



A multi-scale computer model of the cardiovascular system can account for the three roles of the left atrium

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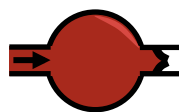
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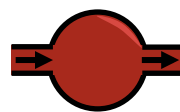
Introduction

During a cardiac cycle, the left atrium exerts 3 roles: reservoir (1), conduit (2) and pump (3).

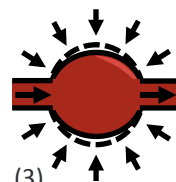
This behavior is difficult to reproduce *in silico* with the time-varying elastance concept since it is not sure whether the elastance curve is load-dependent.



(1)



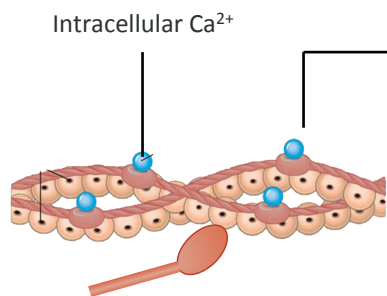
(2)



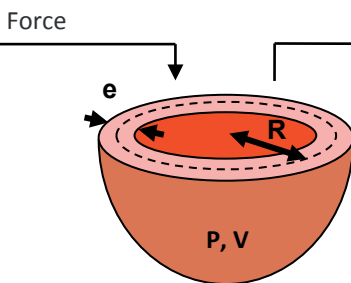
(3)

Methods

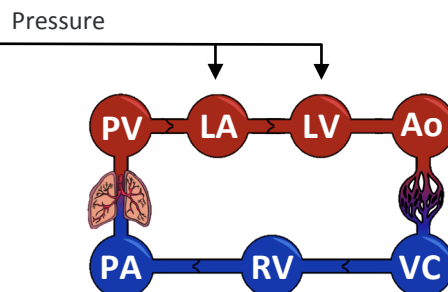
Multi-scale computer model of the cardiovascular system:



Computer model of the atrial and ventricular sarcomeres

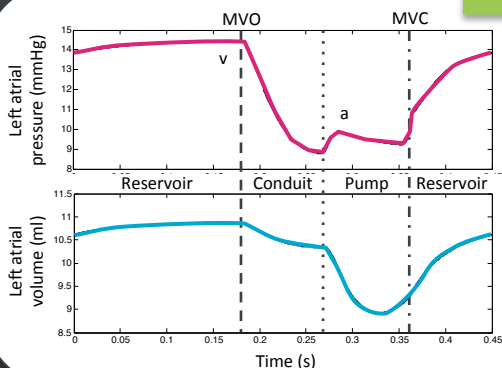


Simple geometrical model of the left atrium and ventricle



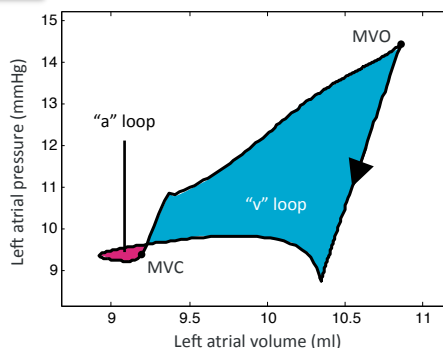
Computer model of the cardiovascular system

Results



Simulated left atrial pressure and volume

Simulated left atrial pressure-volume loop



Conclusion

We implemented a multi-scale model of the cardiovascular system, in which left ventricular and atrial contraction are described by a detailed sarcomere model. Using this model, we successfully reproduced the physiological behavior of the atrium.



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