Poster Abstract

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Abstract details	
Title	Bone cell population models and their advantages: simplicity, purposefulness and exactness
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Equations of bone turnover balance between bone resorption and formation together with time changes of bone resorbing and forming cells numbers form the mathematical model of system of ordinary differential equations (ODEs) capable to describe process of bone remodelling inside one bone multicellular unit (BMU) or compartment (BMC). The level of complexity depends of number of cell lineages involved in signalling processes and the number of parameters that describe biochemical changes in mechanotransduction of the signals. The bottom-line goal of the parameter's importance defines the appropriate model to be used. Two models will be discussed and presented in this paper in order to compare them and to underline the necessities of complex representations and simultaneous multi-parametric analysis. The first model comprises of the system of coupled ODEs with power-law nonlinearity terms that describe autocrine and paracrine signalling of the cell lineages inside BMU. The second contains the cooperative binding Hill`s equation terms that describe decoy-receptor linking processes of realised molecules inside BMC. The former is simpler and more elegant however still has a power to describe importance of involved process. The second model is more detailed and complex with an increased number of equations and of introduced parameters. In both models the multi-parametric analysis give the opportunity to decide, which one of the parameters is the more important depending of the purpose of the model. The models are explored in numerous numerical (in-silico) experiments also provide more possibilities for interpreting the development of interventions for possible bone trauma and diseases.