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Developmental programming of neuroendocrine and immune responses: implications for ageing**

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Developmental stress has significant and often permanent impacts on many biological functions, including stress and immune responses. Alterations of these responses affect the activity of regulatory mechanisms in the brain, such as the hypothalamic pituitary adrenal (HPA) axis and the neuroimmune response by microglia, which can influence phenotypic traits that affect long-term health. Recent evidence, on the other hand, suggests that developmental stress may program physiological changes that could prepare an individual to cope better with future stressful conditions.

To test this hypothesis, in my PhD I am investigating the long-term effects of developmental stress on HPA axis and immune function. Using an avian model system, the Japanese quail (Coturnix japonica), I have shown that post-natal stress induces changes in microglia number and reduced anti-inflammatory cytokine gene expression. I will explore how stress exposure during development and adulthood interact to influence cellular apoptosis and neurogenesis in the adult quail brain (9 and 24 months). Finally, I plan to use transcriptomic techniques to determine whether pre-natal stress leads to long-term changes in spleen function to uncover genes and pathways that could potentially induce a stress-resilient phenotype.

A rise in the ageing population over the last century has resulted in significant increases in the number of people suffering from age-related diseases (e.g. Alzheimer’s), leading to growing healthcare costs of worldwide social and economic importance. As developmental stress impacts both positively and negatively on these age-related diseases, my research will allow us to identify the cellular mechanisms that drive these age-related diseases so that they may be targeted therapeutically in order to increase the quality of life and reduce the socioeconomic impact of ageing.