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Do the Chemical Properties of Amino Acids Have an Impact on the Risk of Rheumatoid Arthritis?

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Abstract

Rheumatoid arthritis is a chronic and autoimmune joint disease. Despite that it is the most common inflammatory joint disease that affects around 0.5-1% of the population it is unknown why the disease occurs. The disease develops when the immune system fails to distinguish between self and non-self antigens and mistakenly attacks its own tissue. The main unit responsible for this function in the human body is the human leucocyte antigen system consisting of amino acids which determine their characteristics. There are theories about that the chemical properties of the amino acids can have an impact on the development of the disease and this is what is going to be investigated in this report. Accordingly, the question is: do the chemical properties of amino acids have an impact on the risk of rheumatoid arthritis?

The main approach was logistic regression with data from a case-control study. For each amino acid three properties (hydrophilicity, bulk and electronic properties) were used as explanatory variables, one at a time, in simple logistic regression models, and also multiple logistic regression models, with all three of them included. Because two different approaches were used initially to reduce the original data in consequence of missing values, two subsets have been treated parallel, with slightly different results.

The result in this study concluded that the properties of some amino acids in a couple of already known positions associated with risk of rheumatoid arthritis do have an impact on the presence of the disease. Because most of the results in this study correspond to findings of previous studies, it indicates that an extension of this work would seemingly be an appropriate future work to continue investigating the connection between amino acids in the human leucocyte antigen region and risk of rheumatoid arthritis.

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