Zinc deficiency and inflammation lead to cognitive decline in an ageing brain

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Research question: Does zinc deficiency drive inflammatory processes to accelerate cognitive decline in aged animals?

Outline: The process of ageing is characterised by a steady functional decline and increase in frailty and is considered the biggest co-morbidity for disease. Age related functional decline in the brain results in cognitive impairment and dementia and significantly compromises the health-span of individuals. Inflammation, a host response to combat infection, is emerging as a major driver of the ageing process[1]. Chronic low grade inflammation contributing to the ageing process is suggested to be driven by the pro-inflammatory cytokine interleukin-1 (IL-1) and to depend upon the NLRP3 inflammasome complex[2]. Zinc (Zn^{2+}) deficiency affects up to 2 billion people worldwide, and is particularly common in aged individuals[3,4], and aged animals naturally become Zn^{2+} deficient and inflamed and this is reversed by dietary Zn^{2+} supplementation[5]. We have recently reported that Zn^{2+} depletion of macrophages activates the NLRP3 inflammasome *in vitro*[6]. The aim of this proposal is to test the hypothesis that Zn^{2+} deficiency accelerates the ageing process by driving NLRP3-dependent inflammation.

Expected output: These experiments will generate data giving us insights into the impact of Zn^{2+} deficiency on inflammation in an aged brain and the consequences of this with respect to cognitive performance. These data will support future applications to the BBSRC or MRC to fully dissect the interaction between Zn^{2+}, inflammation and cognition and could ultimately lead to trials where dietary Zn^{2+} supplements could be used to reduce the effects of inflammation on cognitive ageing and dementia.

References

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