructose and low DHA had memory deficits. Biochemical experiments suggested that these deficits may be caused by changes in brain metabolism and that increased levels of DHA may counteract the changes. These initial studies suggest that MetS causes problems in the brain and that certain omega 3 fatty acids may reduce them.

SfN Abstract Title & Presentation #: Metabolic syndrome in the brain: How the balance between sugars and omega-3 fatty acid determines cognitive plasticity – 726.13

Scientists Discover How Eye Synapses May Adjust to Light and Shadows

N. W. Oesch, J.S. Diamond
National Institute of Neurological Diseases and Stroke, Bethesda, MD

Every fraction of a second the eye adjusts to give clear pictures of the world. Oesch et al. studies the circuitry controlling many of these adjustments which is found in the retina, the tissue in the eye that converts light in nerve signals sent to the brain. Recently Oesch et al. showed that certain neurons in the retina, called rod bipolar cells (RBCs), may compute light and shadows by changing the way they release the neurotransmitter glutamate at synapses. In response, some neighboring cells, such as AII amarcine cells may release another neurotransmitter, called GABA, back onto RBCs. Previous studies have shown GABA release from AII amarcine cells onto RBCs may in turn modulate the way RBCs release glutamate. In this presentation the researchers show that this feedback loop made between RBCs and AII amacrine cells may fine tune, or adjust, the way RBCs compute changes in light and shadows that the eye constantly detects.

Feedback inhibition extends the dynamic range of luminance and contrast – 879.02