Computational Fluid Dynamic Model for Human Brain Cooling During Accidents

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Abstract. A two-dimensional computational model of brain is developed to estimate the time taken to cool the brain of a patient after injury. Brain is designed in hemispherical shape with four tissue layers namely scalp, skull, grey matter, white matter using gambit and analyzed in fluent. The boundary conditions applied are derived from penne's bioheat equation. A user defined function was written to cool the brain according to the supplied temperature of ice. Two different ice packs (ice at 273K and dry ice at 193K) are placed on the head to check the time taken to cool the brain. Temperature should be reduced to minimize brain damage while blood is lost in patient during accident. Infusion of cold saline is responsible for brain cooling until recent studies but there is a possibility of patient to die while bringing him from injury spot to hospital. So cooling needs to be done in the mean time and placing an ice pack on top of the head is one such method. Out of the two ice packs used for the analysis, the one which takes less time to cool can be chosen as the best medium to cool the brain quickly.