

Elucidating the role of circulating nutrients that fuel tumor growth

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Joshua D. Rabinowitz, MD, PhD (left) and Eileen P. White, PhD. Credit: Rutgers Cancer Institute of New Jersey

Tumors acquire nutrition necessary for generating energy and building blocks for growth and survival from the body of the patient in which they reside. Although these nutrients are predominantly provided by the circulating blood supply, our understanding of what these nutrients are and how they are used by tumors is incomplete. Identifying tumor nutrients and how they are used may reveal novel approaches to cancer therapy. Research from investigators at Rutgers Cancer Institute of New Jersey and Princeton University surprisingly finds that circulating lactate rather than glucose is the prominent metabolic fuel source for tumors and most normal tissues. Circulating lactate is used to produce energy, freeing up glucose to support other metabolic functions important for tumor growth.

Rutgers Cancer Institute of New Jersey members Eileen P. White, Yanxiang (Jessie) Guo, and Joshua D. Rabinowitz published these findings in the October 18 edition of *Nature*. They share more about the research, which they say forms the basis for defining and targeting [tumor](#) metabolism for [cancer therapy](#):

Q: Why is this topic important to explore?

A: Much of what we know about [nutrient](#) usage in [cancer](#) derives from examination of cancer cells growing in laboratory culture with artificial media, which may not represent the authentic nutrition that tumors rely on normally provided by the circulating blood supply. Although technically challenging, we chose to determine the nutrient usage by tumors rather than tumor cells in artificial media. We were surprised to find that [lactate](#), normally considered a waste product of metabolism, was a major nutrient source for several types of aggressive tumors. We also learned that this circulating lactate was used by tumors to produce the energy important for growth.

Q: How did your team approach the work and what did you learn?

A: Using genetically engineered lung and pancreatic cancer tumors in mouse models and mass spectrometry, we and our collaborators examined nutrient usage by tumors and also normal tissues. We found that circulating lactate, rather than glucose, is the major source of TCA cycle carbon and thus energy, an unexpected finding based on previous examination of nutrients used by cultured cancer cells.

Q: What is the implication of this finding?

A: Knowing the nutrients that fuel [tumor growth](#) is a first step to targeting cancer metabolism. Cancer is a metabolic disease and there is great potential to exploit this for cancer therapy. It is clear that studying the metabolism of tumors rather than isolated tumor cells in artificial media can uncover novel, physiologically relevant metabolic vulnerabilities potentially targetable for cancer therapy.

More information: Sheng Hui et al. Glucose feeds the TCA cycle via circulating lactate, *Nature* (2017). [DOI: 10.1038/nature24057](https://doi.org/10.1038/nature24057)

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