# Post-Mortem Temperature and its Effect on Quantitative Magnetic Resonance Imaging

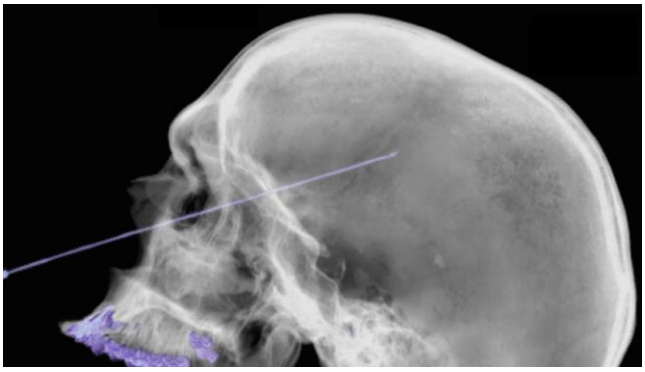

**Figure 1:** The skull presented with the osseous transparent metal mode of the console software (Siemens Healthineers Syngo CT 2014 A VB42B) of subject 9 represented in the sagittal with the temperature probe along the longitudinal fissure (Picture: C. Berger/Institute of Forensic Medicine).

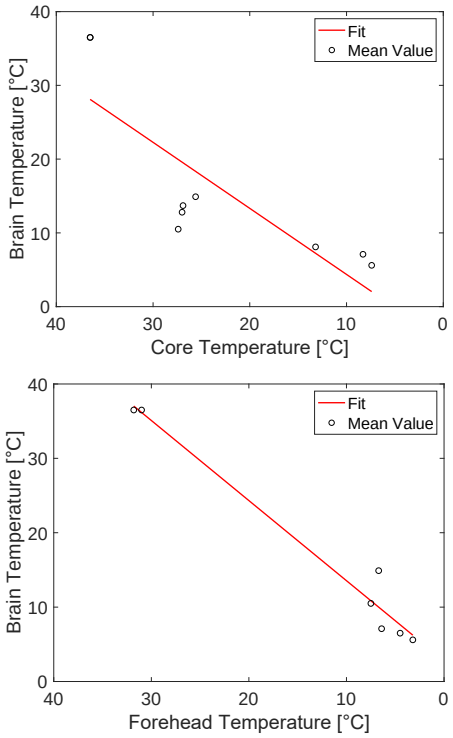


**Figure 2:** The brain temperature as a function of the core temperature and as a function of the forehead temperature measured at the same moment prior to the MR scan. A linear model was fitted to the data. Note that the x axis is inversely (40-0) plotted (Picture: C. Berger/Institute of Forensic Medicine).

**Master's Thesis by Celine Berger (Institute of Forensic Medicine).**

The purpose of this study was to determine the relations between the post-mortem temperature and the magnetic resonance (MR) parameters $T_1$ $T_2$, $T_3$*, MD, and FA. These relations would allow the correction of the MR parameters for the temperature in post-mortem magnetic resonance imaging (PMMR). Further, the temperature profiles of the forehead, brain, and rectal were recorded in order to find a correlation that would allow a non-invasive determination of the brain temperature [1-3].

The post-mortem MRI parameters of the brain were measured in situ of nine deceased. The temperature profiles were recorded in situ with temperature probes placed on the forehead, in the rectum, and in the brain (see figure 1).

In this thesis, a significant linear correlation was observed between the brain and the forehead temperature, while the brain and the core temperature revealed no linear correlation (see figure 2). Further, a significant linear relation between the brain temperature and the relaxation parameter $T_1$ of the gray matter was observed.

As a conclusion, the observed results suggest the need for correction regarding different brain temperatures, particularly that of $T_1$ in order to avoid brain tissue contrast loss caused by post-mortem temperature decreases.

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**References:**

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