Application of Deep Learning Models Into the Prediction of Interleukin-6 and -8 Cytokines in Sickle Cell Anemia Patients

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Interleukin-6 (IL-6) and Interleukin-8 (IL-8) are cytokines related to general immune function, but within Sickle Cell Anemia (SCA) patients, their overproduction tends to cause autoimmune reactions. These vital cytokines engage in the pathophysiology of SCA, but the extent to which they're associated with the disease's genetics needs further exploration. This research paper seeks to further the study of IL-6 and IL-8 in SCA patients as well as the possibilities to predict their presence in patients based on Haptoglobin alleles and various other hematological factors using artificial neural networks. This was done through a cross-sectional study of 60 sickle anemia patients and 74 healthy individuals who provided the basis of this study's data. The deep learning model found a non-linear correlation between the Haptoglobin alleles and the production of IL-6 and IL-8, predicting their over presence in SCA patients with an accuracy of 90.9% and r-squared value of 0.88 based on the given inputs. The machine learning models built in this paper have the potential to accelerate the development of targeted treatments and diagnoses to those suffering from Sickle Cell Anemia and its specific immune complications.

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