

Antibody provide a more exact Alzheimer's diagnosis radioactive tracers

February 19 2016



Diagram of the brain of a person with Alzheimer's Disease. Credit: Wikipedia/public domain.

For the first time, researchers have succeeded in passing an antibody through the blood-brain barrier to act as a tracer for PET imaging of the brain. This resulted in more precise information being obtained than with regular radioactive tracers. The study provides hope for more effective diagnosis of early onset Alzheimer's disease and improvements in monitoring the effects of medication.

In the new study, published in *Nature Communications* today, Uppsala researchers demonstrates that an antibody gives more exact information than regular radioactive tracers used in PET brain scans. .



"The major advantage of <u>monoclonal antibodies</u> compared to regular small molecule PET tracers is their very high specificity. Our antibody binds soluble forms of amyloid beta, so-called protofibrils, which are probably the toxic form of amyloid and which cause the symptoms," says Lars Lannfelt, professor of Geriatrics at Uppsala University and a chief consultant at Uppsala University Hospital.

Positron emission tomography (PET) as a method for diagnosing Alzheimer's disease has made rapid progress in recent years. The person being examined is administered with a radioactive tracer, most often via a blood vessel. Using the PET scanner, it is possible to see how the tracer is taken up by and distributed within cells or organs.

The new PET method has been developed by researchers working at the PET Centre at Uppsala University and Uppsala University Hospital. This is the first time that a monoclonal antibody has been used for PET imaging of molecules in the brain. Such antibodies are sometimes used as tracers, but usually in order to diagnose cancerous tumours in the body. In the brain, however, the uptake of <u>antibodies</u> is limited by the <u>blood-brain barrier</u>. In order to get through this, researchers have developed a fusion protein which increases the passage by a factor of about 15. Like a Trojan horse, an antibody is administered to the brain via another antibody which deceives a receptor on the vessel wall. The study has been carried out using live transgenic Alzheimer mice.

"Compared to traditional tracers which give more statistical/unchanging signals as the disease progresses, with our method you can monitor its progression. This is a great advantage since the symptoms of Alzheimer's disease often appear gradually over a period of 10-20 years. The method much increases our ability to see the progress of the disease and to assess the effects of medication," says Associate Professor Stina Syvänen.

The researchers are currently working on a similar PET method for



Parkinson's disease. In the future, it is expected that it will be possible to examine other <u>brain</u> conditions using these techniques, for example, depression and bipolar disorder.

More information: Dag Sehlin et al. Antibody-based PET imaging of amyloid beta in mouse models of Alzheimer's disease, *Nature Communications* (2016). DOI: 10.1038/ncomms10759

Provided by Uppsala University

Citation: Antibody provide a more exact Alzheimer's diagnosis radioactive tracers (2016, February 19) retrieved 28 April 2024 from <u>https://medicalxpress.com/news/2016-02-antibody-exact-alzheimer-diagnosis-radioactive.html</u>

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