MULTI-SCALE MODEL OF THE CARDIOVASCULAR SYSTEM

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Introduction

Many models of the cardiovascular system describe the heart contraction at the organ scale with phenomenological models (like the varying elastance model). In this work a more realistic model of the CVS is presented, where the detailed biophysics of heart contraction is alternatively described at the cellular scale.
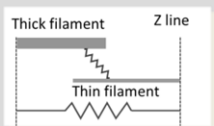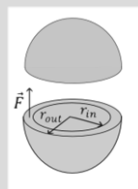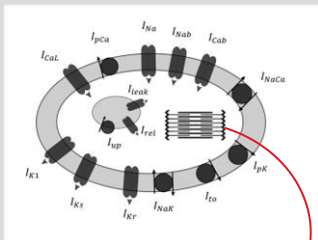
Methods

- **6-chamber hemodynamic model**
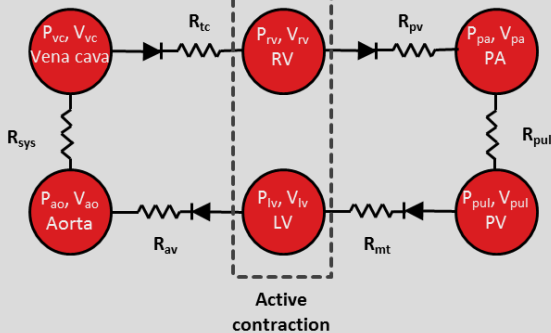
- **Heart model (left & right ventricles)**
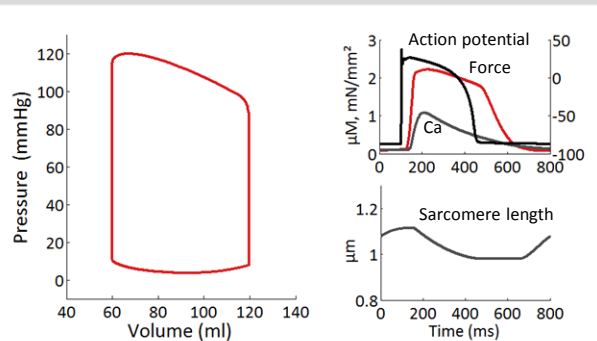
Cell scale ➡ Organ scale
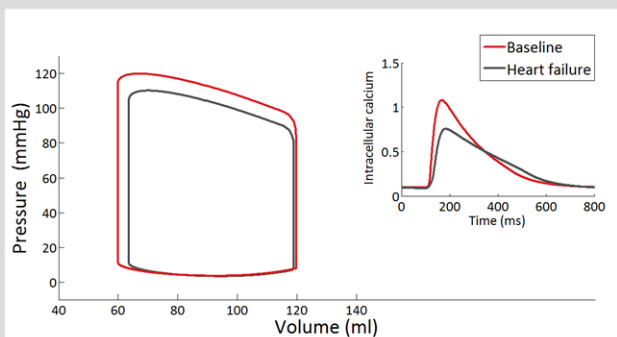
Ventricle → thin sphere

↳ Connexion between microscopic variables (force & length) and macroscopic variables (pressure & volume)

Results

- **One heartbeat (left ventricle)**

- **Heart failure (left ventricle)**

Conclusion

Our multi-scale CVS model is able to reproduce baseline results and to connect cellular and global hemodynamic variables. This model can also account for pathological behaviours with cellular origins, like heart failure.

Acknowledgments

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