Engineering Erythrocytes as a Novel Carrier for the Targeted Delivery of the Anticancer Drug Paclitaxel
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Purpose
In this study, we used human erythrocytes, instead of Cremophor, as a pharmaceutical vehicle for Paclitaxel (PTX). PTX was loaded into erythrocytes using the preswelling method.

Methods
Blood samples from apparently healthy volunteers were collected in heparinized tubes and PTX was loaded. Erythrocytes loaded PTX were characterized hematologically. Entrapment of PTX in erythrocytes and its in vitro release were determined.

Results
Analysis of the obtained data indicates that 148.8 µg of PTX was loaded, with an entrapment efficiency of 46.36 % and a cell recovery rate of 75.94 %. Furthermore, we observed a significant increase in the mean corpuscular volume (MCV) values of the erythrocytes, whereas both the mean corpuscular hemoglobin (MCH) and the mean corpuscular hemoglobin concentration (MCHC) decreased following the loading procedure with or without PTX. The turbulence fragility index values for unloaded, sham-loaded and PTX-loaded erythrocytes were 3, 2, and 1 h, respectively. Additionally, the erythrocyte Glutathione (GSH) level decreased after PTX loading, whereas lipid peroxidation and protein oxidation increased. The release of PTX from loaded erythrocytes followed first-order kinetics, and 81% of the loaded drug was released into the plasma after 48 hours.

Conclusion
The results of the present study revealed that PTX was loaded successfully into human erythrocytes with acceptable loading parameters and with some oxidative modification to the erythrocytes.