

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering  
Department of Biomedical Engineering

Deepak Nagrath, associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering, is recommended for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2003	Rensselaer Polytechnic Institute, Chemical Engineering, Troy, NY
M.S.	2000	Rensselaer Polytechnic Institute, Applied Mathematics, Troy, NY
B.E.	1992	Indian Institute of Technology Roorkee, Chemical Engineering, Roorkee, India

Professional Record:

2018 – present	Associate Professor (without tenure), Chemical Engineering, University of Michigan.
2017 – present	Associate Professor (with tenure), Department of Biomedical Engineering, University of Michigan.
2009 – 2016	Assistant Professor, Chemical and Biomolecular Engineering, Rice University, Houston, TX
2009 – 2016	Assistant Professor, Bioengineering, Rice University, Houston, TX

Summary of Evaluation:

Teaching: Professor Nagrath's contributions to teaching include classroom instruction at the undergraduate, graduate, and postdoctoral levels. Professor Nagrath has graduated seven Ph.D. students and has another nine in progress, with two expected to graduate this year. Examining his role as a mentor, Professor Nagrath has been very active in ensuring a high success rate for his mentees. His excellence in classroom instruction and mentorship can be seen through his students' awards. One student has been awarded an NSF Graduate Research Fellowship and another was awarded the eLife Early Career Researcher Travel Grant.

Research: Professor Nagrath's group is focused on cancer metabolism and distinctively developing metabolic and nutritional systems biology approaches in cancer and liver diseases. His lab is focused on investigating the critical metabolic regulators of cancer metastasis, investigating if tumor microenvironment (TME) plays a role in modulating cancer cell metabolism and discovering the metabolic adaptations that precede liver failure. Professor Nagrath and his lab, through their research, have established novel protocols for stable-isotope tracer-based MS. This data is used with his lab's stable isotope-based flux analysis algorithms specifically designed for multicellular metabolic models to quantify metabolic interactions among different tumor regions. His lab has recently made several important contributions to answer how TME metabolically regulates cancer cells. These findings were published in *Nature Metabolism*, *Cell Metabolism*, *Nature*, *eLife*, *Cancer Research*, and *Metabolic Engineering* and have resulted in six funded R01s on which Professor Nagrath is the PI. He is also a co-PI in a clinical trial funded by Rafael Therapeutics and several co-I grants which includes NIH R01 and the Ben and Catherine Ivy Foundation. Professor Nagrath has

published over 55 papers since coming to UM, served as editor for one book, and authored three chapters in separate books.

#### Recent and Significant Publications:

- Z. Zhu, A. Achreja, N. Meurs, O. Animasahun, S. Owen, A. Mittal, P. Parikh, T. Lo, J. Franco-Barraza, J. Shi, V. Gunchick, M. Sherman, E. Cukierman, A. Pickering, A. Maitra, V. Sahai, M. Morgan, S. Nagrath, T. Lawrence, D. Nagrath, "Tumour-reprogrammed stromal BCAT1 fuels branched-chain ketoacid dependency in stromal-rich PDAC tumours," *Nature Metabolism*. 2020 Aug;2(8):775-792.
- P. Dey, J. Baddour, F. Muller, C. Wu, H. Wang, W. Liao, Z. Lan, A. Chen, T. Gutschner, Y. Kang, J. Fleming, N. Satani, D. Zhao, A. Achreja, L. Yang, J. Lee, E. Chang, G. Genovese, A. Viale, H. Ying, G. Draetta, A. Maitra, A. Wang, D. Nagrath, R. DePinho, "Genomic deletion of malic enzyme 2 confers collateral lethality in pancreatic cancer." *Nature (London)*, vol. 542, no. 7639, England: *Nature Publishing Group*. 2017; pp. 119–23.
- H. Zhao, L. Yang, J. Baddour, A. Achreja, V. Bernard, T. Moss, J. Marini, T. Tudawe, E. Seviour, F. San Lucas, H. Alvarez, S. Gupta, S. Maiti, L. Cooper, D. Peehl, P. Ram, A. Maitra, D. Nagrath, "Tumor microenvironment derived exosomes pleiotropically modulate cancer cell metabolism," *Elife*. 2016 Feb 27;5:e10250.
- L. Yang, A. Achreja, T. Yeung, L. Mangala, D. Jiang, C. Han, J. Baddour, J. Marini, J. Ni, R. Nakahara, S. Wahlig, L. Chiba, S. Kim, J. Morse, S. Pradeep, A. Nagaraja, M. Haemmerle, N. Kyunghee, M. Derichsweiler, T. Plackemeier, I. Mercado-Uribe, G. Lopez-Berestein, T. Moss, P. Ram, J. Liu, X. Lu, S. Mok, A. Sood, D. Nagrath, "Targeting Stromal Glutamine Synthetase in Tumors Disrupts Tumor Microenvironment-Regulated Cancer Cell Growth," *Cell Metab*. 2016 Nov 8;24(5):685-700.
- L. Yang, T. Moss, L. Mangala, J. Marini, H. Zhao, S. Wahlig, G. Armaiz-Pena, D. Jiang, A. Achreja, J. Win, R. Roopaimoole, C. Rodriguez-Aguayo, I. Mercado-Uribe, G. Lopez-Berestein, J. Liu, T. Tsukamoto, A. Sood, P. Ram, D. Nagrath, "Metabolic shifts toward glutamine regulate tumor growth, invasion and bioenergetics in ovarian cancer," *Molecular Systems Biology*. 2014 May 5;10(5):728.

Service: Professor Nagrath has been the systems biology and biotechnology concentration advisor in his department for the last five years. At the same time, he has been a member of the GEC and faculty recruitment committee. Professor Nagrath has also served in the department's ABET team for renewal of ABET certification. Outside BME, he is a member of the Rogel Cancer Center (RCC) and Biointerface Institute (BI) and participates in their research planning and monthly research meetings. Within this, he was an organizing member of "KRAS and Upstream and Downstream Factors-Cancer Pathogenesis and Therapeutic Targeting" meeting at RCC and an organizing committee member for the workshop "Diabetes and its Complications Challenge" at BI.

#### External Reviewers:

Reviewer A: "He clearly has demonstrated his ability to sustain a top-notch research program, to excel as a teacher and mentor, to be a sought-after collaborator, and to provide effective leadership to his professional community."

Reviewer B: "Beyond his published work, Professor Nagrath demonstrates an impeccable and extremely impressive record of past and current research support from competitive funding organizations. This is too, a strong measure of his original thinking and his ability to synthesize different technologies that enable him to take on essential scientific challenges."

Reviewer C: “Taken together, I believe that Professor Nagrath has achieved an international reputation for research excellence, is an excellent teacher for students, and has been actively engaged in service both at the University and in the community at large.”

Reviewer D: “His is one of the few groups that have been able to make quantitative metabolic flux measurements of tumors, and his work stands out for contributions to regarding how the tumor microenvironment metabolically regulates cancer cells.”

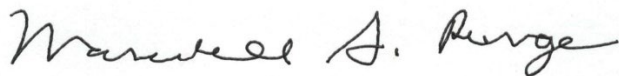
Reviewer E: “By all measures, Deepak is an effective and passionate educator. He has won numerous teaching awards when he was at Rice University and his evaluation scores at Michigan indicate that he continues to be an outstanding educator.”

Summary of Recommendation: Professor Nagrath’s research productivity has been excellent, he has demonstrated dedication to excellence in teaching, and he is actively engaged in service to the University and to his profession. It is with the support of the College of Engineering Executive Committee that we recommend Deepak Nagrath for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.



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Alec D. Gallimore, Ph.D.  
Robert J. Vlasic Dean of Engineering  
College of Engineering



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Marschall S. Runge, M.D., Ph.D.  
Executive Vice President for Medical Affairs  
Dean, Medical School

May 2023