Lead (Pb) is known to induce adverse health effects in humans. In fact, cognitive deficits are repeatedly described with Pb exposure, but little is known about the distribution of lead in brain. Measurements of the distribution of Pb in human brain and to study if Pb is associated with the distribution of other chemical elements such as zinc (Zn), iron (Fe) is of great interest and could reveal some hints about the metabolism of Pb in brain. To determine the local distribution of lead (Pb) and other trace elements X-Ray Fluorescence Spectroscopy (XRF) measurements have been performed, using a microbeam setup and highest flux synchrotron radiation. Experiments have been carried out at ID-22, ESRF, Grenoble, France. The installed microprobe setup provides a monochromatic beam (17 keV) from an undulator station focused by Kirkpatrick-Baez X-ray optics to a spot size of 5 µm x 3µm. Brain slices (20µm thickness, imbedded in paraffin and mounted on Kapton foils) from areas of the frontal cortex, thalamus and hippocampus have been investigated. Generally no significant increase in fluorescence intensities could be detected in one of the investigated brain compartments. However Pb and other (trace) elements (eg. S, Ca, Fe, Cu, Zn, Br) could be detected in all samples and showed strong inhomogeneities across the analysed areas. While S, Ca, Fe, Cu, Zn and Br could be clearly assigned to the investigated brain structures (vessels, etc.) Pb showed a very different behaviour. In some cases (e.g. plexus choroidei) Pb was located at the walls of the vessel, whereas with other structures (e.g. blood vessel) this correlation was not found. Moreover the detected Pb in different brain areas was individually correlated with various elements. The local distribution of the detected elements in various brain structures will be discussed in this work.

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