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BIOL606
Midterm 2

The impact of high-density lipoproteins on the frequency of circulating monocytes in older adults.

Methods

I analysed the circulating monocyte frequencies of older adults using a linear mixed model (Pinheiro et al., 2022) with high-density lipoproteins (HDL) levels, age, and sex as fixed independent variables. The group effect exerted by dividing the clinical population into several cohorts was also included in the model as a random effect. The HDL values were log-transformed to further adhere to the model assumption that the errors are normally distributed. I investigated the effects of HDL level and age as interacting predictors toward monocyte frequencies. I analysed this model using a "Type III" ANOVA and found that this interaction effect was statistically insignificant (P>0.67828) (Fox J, Weisberg S, 2019). In other words, age did not exert any reinforcing effect towards HDL as a predictive variable. As such, I excluded the interaction effect and age was considered only as an additive variable to the model akin to biological sex. Since this new model only contained additive effects, it was analysed using a "Type II" ANOVA (Fox J, Weisberg S, 2019). All statistical analyses were executed using R and RStudio (R Core Team, 2021; RStudio Team, 2021). Statistical graphs were created using the ggplot2 package (Wickham, 2016).

Results

High-density lipoprotein (χ^2=0.251, P=0.617) blood levels did not affect the circulating monocyte frequencies of older adults. The cohort variable exerted only a small random effect onto the model (Intercept<0.001). The predictor variables age (χ^2=5.848, P=0.016) and sex (χ^2=0.028, P=4.836) exerted significant, independent effects toward the monocyte frequencies of the older adults. In conclusion, I failed to reject the null hypothesis that HDL levels do not affect circulating monocyte frequencies in older adults. However, reanalysis of this relationship using a linear mixed model that blocked for group effects, further cemented the importance of age and sex as predictive risk factors for the development of high monocyte blood counts. Future studies should take a more direct inflammation-oriented approach by investigating the relationship between HDL levels and the frequency of TNF- or CRP-producing monocytes.

Literature cited

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