

<https://doi.org/10.7124/bc.000B93>

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LOX AND PLOD2 AS POTENTIAL MARKERS OF PROSTATE CANCER METASTASIS

Background. Prostate cancer (PCa) is a leading cause of cancer incidence and mortality among men both in Ukraine and worldwide. Despite significant diagnostic and therapeutic advances, managing metastasis remains a major clinical challenge. A key mechanism driving this tumor progression and metastatic development is extracellular matrix remodeling. The enzymes involved in the post-translational modification of collagen, particularly lysyl oxidase (LOX) and procollagen-lysine,2-oxoglutarate 5-dioxygenase 2 (PLOD2), play an important role in these processes by promoting the formation of covalent collagen cross-links, increasing extracellular matrix stiffness, and creating favorable conditions for tumor cell invasion and dissemination. The aim of the study is to investigate the expression patterns of LOX and PLOD2 in PCa tissue and determine their association with the risk of metastasis. **Materials and Methods.** The study was performed on clinical specimens obtained from 40 patients with PCa who underwent treatment at the National Cancer Institute (Kyiv, Ukraine) between 2021 and 2024. Immunohistochemical evaluation of the LOX and PLOD2 expression was performed using the corresponding monoclonal antibodies. The LOX and PLOD2 mRNA expression levels were determined by qRT-PCR. Statistical analysis was performed using GraphPad Prism v.10. **Results.** The mean protein expression levels of LOX and PLOD2 in PCa tissue were 108.1 ± 11.4 and 135.2 ± 13.6 H-score points, respectively. It was found that the LOX expression in tumor tissue of the patients with metastases was 2.3-fold higher ($p < 0.05$), while the PLOD2 expression was 1.9-fold higher ($p < 0.05$), compared with the patients without distant metastases. The mean LOX mRNA level in PCa tissue was 0.68 ± 0.08 r.u., ranging from 0.12 to 2.70 r.u., whereas the mean PLOD2 mRNA level was 0.13 ± 0.05 r.u., ranging from 0.02 to 1.55 r.u. No association was found between LOX or PLOD2 mRNA expression levels and the presence of metastases in patients with PCa. **Conclusions.** Increased protein expression of LOX and PLOD2 is associated with the presence of metastases in patients with PCa. These findings suggest that LOX and PLOD2 may be considered promising protein biomarkers of aggressive PCa behavior and potential contributors to the development of the metastatic phenotype. **Funding.** This study was supported by the Grants of the President of Ukraine for the Support of Research and Development of Young Scientists (Decree of the President of Ukraine No. 130/2025-pn) entitled "Molecular and biological characteristics of prostate cancer with high metastatic potential" (0126U003608).

Keywords: prostate cancer, extracellular matrix, collagen.

Received: 08.06.2026; Accepted: 08.09.2026; Published: 29.09.2026

Citation: Steniakina N.A., Suslova S.I., Burda T.S., Pavlova A.O., Zadvornyi T.V. (2026) LOX and PLOD2 as potential markers of prostate cancer metastasis. *Biopolymers & Cell*, Special issue(42), 88. <https://doi.org/10.7124/bc.000B93>

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