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**Parasites and Skeletal Indicators of Anemia in the Eastern United States**

The goal of this research is to examine the influence of parasitic infection and diet in the etiology of anemia in prehistoric populations of the eastern United States. Anemia in the past is often attributed to nutrient-deficient diet, while the potential role of parasite infection is discussed as a secondary cause. However, parasite infection is a leading cause of anemia in the developing world today. Modern epidemiological studies have demonstrated that parasites thrive or perish under particular environmental conditions, and risk for parasite infection can be predicted based on environment using GIS. Here I applied this method to see whether environmental conditions, acting as a proxy for parasite infection risk, could predict prehistoric skeletal lesion rates for porotic hyperostosis and cribra orbitalia, representing acquired anemia from parasite infection.

Rates of porotic hyperostosis and cribra orbitalia for children and adults were collected from published data for twenty-two sites in the eastern United States. GIS was used to gather comparable environmental data. Soil drainage, elevation, precipitation, temperature and the surface area of bodies of water were recorded within a 15 km radius of each site. Bone collagen carbon data and historic hookworm infection rates were also collected when available. Multiple linear regression was used to test the predictive ability of environment. Statistically significant correlation was found for both adults and children, but the strength and direction of relationships with environmental variables were inconsistent. It is possible that the correlation seen is not because of parasite infection, but instead exists because these skeletal 'lesions' may be the result of post-mortem bone degeneration.

The correlations for porotic hyperostosis and cribra orbitalia were stronger when examined separately than when examined together, suggesting that they may have separate etiologies; however, the sample sizes were small and these results were not statistically significant. Comparison of children and adults showed stronger correlation for children, though when observing the lesions separately this pattern was not consistent. Collagen carbon values were correlated with lesion rates in children but not adults, perhaps because differential healing in adults.

These results demonstrate that environment and skeletal lesions are correlated, but the underlying mechanism for this remains unclear. Larger sample sizes would allow for more robust statistical analyses of the trends observed here. Nevertheless, these results do confirm that porotic hyperostosis and cribra orbitalia cannot be assumed to be the result of nutrient-deficient diets. Interpretation of skeletal data for assessing health in the past must also consider the natural and social context in which individuals lived.