INTISARI

POLA PROSES AGREGASI SEL DALAM DARAH-EDTA DENGAN METODE SPEKTROFOTOMETRI PADA PENDERITA KANKER

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Tujuan penelitian ini adalah 1) mengetahui perbedaan pola proses agregasi sel darah sebagian besar hidup pada subjek normal, penderita kanker kolorektal, dan penderita kanker Ovarium, 2) menjelaskan pola proses agregasi eritrosit dengan persamaan energi Gibbs, Nernst, potensial zeta, dan gaya Coulomb. Pola proses agregasi sel darah dideteksi menggunakan spektrofotometer dengan panjang gelombang (λ) = 560 nm. Volume darah yang digunakan sebanyak 550 cc. Laptop dikoneksikan dengan spektrofotometer untuk merekam data. Analisis data pola absorbansi menggunakan pendekatan deterministik dan pendekatan stokastik diperoleh tiga parameter deterministik dan tiga parameter stokastik dari masing-masing subjek penelitian. Pola grafik diperoleh dengan normalisasi data. Hasil analisis uji One-Way ANOVA dan uji Kruskal-Wallis diperoleh hasil P_{hitung} untuk masing-masing parameter (d_1, d_2, d_3, s_1, s_2, s_3) dari ketiga kelompok penelitian berturut-turut adalah 0,250; 0,170; 0,622; 0,40; 0,847; 0,677. Hasil P_{hitung} ini dibandingkan dengan taraf signifikansi α = 0,05. Berdasarkan hasil analisis pola agregasi bahwa: pertama, berdasar parameter d_1, d_2, d_3, s_1, s_2, s_3 tidak ada perbedaan dari ketiga kelompok subjek penelitian. Berturut-turut persamaan gafik normalisasi data pola proses agregasi untuk subjek normal, kanker ovarium, kanker kolorektal dari analisis dengan pendekatan determisistik $y = -3.10^{-21}x^6 + 2.10^{-17}x^5 – 4.10^{-14}x^4 + 3.10^{-11}x^3 – 5.10^{-09}x^2 – 9.10^{-07}x + 1$; $y = 2.10^{-20}x^6 – 8.10^{-17}x^5 + 1.10^{-13}x^4 – 4.10^{-11}x^3 – 2.10^{-08}x^2 + 1.10^{-06}x + 1.0001$; $y = -2.10^{-20}x^6 + 1.10^{-16}x^5 – 1.10^{-13}x^4 – 6.10^{-11}x^3 + 1.10^{-07}x^2 – 2.10^{-05}x + 1.0004$. Pola grafik dari analisis stokastik adalah $y = 3.10^{-18}x^6 – 1.10^{-14}x^5 + 2.10^{-11}x^4 - 10^{-08}x^3 + 2.10^{-06}x^2 - 0.0016x + 1.0024$; $y = 8.10^{-18}x^6 – 3.10^{-14}x^5 + 3.10^{-11}x^4 – 1.10^{-08}x^3 + 9.10^{-08}x^2 - 0.0011x + 1.002$; $y = 6.10^{-18}x^6 – 1.10^{-14}x^5 + 5.10^{-12}x^4 + 3.10^{-09}x^3 – 3.10^{-06}x^2 - 0.0012x + 0.9959$. Kedua, pola proses agregasi eritrosit hidup tidak dapat dijelaskan dengan tepat menggunakan persamaan energi Gibbs, Nernst, potensial zeta, gaya Coulomb.

Kata kunci: eritrosit, agregasi, absorbansi, spektrofotometer

ABSTRACT

PATTERNS OF CELL AGGREGATION IN BLOOD-EDTA USING SPECTHROPHOTOMETRIC METHOD IN CANCER PATIENTS

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The purposes of the research are 1) to describe the difference of aggregation pattern of living cells in normal subjects, colorectal cancer patients, and ovarian cancer patients, and 2) to explain the patterns of erythrocyte aggregation process with the equation of Gibbs energy, Nernst, zeta potential, and Coulomb style A Spectrophotometer with the wavelength of (λ) = 560 nm was installed to detect the patterns of blood cell aggregation process. The spectrophotometer rays were passed at the underside of a cuvette with 550 cc of the blood inside. A laptop was connected to the spectrophotometer to record the data. Deterministic and stochastic approaches to analyze the erythrocyte absorbance patterns found three deterministic parameters and three stochastic parameters from every group of participants. Data normalization was applied to draw the graphic patters. One-Way ANOVA and Kruskal-Wallis tests resulted in the P_{values} of 0,250; 0,170; 0,622; 0,40; 0,847; 0,677 from each parameter (d_1, d_2, d_3, s_1, s_2, s_3) with the significance number (α) of 0,05. The analysis of the aggregation patterns shows that: first, based on parameters d_1, d_2, d_3, s_1, s_2, s_3, there is no difference between the three groups of participants. Graph equations of data normalizations of the patterns of the aggregation process for healthy subjects, ovarian cancer subjects, and colorectal cancer subjects from the deterministic analysis are: $y = -3.10^{-21}x^6 + 2.10^{-17}x^5 – 4.10^{-14}x^4 + 3.10^{-11}x^3 – 5.10^{-09}x^2 – 9.10^{-07}x + 1$; $y = 2.10^{-20}x^6 – 8.10^{-17}x^5 + 1.10^{-13}x^4 – 4.10^{-11}x^3 – 2.10^{-08}x^2 + 1.10^{-06}x + 1.0001$; $y = -2.10^{-20}x^6 + 1.10^{-16}x^5 – 1.10^{-13}x^4 – 6.10^{-11}x^3 + 1.10^{-07}x^2 – 2.10^{-05}x + 1.0004$ consecutively. Based on the stochastic analysis, the equations are $y = 3.10^{-18}x^6 – 1.10^{-14}x^5 + 2.10^{-11}x^4 - 10^{-08}x^3 + 2.10^{-06}x^2 - 0.0016x + 1.0024$; $y = 8.10^{-18}x^6 – 3.10^{-14}x^5 + 3.10^{-11}x^4 – 1.10^{-08}x^3 + 9.10^{-08}x^2 - 0.0011x + 1.002$; and $y = 6.10^{-18}x^6 – 1.10^{-14}x^5 + 5.10^{-12}x^4 + 3.10^{-09}x^3 – 3.10^{-06}x^2 - 0.0012x + 0.9959$ consecutively for healthy subjects, ovarian cancer subjects, and colorectal cancer subjects. Second, the pattern of erythrocyte aggregation process cannot be accurately explained by using the equation of Gibbs energy, Nernst, zeta potential, and Coulomb style.

Keywords: erythrocyte, aggregation, absorbance, spectrophotometer