



# ME Seminar



## A contact mechanics based mathematical model for studying the dynamics of endothelium

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### ABSTRACT

Several life-threatening diseases such as cancer, atherosclerosis, and Covid-19 exhibit a common trait – leaking blood vessels. A specific type of cells called Endothelial cells form an inner lining of the vascular network. These cells form bonds with neighbouring cells that can open and close resulting in dynamically varying gap sizes, thereby regulating permeability. Diseased conditions change the homeostasis either by affecting the gap size or the frequency of opening of the gaps, and pathogens make use of these gaps to spread to tissues. But how the coupled mechano-chemical stimuli affect endothelial permeability is still not understood completely. In this talk, we will explore the effects of altering permeability in health and disease and introduce you to a continuum level contact mechanics based mathematical model simulating VE-cadherins coupled to actin cytoskeleton network. We will use the model and try to answer several intriguing questions such as what is the relation between blood flow and atherosclerosis? Is there any role of extra-cellular matrix in determining cell-cell interactions?

### ABOUT THE SPEAKER

Pradeep Keshavanarayana obtained his undergraduate degree in Civil Engineering from NITK Surathkal. After which, he moved to University of Stuttgart, Germany to pursue MSc in Computational Mechanics. Having developed keen interest in Biomechanics, he went on to University of Glasgow to work on cell mechanics as part of his PhD. Currently, he is pursuing his research as a post-doc at University of Birmingham. Prior to starting his post-doc, he worked as a space-structures engineer at Agnikul Cosmos, a startup working on designing and building rockets, incubated at IIT Madras, India. His research interests are broadly in the field of intersection of bioengineering, and continuum mechanics.



**February 8, 2023**  
**4:00 pm, A R Auditorium**