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Brody H Foy* (bfoy1@mgh.harvard.edu), Center for Systems Biology, Simches Research Building, 185 Cambridge Street, Boston, MA 02114, and **John M Higgins**. *Using mass balance equations to quantify properties of red blood cell production and growth.*

As red blood cells (RBCs) develop, grow and respond to disease pathophysiology they exhibit a variety of changes. Over their lifespan, RBCs typically exhibit significant loss of both volume and hemoglobin mass, due to processes such as vesiculation. While these processes have been well studied in experimental models (e.g mice, etc.), due to the difficulties of in vivo measurement of blood cells, patient-specific estimates of volume and hemoglobin loss at the cellular level are challenging to obtain.

To address this issue, we propose use of mass balance equations to estimate cell clearance, and volume and hemoglobin loss. This model is applied using both routine clinical measurements such as the complete blood count, and single-cell flow cytometry measurements from which the blood count is derived.

We apply this mass balance system to analysis of a group of $N = 28$ healthy subjects who all donated blood, and 3 weeks later underwent either autotransfusion of this blood ($N = 14$) or had a placebo saline injection ($N = 14$). This analysis highlights both qualitative and quantitative differences in blood production between the two groups at various points throughout the study. (Received September 14, 2020)