

# THE INFLUENCE OF EXTRACORPOREAL SHOCK WAVE LITHOTRIpsy ON THE QUANTITY OF B2-MICROGLOBULIN IN PATIENTS WITH URINE STONE DISEASE AND CHRONIC PYELONEPHRITIS

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**Introduction:** In recent years, Beta-2 microglobulin (B2M) has attracted special interest. This compound consists of a single polypeptide chain containing 100 amino acid residues. Most cells of living organisms, including blood cells (except erythrocytes), carry B2M on their membrane [1]. Increased levels of B2M in blood serum are observed in oncological diseases, inflammatory processes, as well as in renal tubular dysfunction and acute pyelonephritis exacerbation [2-7]. Elevated levels of B2M can also be observed in arterial hypertension (AH) [5]. Recent studies indicate that there is even a moderate positive correlation between increased B2M levels and cardiovascular diseases and mortality [5]. Urolithiasis (UL) and chronic pyelonephritis (CP) are relatively common pathologies of the urinary system. They can occur separately or concurrently, aggravating each other. Extracorporeal shock wave lithotripsy (ESWL) is one of the treatment methods for UL. There is evidence that one of the most frequent complications of ESWL is exacerbation of CP, which, in some cases, may manifest with mild clinical symptoms [6-10]. Therefore, it may be considered to determine the level of B2M before performing ESWL as a prognostic factor for pyelonephritis exacerbation.

**Aim:** To study changes in the blood serum levels of Beta-2 microglobulin (B2M) in patients with urolithiasis and chronic pyelonephritis undergoing extracorporeal shock wave lithotripsy (ESWL).

**Materials and Methods:** A total of 30 patients with urolithiasis and chronic pyelonephritis, accompanied by chronic kidney disease (CKD) stage I-II without chronic renal insufficiency (CRI), were examined at the Nephrology Department of Dniprovska City Clinical Hospital No. 4, Dnipro, Ukraine. The age of the patients ranged from 30 to 75 years, with a mean age of 55.3 (5.5) years. An essential requirement for the study was the presence of urolithiasis and chronic pyelonephritis in patients in a non-exacerbation stage. All patients underwent radiological examination of the kidneys before extracorporeal shock wave lithotripsy (ESWL) and ultrasound examination before and after ESWL. All patients were hospitalized and examined according to the clinical guidelines 00226 of the Ministry of Health of Ukraine (2017).[11] Blood samples for B2M measurement were taken in the morning,

immediately after waking up. A repeated measurement was conducted under the same conditions 24 hours after ESWL. The normal range for B2M levels was considered to be 0.5-3 mg/L.

**Results and discussion.**

The study of B2M levels 24 hours after ESWL showed that the number of patients with normal B2M levels before the procedure decreased to 12 (40%), while the number of patients with elevated B2M levels increased to 18 (60%). The results are presented in Table 1.

**Table 1**

	Before ESWL n=30(100%)	After ESWL n=30(100%)
Normal level of B2-microglobulins	n=22 (73,3)	n=12 (40%)
Increased level of B2-microglobulins	n=8 (26,7)	n=18 (60%)

As can be seen from Table 1, the total number of patients with normal B2-microglobulin content decreased by a third after the DUHL session. At the same time, among patients with an elevated level of B2-microglobulin, there is an increase in patients by 33.3%.

These findings indicate that ESWL may have an impact on B2M levels in patients with urolithiasis and chronic pyelonephritis. The increase in B2M levels after ESWL suggests a potential aggravation of pyelonephritis, because B2-microglobulin is one of the markers of renal parenchyma damage [6,7] It is important to note that the majority of patients in this study experienced an elevation in B2M levels, which emphasizes the need for careful monitoring and appropriate management during and after ESWL procedures.

These findings highlight the potential value of monitoring B2M levels as an additional tool in the evaluation and management of patients with urolithiasis and chronic pyelonephritis undergoing ESWL. Further research is needed to confirm these observations and establish the precise clinical implications of B2M in the context of ESWL treatment.

**Conclusion:**

1. The results of the conducted research indicate that in addition to conventional methods, the assessment of Beta-2 microglobulin (B2M) levels can be considered when determining indications for extracorporeal shock wave lithotripsy (ESWL). B2M levels can serve as prognostic markers for preventing exacerbation of chronic pyelonephritis.

2. The levels of B2M in the blood of patients undergoing ESWL before and after the procedure differ. Changes in B2M levels may indicate kidney parenchymal damage.

### References

1. Li, L., Dong, M., & Wang, X. G. (2016). The Implication and Significance of Beta 2 Microglobulin: A Conservative Multifunctional Regulator. *Chinese medical journal*, 129(4), 448–455. <https://doi.org/10.4103/0366-6999.176084>
2. Zhang, B., Chen, X., Mu, X., Liu, E., Liu, T., Xu, G., Bao, Q., & Li, G. (2021). Serum Beta-2 Microglobulin: A Possible Biomarker for Atrial Fibrillation. *Medical science monitor : international medical journal of experimental and clinical research*, 27, e932813. <https://doi.org/10.12659/MSM.932813>
3. Forman D. T. (1982). Beta-2 microglobulin--an immunogenetic marker of inflammatory and malignant origin. *Annals of clinical and laboratory science*, 12(6), 447–452.
4. Nomura, T., Huang, W. C., Zhau, H. E., Josson, S., Mimata, H., & Chung, L. W. (2014).  $\beta$ 2-Microglobulin-mediated signaling as a target for cancer therapy. *Anti-cancer agents in medicinal chemistry*, 14(3), 343–352. <https://doi.org/10.2174/18715206113139990092>
5. Shi, F., Sun, L., & Kaptoge, S. (2021). Association of beta-2-microglobulin and cardiovascular events and mortality: A systematic review and meta-analysis. *Atherosclerosis*, 320, 70–78. <https://doi.org/10.1016/j.atherosclerosis.2021.01.018>
6. Sedighi, O., Abediankenari, S., & Omranifar, B. (2014). Association between plasma Beta-2 microglobulin level and cardiac performance in patients with chronic kidney disease. *Nephro-urology monthly*, 7(1), e23563. <https://doi.org/10.5812/numonthly.23563>
7. Argyropoulos, C. P., Chen, S. S., Ng, Y. H., Roumelioti, M. E., Shaffi, K., Singh, P. P., & Tzamaloukas, A. H. (2017). Rediscovering Beta-2 Microglobulin As a Biomarker across the Spectrum of Kidney Diseases. *Frontiers in medicine*, 4, 73. <https://doi.org/10.3389/fmed.2017.00073>
8. Sedighi, O., Abediankenari, S., & Omranifar, B. (2014). Association between plasma Beta-2 microglobulin level and cardiac performance in patients with chronic kidney disease. *Nephro-urology monthly*, 7(1), e23563. <https://doi.org/10.5812/numonthly.23563>
9. Ciccacese, F., Brandi, N., Corcioni, B., Golfieri, R., & Gaudiano, C. (2021). Complicated pyelonephritis associated with chronic renal stone disease. *La Radiologia medica*, 126(4), 505–516. <https://doi.org/10.1007/s11547-020-01315-7>
10. Pereira-Arias, J. G., Gamarra-Quintanilla, M., Urdaneta-Salegui, L. F., Mora-Christian, J. A., Sánchez-Vazquez, A., Astobieta-Odrizola, A., & Ibarluzea-González, G. (2017). Estado actual de la litotricia extracorpórea por ondas de choque en la litíasis urinaria [Current status of extracorporeal shock wave lithotripsy in urinary lithiasis.]. *Archivos españoles de urología*, 70(2), 263–287.
11. Kaartinen K. (2017). Guideline 00226. Treatment of chronic kidney disease. *DUODECIM Medical Publications, Ltd.* 1-11. <https://guidelines.moz.gov.ua/documents/3114>