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Foetal Adjustment to Precarious Conditions: Genes Elegantly Bioprocess

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The objective of this perspective article was to underline the significance of embryonic and foetal adaptation to risky environmental conditions through internal maternal and own physiology. Mammals including humans are characterized by their evolutionary principles of growth and development. These evolutionary trends are integrated with earth sciences following physics laws and cosmology as both a science and a reality. In a more limited scale, occurrence of day and night has caused the emergence of circadian rhythms in cell biology that are best reflected in circadian patterns of gene expression, transcription and translation. Such an evolutionary cascade orchestrates different types and functions of genes and proteins in mammals [1-3].

Recent discoveries indicate that foetus can be well adapted to any modest modifications that occur in the environment. Despite the fact that embryo and indeed foetus utilize substrates preferentially over maternal tissues, the possibility exists that under very exceptional circumstances, any environmental issue affecting the mother, will also influence the foetus either beneficially or unhealthfully. However, this article proposes that gradual exposure to any serious environmental limitation experienced by maternal tissues and uterine can enable the foetus become accustomed steadily but effectively. Exposure to deficient oxygen at high altitude is a working example. Allowing the cell physiology to gradually adapt to reduced oxygen availability can prevent hazardous effects and even improve fuel use efficiency with better waste management. Adjustment to high elevations is brought about through faster breathing, higher heart rate, and feasibly altered blood chemistry [4]. This usually takes place at above 2500 meters height. Nevertheless, variably some adaptation may also occur at above 1500 meters altitude [4].

Evidence exists that mortality rate is lower in residents of higher vs. lower altitudes [5]. Moreover, increased elevation seems to be related to decreased obesity [6]. Furthermore, high altitude has been proposed to protect human against Alzheimer's disease via erythropoietin hormone that is released from kidney under hypoxia [7]. These responses demonstrate profound adjustments at lower cell levels involving genomics, proteomics and metabolomics [1]. The working philosophy is that genes exposed to extreme environments considered risky for optimal cell physiology and embryo and foetus health, should be adapted steadily, can develop a type of physiology that performs even better than usual under normal conditions. The recent findings support this philosophy [8-10].

To sum, human genes and proteins construction during embryonic and foetal development are highly responsive and adaptable to the environments even when considered risky for normal cell physiology and overall health. Future research is required to gain further new insights into such adaptations that may be studied as a model to develop prevention strategies for adult diseases.

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