



# Serum Lactate Levels are Associated with Glioma Malignancy Grade

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To the Editor

We have read with great interest the study by Branco et al. about the “Serum lactate levels are associated with glioma malignancy grade” (1). Malignant gliomas are the most common and most lethal of the primary tumors of central nervous system; these tumors result in progressive and severe disability prior to death (2). The results reported by Branco et al. provide critical reference values that will permit us to predict the malignancy grade of gliomas using serum lactate levels as a simple and readily available biomarker. To a certain extent, these findings may also provide a reference for the development of appropriate surgical protocols. However, several questions remain that require significant additional consideration. First, the authors report correlations between tumor grade (high vs. low) and lactic acid levels from arterial blood gas samples sampled immediately after the induction of anesthesia. We would be interested to know whether these findings permit the authors to reach any conclusions regarding lactic acid levels and the nature and specific type of malignancy. Likewise, the authors did not mention whether patients with diabetes and/or chronic lung disease (e.g., bronchial asthma, chronic obstructive pulmonary disease, and/or pulmonary fibrosis) met the inclusion criteria. If these

patients were included, was any effort made to adjust for the impact of these conditions on lactic acid levels? The subtypes of glioma and sites of tumor growth should also receive some attention in future research on this subject; if the authors have these data available, a subgroup analysis might be performed. Similarly, it will be important to determine whether lactic acid concentrations in arterial blood vs. those in venous blood are most suitable for analysis; we also cannot ignore the influence of different blood sampling sites and time elapsed between sampling and evaluation of the specimens. We are very grateful to Branco et al. for their research and we hope that the authors will be able to extend their findings in order to respond to some of the points that we have raised.

## REFERENCES

1. Branco M, Linhares P, Bruno C, Santos P, Costa BM, Vaz R: Serum lactate levels are associated with glioma malignancy grade. *Clin Neurol Neurosurg* 186:105546, 2019
2. Wang W, Shi G, Ma BB, Hao XC, Dong X, Zhang B: Chemotherapy for adults with malignant glioma: A systematic review and network meta-analysis. *Turk Neurosurg* 27(2):174-181, 2017