

The Effect of Malnutrition on T-cell Circadian Rhythms

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In mammals, T-cell migration is under circadian control, likely to anticipate daily rhythms in infection risk. Glucocorticoids are a major controller of circadian processes and malnutrition is associated with increased glucocorticoid secretion. Previous studies suggest malnutrition may impart a “super-quiescent” phenotype to T-cells, enabling a greater number of naïve T-cells to survive short-term malnutrition albeit with diminished function. Thus, we hypothesize that malnourished T-cells may conserve energy by disengaging from rhythmic migration under circadian control and/or foregoing migration to reside in the bone marrow instead. To test this hypothesis, the total number of nucleated cells and naïve CD4+ and CD8+ T-cells in the blood, spleen, bone marrow, and brachial and mesenteric lymph nodes were enumerated by flow cytometry every four hours over the course of one day from control and malnourished mice.

Additionally, expression levels of CD127 and CXCR4 in both T-cell populations and the concentration of glucocorticoids in the blood were assessed. A better understanding of how malnutrition affects the circadian rhythm of T-cell migration will not only help identify the mechanisms of how circadian rhythms work, but also how organisms' circadian rhythms change in response to malnutrition. This knowledge of how malnutrition disrupts the circadian rhythm of T-cells may help improve vaccination strategies in malnourished children.