Environmental and Dietary Interventions in the Pathogenesis of Rheumatoid Arthritis

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Rheumatoid arthritis (RA), the most common form of autoimmune arthritis, is a progressive inflammatory disease with unclear causes. Many people with arthritis feel worsening symptoms when weather changes, however the exact risk factors in the pathogenesis of rheumatic disease have not been determined. The objective of this project was to assess how environmental factors play a role in the pathogenesis of RA, using cultures of human joint synovial cells and monocytes. To determine the effect of changes in temperature, pressure, and humidity on inflammation progression, synovial cells were analyzed for production of PGE2 cytokine using ELISA and expression of COX-2 gene as measured by real-time quantitative PCR (qPCR). Results showed that colder external temperatures caused a 352.29% rise in PGE2 and 414.22% rise in COX-2 in autoimmune predisposed synovial cells. Low humidity reduced PGE2 by 74.99% and COX-2 by 79.26%, while barometric pressure had no direct effect on progression of inflammation. A T-test showed that these findings are statistically significant, with p values .0002 and .0004, respectively. In conclusion, colder temperatures worsen PGE2 inflammation with the excess COX-2 activity, indicating faster disease progression. Arid conditions ameliorate PGE2 and COX-2 responses, thus indicating a reduction in immediate inflammation. Therefore, precautionary measures like protecting the body from colder weather and moving to warmer, arid climates could be used as an intervention in alleviating chronic joint inflammation and slowing the pathogenesis of RA. Additionally, my previous research proved that dietary supplementation with vitamin D could be also used to reduce autoimmune disease progression.

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