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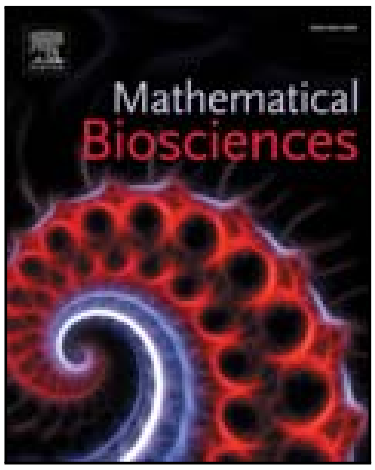

A Cellular Automata Model of Bone Formation

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PII: S0025-5564(17)30063-9
DOI: 10.1016/j.mbs.2017.02.001
Reference: MBS 7907

To appear in: *Mathematical Biosciences*

Received date: 8 December 2015
Revised date: 27 January 2017
Accepted date: 2 February 2017

Please cite this article as: Gabrielle K. Van Scoy, Estee L. George, Flora Opoku Asantewaa, Lucy Kerns, Marnie M. Saunders, Alicia Prieto-Langarica, A Cellular Automata Model of Bone Formation, *Mathematical Biosciences* (2017), doi: 10.1016/j.mbs.2017.02.001

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Highlights

- In this paper we present the first towards the larger goal to construt biomimetic multisale mathematial models to understand the underlying mehanisms, pathways and mukticellular interactions that regulate bone remodeling.
  - The team will work to isolate each cell involved in te bone remodeling process in *in vitro* characterizations and experiments to analyze the mechanisms underlying this complex process by using mathematical modeling and statistical tools.
  - As a first step, this manuscript presents the isolation of osteoblasts in an *in vitro* characterization and the accompanying cellular automata model that mimics the behaviour of osteoblastics cells.
- This paper is truly multi discipliunary approach to understanding the bone formation process. The team includes to biomedical engineers, two staticians and two mathematical modelers. By taking a multidisciplinary approach, we are able to utilize the strengths of three different areas to better understand the dynamics of bone formation.
  - One feature that makes this paper unique is the use of statistical methods to validate the cellular autodata model.
  - The use of statistical tools assess how effectively the mathematical model represents the biological phenomenon provides an innovative way to improve mathematical modeling of highly stochastic biological processes.
  - We are hoping that making mathematical models more realistics becomes a trend in mathematics.

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