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Prediction and optimization of the recovery rate in centrifugal separation of platelet-rich plasma (PRP).[1] LINFENG PIAO, HYUNGMIN PARK, Seoul National University, CHRIS JO, Seoul National University Hospital — We present a theoretical model of the recovery rate of platelet and white blood cell in the process of centrifugal separation of platelet-rich plasma (PRP). For the practically used conditions in the field, the separation process is modeled as a one-dimensional particle sedimentation; a quasi-linear partial differential equation is derived based on the kinematic-wave theory. This is solved to determine the interface positions between supernatant-suspension and suspension-sediment, used to estimate the recovery rate of the plasma. While correcting the Brown's hypothesis (1989) claiming that the platelet recovery is linearly proportional to that of plasma, we propose a new correlation model for prediction of the platelet recovery, which is a function of the volume of whole blood, centrifugal acceleration and time. For a range of practical parameters, such as hematocrit, volume of whole blood and centrifugation (time and acceleration), the predicted recovery rate shows a good agreement with available clinical data. We propose that this model is further used to optimize the preparation method of PRP that satisfies the customized case.

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