# Red Blood Cell Shapes Parameterization Using Partial Differential Equations.

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- **Abstract:** The research aim's is to produce distinguishable shapes of red blood cells (RBC) by utilizing partial differential equations (PDE). This work employs the solution of a fourth-order elliptic PDE in alliance with a group of boundary conditions as a technique to design the shapes, known as the PDE method. This method can generate various surfaces based on a boundary representation with fewer parameters. Furthermore, it is easy to modify the shape of PDE-based surfaces because it is characterized by data scattered around the boundaries. The findings showed that the PDE method is suitable in designing a normal RBC's shape. In addition, two equations have been obtained from the data regarding the normal RBC's radius and height. These equations can be utilized to transform the parametric design of RBC to abnormal cells by changing the value of some parameters. In conclusion, the PDE method is capable to create smooth parametric surface representations of any given blood cells shape, as well as surfaces of complex geometries which then can be easily modified.