Protein Absorption of Hydrophobic Surfaces of Biomaterials under Flow Shear

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Long Abstract

Introduction

Biomaterial surfaces are widely used to improve the blood compatibility of ventricular assist devices with the ability to anticoagulate and effect on hemolysis. Protein absoption has significant effects on the interaction between the biomaterial surfaces and the blood. Thereas, conventional protein absorption experiments are performed in steady conditions without considering the influence of the flow shear. To assess the biomaterial surface to be used in the blood pumps and explore the mechanism of protein absorption under flow shear, we exposed different hydrophobic surfaces of biomaterials to flow shear in microchannels to simulate flow conditions which may be encountered in blood pumps. In the experiments, the pressure drop across the microchannels was measured. The results will be discussed in the full length paper.

1. Methods

Phosphate buffer solution (PBS) of bovine serum albumin (BSA) was chosen as fluid medium in experiments of protein absoption under flow shear. According to the previous numerical simulation of a blood pump, the wall shear in the blood pump ranges from 0 to 1048 Pa, mainly between 150 and 500 Pa. The schematic of the experimental system is shown in Fig.1.

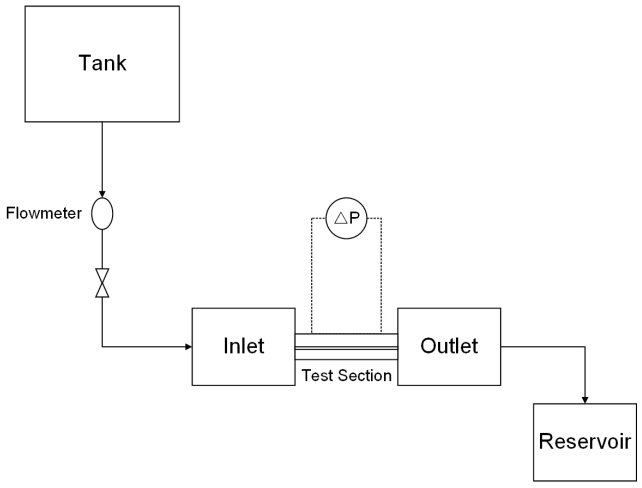

Figure 1. Schematic of the experimental system

Based on the conventional laminar flow theory, by altering the flow rate and measuring the pressure drop, we can calculate the flow shear to stimulate similar conditions in blood pumps. A fluorimetric assay was used to quantify protein remaining absorbed.

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