OMICS J Radiol 2017, 6:6, (Suppl)
DOI: 10.4172/2167-7964-C1-019

Febrile seizures, thermoregulation and febrile responses, complex processes are important aspects of the unsolved puzzle

Alexandra Kunz
Harvard University, USA

Introduction: Febrile seizures (FS) are always a relevant topic; thermoregulation and febrile responses, complex processes are important aspects of the unsolved puzzle.

Methods: Here, FS are explored from comparative evolutionary pressure data-sets for insights/contributing factors to age dependent vulnerability and for potential MRI data acquisition for evidence-based medicine.

Results: Thermoregulatory responses' evolutionary quest is for maximal performance at optimal temperature, experimentally shown for insects'/viruses' population growth and for not performance. Relying on external heat sources, ectotherms' narrow range of performance thermal sensitivities is explained by natural selection, not thermodynamics; endotherms', birds'/mammals', thermally constrained set-points evolved promoting heat loss, not enhancing performance. Mammalian brains' selective brain cooling (SBC) is a special evolutionary case within the thermal core because hyperthermia, causing febrile seizures, limits performance; SBC separates brain temperature (T) regulation independently from the body to keep Tbrain<Ttrunk, $p<0.01$. Species-specific SBC mechanisms during hyperthermia promote reversing normal blood flow, from brain skin to skin brain, to cool/maintain constant cerebral metabolism. A 4-part venous pathway connects extracranial diploic/emissary veins with intracranial meningeal veins/sinuses; the richly vascularized/complex human diploe has an age dependent developmental pattern, fully established, age 5, large variations at each age. Primate emissary veins respond immediately to hyperthermia; their parietal/mastoid/condyloid/post-glenoid foramina prominence shifts in an evolutionary pattern: Tarsius 0%, 0%, 0%, 100%; Lemurs 0%, 74.4%, 0%, 99%; orangutan 3%, 81.6%, 1%, 2%; chimpanzee 8.7%, 14%, 16.5%, 0%; human 60.5%, 68%, 77%, 0.6%. Furthermore, intrinsic brain geometry plays an important evolutionary role in thermoregulatory patterns/heat distribution. Notably, perinatal discontinuity of ontological size/shape changes in chimps/humans at 4-6 months, $p<0.0044$, produces topographical changes in vascular system; an expanded human frontoparietal volume, now globular, with highest concentration of diploic/emissary veins, richly anastomosed/reticulated, affects heat dissipation. Brain surface:volume ratio values for chimps'/humans' heat loading, 1.59 vs. 0.91, respectively, confirms globular shape decreases thermic values in heat transfer.

Conclusion: In light of evolution, human ontological variations from MRI measurements may offer an option to FS' unsolved puzzle for evidence-based medicine.

alexandrakunz@earthlink.net
kunzar@gmail.com