NN-GVEIN: Neural Network-Based Modeling of Velocity Profile inside Graft-To-Vein Connection

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Abstract

This paper presents the application of backpropagation neural networks (NN) to modeling of flow field inside in vitro arteriovenous graft-to-vein connection. The flow field was analyzed using the experimental laser Doppler method. The experimental results were used as input data for the neural networks-based modeling. Experimental studies are very time consuming and expensive. Whereas the NN modeling technique is time saving and cheap compared to experimental methods. In this study, the advantage is that this approach does not require the model structure to be known a priori, in contrast to most of the modeling techniques. The results showed that this method is a feasible technique for modeling of flow velocity profiles inside graft-to-vein connection. The NN algorithm and NN structure are adaptively determined based on minimization of mean squared error. The model showed good modeling performance.

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