Introduction:
After Traumatic Brain Injury (TBI) fever is common and may cause secondary brain damage. In this study we investigated the association between changes in brain temperature (BT), intracranial pressure (ICP), and cerebral perfusion pressure (CPP).

Methods:
CENTER-TBI is a co-operative effort of several neurotrauma centers in Europe and includes a repository of monitored data sampled at high-frequency (from 200 Hz to 500 Hz). Simultaneous BT, ICP and CPP recordings were studied, focusing on episodes of BT changes (delta BT ≥0.5 °C, lasting 15 minutes - 3 hours) up or downward. Using the linear correlation coefficient episodes were coded as responding (R), when there was a clear association between ICP and BT (Pearson’s R value ≥0.5) or non-responding (NR) when the correlation coefficient was <0.5.

Results:
Twenty-one patients were selected for the study for a total of 2435 monitoring hours. The mean duration of monitoring was 86 hours. All patients reached a BT above 38° and experienced at least one episode of ICP above 20 mmHg. A CPP lower than 60 mmHg (often of very short duration) has been recorded in all patients. 149 episodes (79 for BT elevation and 70 for BT reduction) were identified. During BT elevations, the increase in temperature was accompanied by ICP increases in slightly more than half episodes (43 R (54%) vs 37 NR (46%)). During BT reduction there were 32 R (46%) and 38 NR (54%) episodes.

Conclusion:
Patients after TBI usually develop BT > 38° soon after the injury. The BT may influence brain physiology, as reflected by ICP, through vascular responses (respectively vasodilation/vasoconstriction). Our analysis identified potential ICP and CPP variations connected to BT changes in approximately half of episodes. However, it has to be noted that both ICP and CPP have been actively manipulated in the ICU, potentially blunting the biological responses due to BT.