

Study of flow field of blood in the Human Carotid Bifurcation for different degrees of stenosis using OpenFOAM

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Abstract: Stenosis is the narrowing of the artery due to deposition of plaque in the inner walls. This causes a wide range of problems ranging from heart attacks to increased blood pressure. The geometry of the bifurcation shown in figure represents a mean of angiogram measurements of over 57 adults and 67 children [1]. Steady flow analysis is performed using icoFOAM solver and compared with the experimental results obtained by Bharadwaj [1]. Then the model is altered to constrict the Common Carotid artery different degrees of stenosis. Due to the non-Newtonian characteristics of blood at high shear rate, non-Newtonian icoFOAM solver will be used. Casson model is used to capture the rheology of flow.

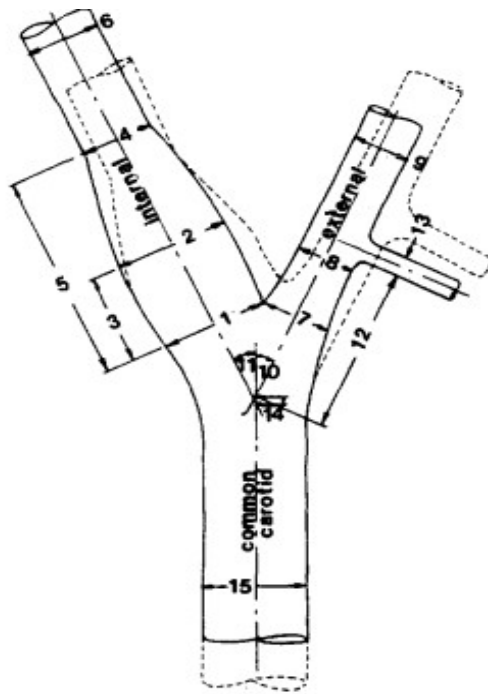


Fig.1

Location in fig	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mean (mm)	8.3	8.9	7.3	5.7	17.1	5.6	5.6	5.5	4.6	25.1 deg	25.4 deg	14.9	1.9	0.2	8.00

Mean flow rate	500 mL/min
Reynolds Number	380
Viscosity	0.0035 Kg/m-s

Reference: [1] B. K. Bharadvaj, R. F. Mabon and, D. P. Giddens. Steady flow in a model of the human carotid bifurcation-II. Laser-Doppler anemometer measurements, J. Biomechanics 1982; 15: 363-378.