

PROMOTION RECOMMENDATION  
The University of Michigan  
School of Dentistry

Nan E. Hatch, associate professor of dentistry, with tenure, School of Dentistry, is recommended for promotion to professor of dentistry, with tenure, School of Dentistry.

Academic Degrees:

PhD	2005	University of Washington, Molecular and Cellular Biology
DMD	1999	Harvard School of Dental Medicine

Professional Record:

2015-present	Associate Professor, with tenure, Orthodontics and Pediatric Dentistry, School of Dentistry, University of Michigan
2008-2015	Assistant Professor, Orthodontics and Pediatric Dentistry, School of Dentistry, University of Michigan
2005-2008	Research Fellow, Orthodontics and Pediatric Dentistry, School of Dentistry, University of Michigan

Summary of Evaluation:

Teaching: Professor Hatch's teaching activities include classroom teaching for graduate orthodontic and pediatric dentistry residents and mentoring of undergraduates, pre-doctoral dental students, and graduate students. She has trained a diverse group of young scientists both in terms of gender and ethnicity. While in rank, she has served as a primary mentor or chair for eleven Masters of Science thesis candidate committees, and as a member for three. She has been an advisor for five dental students in the research pathway and one in the immersion pathway. She has been an advisor for two PhD candidate research projects, and she has hosted three post-doctoral trainees in her lab. Her students have excellent records of achievement reflected by numerous research presentation awards from the American Academy of Orthodontics and several publications. Professor Hatch has made substantial teaching contributions based on her unique philosophy of presenting information in a manner that encourages critical thinking and self-directed learning. She is valued for holding high standards for orthodontic residents and graduate students. She is the course director for Biology in Tooth Movement in the graduate orthodontics curriculum. She provides topical teaching within other courses to graduate orthodontic students on orthodontic biomechanics, as well as genetic and environmental influences that alter the patient response to orthodontic treatment. All of Professor Hatch's student and peer evaluations are uniformly positive. She is a very knowledgeable instructor in a range of subjects pertaining to orthodontic biomechanics, as well as genetic and environmental influences in orthodontic treatment. Her teaching efforts will continue to make an impact on the instruction of orthodontic residents and graduate students throughout her career.

Research: Professor Hatch's research focus is in the field of craniofacial skeletal development and craniosynostosis. She has successfully led a program that aims to better understand molecular mechanisms behind this disorder to develop drug interventions to eliminate or alleviate the severity of craniosynostosis. She has combined her expertise with other investigators at the School of Dentistry and successfully achieved a joint (Multi-PI) R01 level funding in 2018. Her collective efforts, while in rank, have led to 23 peer-reviewed publications in high-profile journals such as *Biomaterials* and the *Journal of Developmental Biology*. She is the corresponding author for 15 of those. Professor Hatch has been regularly invited to give seminars and presentations nationally and

internationally. She has been an invited speaker and has presented at several professional meetings at the University of Michigan and other esteemed institutions. In rank, Professor Hatch has had two grants funded by the National Institutes for Health (NIH) as the principal investigator or co-principal investigator, as well as two foundation grants and one MCubed grant.

#### Recent and Significant Publications

Swanson WB, Omi M, Zhang Z, Nam HK, Jung Y, Wang G, Ma PX, Hatch NE, Mishina Y.

Macropore design of tissue engineering scaffolds regulates mesenchymal stem cell differential fate. *Biomaterials*. 2021 May; 272:120769. PMID: PMC8068670.

Zhang, Z, Nam HK, Crouch S, Hatch NE. Tissue Nonspecific Alkaline Phosphatase Function in Bone and Muscle Progenitor Cells: Control of Mitochondrial Respiration and PTP. Production. *Int J Mol Sci*. 2021 Jan 24;22(3). PMID: PMC7865776.

Nam HK, Vesela I, Siismets E, Hatch NE. Tissue Nonspecific Alkaline Phosphatase Promotes Calvarial Progenitor Cell Cycle Progression and Cytokinesis via Erk1,2. *Bone*. 2019 Mar;120:125-136. PMID: PMC6360114.

Sydorak I, Dang M, Baxter SJ, Halcomb M, Ma P, Kapila S, Hatch N. Microsphere controlled drug delivery for local control of tooth movement. *Eur J Ortho*. 2019 Jan 23;41(1):1-8. PMID: PMC6343727.

Gupte MJ, Swanson WB, Hu J, Jin X, Ma H, Zhang Z, Liu Z, Feng K, Feng G, Xiao G, Hatch N, Mishina Y, Ma PX. Pore Size Directs Bone Marrow Stromal Cell Fate and Tissue Regeneration in Nanofibrous Macroporous Scaffolds by Mediating Vascularization. *Acta Biomater*. 2018 Dec 82;1-11. PMID: PMC6258662

Service: Professor Hatch contributes significantly to the school's service mission as the department chair as well as service to university, national, and international communities. She actively participates in professional organizations such as The American Society for Bone and Mineral Research, as a peer-reviewer for numerous high-profile scientific journals, and as a study section reviewer for the National Institutes of Health. She has served on the prestigious Skeletal Biology Development and Disease committee at the National Institutes of Health as an ad hoc member to provide dental, craniofacial skeletal development, and craniosynostosis expertise.

#### External Reviewers:

Reviewer A: "She has served as chair, advisor, or co-advisor for 50 graduate/dental student research projects with several of her mentees winning prestigious awards such as the Milo Henman Award, Thomas Graber Award, Charley Schultz Award to name a few. This clearly demonstrates the impact that Dr. Hatch's mentoring has had on her mentees and the quality of work that has been the outcome of resident/student research projects mentored by her. I don't know of any other Orthodontic faculty in the United States that has as many mentee awards as Dr. Hatch has. Furthermore, Dr. Hatch's mentees have gone on to exert a profound and sustained national impact in the fields of Craniofacial Biology and Orthodontics. Dr. Hatch is a very highly-rated educator internationally."

Reviewer B: "Prominently is her work in tissue regeneration and bone biology. Dr. Hatch occupies a unique niche as a clinician/scientist. There are few orthodontist/ bone scientists. This is perhaps why she has had very productive collaborations."

Reviewer C: "In my opinion, particularly outstanding are Dr. Hatch's investigations to demonstrate that differences in genetic backgrounds between different strains of mice with the same genetic mutations known to be associated with craniosynostosis, explain variable phenotype severity (Dudakovic et al. 2020, senior author: Dr. Hatch)."

Reviewer D: “She was instrumental in the identification and characterization of the molecular pathology underlying human disease-altering expression of proteins occurring in craniosynostosis and the role of the FGF signaling pathway in mineralized tissue development. She has continued this important and significant work through the analyses of knock out and transgenic mouse models of disease.”

Reviewer E: “I can see that publication record since 2015 has been continuous without any gap and with an average of three manuscripts/year. This is a high level of productivity for someone with major administrative and teaching responsibility. This record is an indication that she continues leading independent scientific projects even when facing challenges.”

Reviewer F: “Throughout her career, Dr. Hatch has produced rigorous, high quality and scholarly work published in international journals and is clearly on an upward trajectory with annual citations almost doubling since 2020... Among Dr. Hatch’s recent, most highly cited papers is a collaborative study (Gupte et al., 2018; 100 citations) describing how tunable scaffolds can control cell differentiation and direct stem cells towards ossification or chondrogenesis. This work is an excellent example of interdisciplinary, collaborative research and was funded by a joint RO1 award with Dr. Hatch as coPI.”

Reviewer G: “Dr. Hatch accepted the position of Chair of the Department of Orthodontics somewhat earlier than most, and from all accounts, she has done an excellent job as evidenced by her being reappointed chair for a second term. Balancing this more senior administrative position with managing a research laboratory and mentoring students, be they dental, masters, and PhD students as well as postdoctoral residents is no mean feat. Despite this early challenge, she has managed to maintain her research focus and the quality of her work.”

Summary of Recommendation:

Professor Hatch is a valuable asset to the School of Dentistry. She has demonstrated exceptional contributions to teaching, research, and service and she is recognized as an expert in her field. She is an accomplished dental clinical scientist, who is highly productive in research and scholarly contributions, while also being a leader to students and faculty in her department and at the School of Dentistry. It is with the support of the Executive Committee, that I recommend Nan E. Hatch for promotion to professor of dentistry, with tenure, School of Dentistry.



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Jan Hu  
Interim Dean, School of Dentistry

May 2023