

Electronic Supplementary Material

Community effort endorsing multiscale modeling, multiscale data science and multiscale computing for systems medicine

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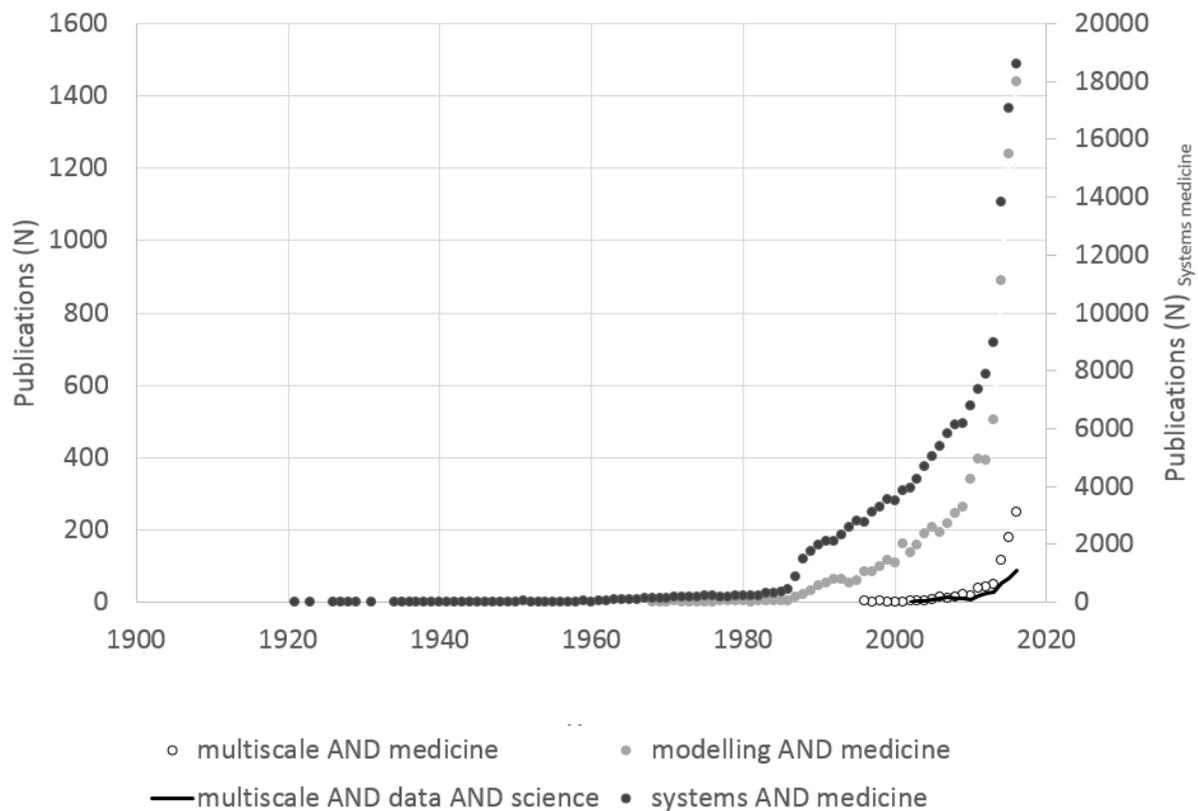


Figure S1: The exponential increase in the number of reports dealing with the four topics of this paper: “systems AND medicine”, “modelling AND medicine” next to “multiscale AND medicine” as observed from Medline NCBI keyword search (Accessed 07.10.2017). Please note the small scale of “multiscale AND data AND science”. See Table S1 for a list of reviews on the state of the art of multiscale modelling.

Table S1: A list of suggested reading on the state of the art of multiscale modelling

Cappuccio A, Tieri P, Castiglione F. Multiscale modelling in immunology: a review. *Brief Bioinform.* 2016 May;17(3):408-18. doi: 10.1093/bib/bbv012. Epub 2015 Mar 25. Review. PubMed PMID: 25810307.

Eberhardt M, Lai X, Tomar N, Gupta S, Schmeck B, Steinkasserer A, Schuler G, Vera J. Third-Kind Encounters in Biomedicine: Immunology Meets Mathematics and Informatics to Become Quantitative and Predictive. *Methods Mol Biol.* 2016;1386:135-79. doi: 10.1007/978-1-4939-3283-2_9. Review. PubMed PMID: 26677184.

Gietzelt M, Löprrich M, Karmen C, Knaup P, Ganzinger. Models and Data Sources Used in Systems Medicine. A Systematic Literature Review. *MMethods Inf Med.* (2016)

Kassab GS, An G, Sander EA, Miga MI, Guccione JM, Ji S, Vodovotz Y. Augmenting Surgery via Multi-scale Modeling and Translational Systems Biology in the Era of Precision Medicine: A Multidisciplinary Perspective. *Ann Biomed Eng.* 2016 Sep;44(9):2611-25. doi: 10.1007/s10439-016-1596-4. Epub 2016 Mar 25. Review. PubMed PMID: 27015816; PubMed Central PMCID: PMC4983470.

Lytton WW, Arle J, Bobashev G, Ji S, Klassen TL, Marmarelis VZ, Schwaber J, Sherif MA, Sanger TD. Multiscale modeling in the clinic: diseases of the brain and nervous system. *Brain Inform.* 2017 May 9. doi: 10.1007/s40708-017-0067-5. PubMed PMID: 28488252.

Mizeranschi A, Groen D, Borgdorff J, Hoekstra AG, Chopard B, Dubitzky W. Anatomy and Physiology of Multiscale Modeling and Simulation in Systems Medicine. *Methods Mol Biol.* 2016;1386:375-404. doi: 10.1007/978-1-4939-3283-2_17. Review. PubMed PMID: 26677192.

Motta S, Pappalardo F. Mathematical modeling of biological systems, *Briefings in Bioinformatics.* 2013; 14(4), 411–422, <https://doi.org/10.1093>

Verma M, Hontecillas R, Abedi V, Leber A, Tubau-Juni N, Philipson C, Carbo A, Bassaganya-Riera J. Modeling-Enabled Systems Nutritional Immunology. *Front Nutr.* 2016 16;3:5. doi: 10.3389/fnut.2016.00005. eCollection 2016. Review. PubMed PMID: 26909350; PubMed Central PMCID: PMC4754447.

Yankeelov TE, An G, Saut O, Luebeck EG, Popel AS, Ribba B, Vicini P, Zhou X, Weis JA, Ye K, Genin GM. Multi-scale Modeling in Clinical Oncology: Opportunities and Barriers to Success. *Ann Biomed Eng.* 2016 Sep;44(9):2626-41. Doi: 10.1007/s10439-016-1691-6. Epub 2016 Jul 6. Review. PubMed PMID: 27384942; PubMed Central PMCID: PMC4983505.