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# A COMPUTATIONAL MODEL FOR TISSUE REMODELING IN CANCELOUS BONE

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Remodeling processes in bone act across multiple spatial and temporal scales, and there is a growing need to develop systematic modeling and simulation approaches for this multiscale problem. The potential benefit and also the pitfalls of computational models for remodeling have long been recognized [1] and reiterated in context of more recent developments [2]. Existing models overlap in terms of their scope and scale of application, ranging from biochemical and cellular aspects, to mechanical and tissue aspects to larger scale biomechanical aspects. The longterm goal is an aggregate predictive model comprising separate but connected models at different spatial and temporal scales, leading to greater understanding of remodeling and, in turn, improved treatment. The aim of this study is to develop a computational model at the tissue level, for the effect of remodeling process on the local structure of cancelous bone.

The model comprises a spatio-temporal PDE for BV/TV, coupled with simulations of bone remodeling to explain changes in the architecture of trabecular bone over time for three experimental groups of rats: sham-operated rats (sham), ovariectomised rats (ovx) and ovariectomised rats with follow-up regularly administered Zoldronic acid (ovx+zol). The model elucidates how the balance of the remodeling parameters differ in disease, treatment and normal states. In addition, the model demonstrates that, in the case of treatment with bisphosphonates, the BV/TV of the bone emerging from the GP changes.

## REFERENCES

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