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Conflict within: The epigenetics of troubled sleep

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Statement of the Problem: Genomic imprinting — parent-of-origin dependent gene expression evolves at a locus when there is a conflict of interest between parental genomes within offspring over the optimal level of maternal investment. Conflicts emerge due to relatedness asymmetries within families (e.g., caused by multiple paternity and sex-biased dispersal). Here it is argued based on Haig (2014) and McNamara (2014) -- that sleep disturbance is caused by underlying genetic conflicts over the optimal amount of maternal investment. The purpose of this study is to outline the neurobiological and behavioral evidence that imprinted genes and intragenomic conflicts cause sleep disturbance. Furthermore, I outline the possibility of how intragenomic conflict resolution may occur to reduce sleep disturbances.

Methodology & Theoretical Orientation: Three studies are discussed from evolutionary and attachment theoretical perspectives. Study one outlines the case for imprinted gene involvement in sleep regulation. Study two and three investigate the degree to which poor attachment style is a positive correlate of nightmare occurrence.

Findings: As expected, study one shows that the frequency of imprinted genes involved in sleep regulation is greater than chance (i.e., considering imprinted genes are rare). Studies two and three reveal that young adults with insecure attachment styles self-report more nightmares.

Conclusion & Significance: Preliminary evidence is consistent with an intragenomic conflict perspective and previous work on sleep regulation. It is expected that paternal genes increase offspring sleep disturbance, whilst maternal genes minimize night waking. Future work should explore whether self-reports of disturbed sleep are valid (e.g., behavioral sleep lab work) and parent-of-origin gene network activation whilst sleeping. It is important to note that intragenomic conflict resolution may be mediated by secure attachment style providing a potential pathway for treatment of sleep disturbance.

Recent Publications

1. Brown W M (2015) Exercise-associated DNA methylation change in skeletal muscle and the importance of imprinted genes: A bioinformatics meta-analysis. British Journal of Sports Medicine 49(24):1567-1578.
2. Haig D (2014) Troubled sleep: Night waking, breastfeeding and parent-off spring conflict. Evolution, Medicine and Public Health 1:32-39.
3. Hanna C W and Kelsey G (2017) Genomic imprinting beyond DNA methylation: A role for maternal histones. Genome Biology 18:177.
4. Mcnamara P (2014) Comment on David Haig's troubled sleep: Implications for functions of infant sleep. Evolution, Medicine and Public Health 1:54-56.
5. Tucci V (2016) Genomic imprinting: A new epigenetic perspective of sleep regulation. PLOS Genetics 12(5):e1006004.

Biography

William M Brown was a Natural Science and Engineering Research Council (NSERC) and Killam Scholar whilst completing a PhD at Dalhousie University, Canada. Subsequently, he received a NSERC Postdoctoral Fellowship to study Genomic Imprinting in the USA. In 2006, he founded the Centre for Culture and Evolutionary Psychology at Brunel University teaching evolutionary biology and research methods. In 2009, he moved to Queen Mary, University of London and University of East London to teach research methods and behavioral biology. He has been at the University of Bedfordshire since 2011 and was appointed Senior Lecturer in the School of Psychology in 2015. His interests reside in the evolution of cooperation, development and genomic imprinting. The three topics merge in his work on sleep disturbance, which suggests that frequent night waking mediated by paternal genes was designed to extract social resources from mothers. Cooperation between parental genomes may facilitate more restful sleep and secure attachment between mother and child.

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