

Can routine hematological parameters distinguish cardiovascular patients with current myocardial infarction?

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This retrospective study aimed to assess whether basic blood counts— red blood cell (RBC), white blood cell (WBC), and platelets (PLT) counts— differ between cardiovascular patients with and without a history of first-time myocardial infarction (MI). Data from 743 hospitalized adults were analyzed using both conventional statistical methods and bootstrap resampling to enhance inference robustness. The rationale for focusing on these parameters lies in their established links to key mechanisms in cardiovascular disease. WBC and PLT act in well-defined pro-inflammatory and pro-thrombotic directions, respectively. In contrast, RBCs present a biologically intriguing duality: elevated RBC levels may increase blood viscosity and impair microcirculatory flow, while moderate levels support oxygen delivery and nitric oxide (NO) signaling via RBC-bound NO synthase. This tension between risk and protection makes erythrocytes a particularly compelling subject of investigation. Patients with a history of MI showed lower RBC and elevated WBC counts compared to those without infarction, with no significant differences in PLT levels. A non-linear association was observed between RBC and MI, with statistically significant differences in the middle quartiles (Q2–Q3, $p < 0.05$), where MI-positive patients exhibited lower RBC counts. These patterns remained stable in models including both RBC and WBC and were validated through bootstrap analysis. Our findings suggest that even the most basic hematological variables may help in differentiating patients with current myocardial infarction from those without, especially when interpreted in light of their physiological relevance and analyzed using robust statistical approaches.

Recent Publications

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2. Kostanek J, Karolczak K, Kuliczowski W, Watala C (2024) Bootstrap method as a tool for analyzing data with atypical distributions deviating from parametric assumptions: critique and effectiveness evaluation. *Data* 9:95.
3. Gurubaran IS, Watala C, Kostanek J, Szczepanska J, Pawlowska E, Kaarniranta K, Blasiak J (2024) PGC-1 α regulates the interplay between oxidative stress, senescence and autophagy in the ageing retina important in age-related macular degeneration. *J Cell Mol Med* 28(8):e18051.

4. Karolczak K, Guligowska A, Sołtysik BK, Kostanek J, Kostka T, Watala C (2024) Estimated intake of potassium, phosphorus and zinc with the daily diet negatively correlates with ADP-dependent whole blood platelet aggregation in older subjects. *Nutrients* 16(3):332.
5. Karolczak K, Konieczna L, Sołtysik B, Kostka T, Witas PJ, Kostanek J, Baczek T, Watala C (2022) Plasma concentration of cortisol negatively associates with platelet reactivity in older subjects. *Int J Mol Sci* 24(1):717.
6. Karolczak K, Kostanek J, Sołtysik B, Konieczna L, Baczek T, Kostka T, Watala C (2022) Relationships between plasma concentrations of testosterone and dihydrotestosterone and geriatric depression scale scores in men and women aged 60–65 years—a multivariate approach with the use of Quade's test. *Int J Environ Res Public Health* 19(19):12507.

Biography

Joanna Kostanek is a fourth-year PhD candidate at the Medical University of Lodz, Poland, specializing in statistical methodology, particularly in cardiovascular research. Her current work focuses on identifying hematological differences between cardiovascular patients with and without myocardial infarction. She combines classical statistical methods with advanced techniques such as bootstrap resampling to enhance inference stability in skewed or small-sample medical datasets. Her broader interests include statistical modeling, reproducibility in medical science, and the integration of advanced statistical approaches into biomedical research.

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