

STIM identification of diffuse amyloid deposits in the brains of transgenic mice

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The Swedish transgenic mouse Tg2576 contains additional artificially introduced genetic material in every cell, in this case mutant genes known to cause Alzheimer's disease in humans. The transgenic mice therefore develop characteristic biochemical signs of the disease such as the deposits of amyloid seen in the extra cellular space of the brain tissue.

One hypothesis for amyloid deposition is via excessive free radical damage which in turn can be caused by the presence of unregulated metallic ions. In order to test this hypothesis, the amyloid deposits have to be identified prior to analysis without recourse to conventional fixing and staining, since these processes are known to cause trace element redistribution and contamination.

Off Axis Scanning Transmission Ion Microscopy (STIM) has been used previously [1] to detect characteristic circular neurotic plaques in AD human brains. Here we present a more systematic way of using off-axis STIM to measure diffuse amyloid plaques (which do not have a characteristic shape). Direct STIM gives a much more accurate density map of the tissue, but is necessarily a low current technique and not suitable for simultaneous analysis with PIXE and RBS. Off axis STIM is compatible with PIXE and RBS, but is more difficult to interpret. By optimizing the energy sort window for off-axis STIM, an off-axis STIM image can be obtained which is similar to the images produced using direct STIM. We have used this technique to image diffuse plaques in fresh unstained brain tissue obtained from Swedish mice Tg 2576. These results will be presented and compared to histochemical staining.

[1] J P Landsberg, B McDonald and F Watt, *Absence of aluminium in neuritic plaque cores in Alzheimer's disease*, Nature 360 (1992) 65-67.