Review of: "Dynamics of blood cells during a routine laboratory examination"

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Potential competing interests: No potential competing interests to declare.

The manuscript discusses a work of substantial clinical significance and contributes to the improvement of the centrifugation process. According to the manuscript, the author aims to analyze the efficacy of the centrifugation process using an exact analytical solution based on the Langevin equation and the Fokker-Planck equation. The manuscript covers different parameters involved in centrifugation. The author reports the mathematical relationship between height and viscous friction and claims that as viscous friction increases, blood height increases. The author also discusses the relationship between ESR and model parameters. However, several questions remain unanswered and these concerns are listed below

- The author employs the Langevin equation to investigate the dynamics of blood cells and the Fokker-Planck equation to get information on RBC mobility. Can the author explain in a short paragraph how these equations help to obtain information on various parameters associated with centrifugation?
- The author models RBCs with spherical objects and asserts that the developed analytical model is an exact solution that matches experimental results. RBCs, on the other hand, are biconcave deformable cells and not spherical objects. How far is this approach correct?
- In figure 3 and figure 4, the author shows the results of RBC, but why do they discard the results of platelet?
- In figure 3 and figure 4, the author uses a single RBC to show the effect of velocity and displacement with respect to time and angular velocity. However, in practice, the number of RBCs is high. So, how does this newly developed analytical model aid in determining the velocity and displacement of cells in whole blood during centrifugation?
- The author can provide more information on analytical and experimental results to better comprehend the centrifugation process by varying the parameters such as the number of cells, speed, time, temperature, and so on. These results in tabular form can provide an understanding of how to utilize a centrifuge for a better cell separation process.
- The word “steps up” etc usage should be avoided. Grammar needs corrections. Several equations and sentences are without proper referencing.
- What is “N” and what is the origin of this equation. Are RBCs are heavier than WBCs ? There is no reference to densities of the cells. Specify the mass of WBC. Further “N” is taken as a constant. Can it have a dependence on the speed of the centrifuge? Wont it exhibit a time dependence.
- Author can also explore the model describing the temperature generation due to centrifugation
- There is a lack of strong correlation between analytical solution and experiments.