# FEDERATION OF EUROPEAN NEUROSCIENCE SOCIETIES
## 11th FENS Forum of Neuroscience

7-11 July 2018 – Berlin, Germany
https://forum2018.fens.org/

**PRESS RELEASE**
EMBARGOED UNTIL SUNDAY 8 JULY 17.15 CEST/16.15 BST

### HOW DOES YOUR BRAIN KNOW WHERE YOU ARE?

As we navigate the world, it is crucial that we maintain a robust sense of where we are, and head-direction (HD) cells serve as the brain's internal 'compass.' Each HD is tuned specifically to the direction that we are facing, regardless of our location or behaviour, and scientists believe that malfunction of such cells may underlie problems with spatial awareness, such as in the early symptoms of Alzheimer's disease.

These cells are remarkably preserved across species, shared by man, animals and insects, delegates at the FENS Forum of Neuroscience heard today (8 July). But alone, they would simply tell you which way you are pointing; to provide a more detailed navigational system their activity needs to be combined with other cues.

As **Dr Adrien Peyrache** at McGill University in Montreal, Canada explained, "We understand how these individual head-direction cells work, what we are now exploring is how their activity is combined with other sensory information to create the brain's spatial code. It's just like a compass reading not being very useful without other information such as speed and distance from a target."

Working with mouse models, Dr Peyrache has been able to record brain activity as animals explore their environments and thus reveal the details of how single head-direction cells work as well as their activity in groups and the effect of external inputs. He has also found that these directionally sensitive nerve cells continue to work even when we are asleep and believes that they may play crucial roles in brain activity beyond navigation.

"We know that long term memories are laid down when we sleep, and our findings suggest that such memory requires spatial cues. In patients with epilepsy, the ability to form memories may be lost in part due to a fundamental problem with cells that map our position," he said.

Later this year, Dr Peyrache and colleagues hope to extend their work from mice to brain recordings from epilepsy patients. "These patients are often confined to bed for one or two weeks with brain electrodes implanted so the neurosurgeons can pinpoint where their seizures originate with a view to possible surgery. We are looking to play some spatial navigational games with them during this time to see whether what we see in animals is also true in man," he said.

Alongside their work with epilepsy patients and the possibility that HD impairment may occur in Alzheimer's disease and other dementias, Dr Peyrache and colleagues are intrigued by a recent finding from a mouse model of cocaine addiction suggesting that the reward system in the brain triggered by the drug may be intimately linked with a sense of place about where the drug is taken. Head–direction cells seem to reveal much more than simply which way we are facing.

**END**

**Symposium:** S15 - Cells and circuits signaling spatial orientation
**Abstract**: reference Internally organized mechanisms of the head direction sense

**Contact**
**FENS Press Office and all media enquiries:**
Elaine Snell, Snell Communications Ltd, London UK *(English language)*
tel: +44 (0)207 738 0424 or mobile +44 (0)7973 953794
*email: Elaine@snell-communications.net*

Barbara Ritzert, ProScience Communications, Pöcking, Germany *(German language)*
tel: +49 8157 9397-0 or mobile +49 151 12043311
*email: ritzert@proscience-com.de*

**NOTES TO EDITORS**

**Dr Adrien Peyrache**, Montreal Neurological Institute, McGill University, Canada
www.peyrachelab.com

**The 11th FENS Forum of Neuroscience**, the largest basic neuroscience meeting in Europe, organised by FENS and hosted by the German Neuroscience Society will attract more than 7,000 international delegates. The Federation of European Neuroscience Societies (FENS) was founded in 1998. With 43 neuroscience member societies across 33 European countries, FENS as an organisation represents 24,000 European neuroscientists with a mission to advance European neuroscience education and research. https://forum2018.fens.org/