МЕДИЦИНСКИ УНИВЕРСИТЕТ - ВАРНА
„Проф. д-р Параскев Стоянов“
Ул.“Марин Дринов“ 55, Варна 9002, България
Тел. : 052/ 65 00 57, Факс: 052/ 65 00 19
e-mail: uni@mu-varna.bg, www.mu-varna.bg

MEDICAL UNIVERSITY - VARNA
“Prof. Dr. Paraskev Stoyanov”
55, Marin Drinov Str., 9002 Varna, Bulgaria
Tel.: +359 52/ 65 00 57, Fax: + 359 52/ 65 00 19
e-mail: uni@mu-varna.bg, www.mu-varna.bg

Fund “Nauka” Project № 22002 Resume – Competition-Based Session 2022:

“Bone health and fracture risk in men according to their androgen status”

Project leader: Assoc. prof. Mira Valentinova Siderova, MD, PhD

The aim of this research study is to look for correlations between outcomes that provide information on androgen status (male sex hormone levels) among men and their impact on bone density and future fracture risk. Respectively, the impact of prostate cancer as a current socially significant disease and the influence of therapeutic approaches on patients’ bone health will be investigated.

The research **tasks** include:

1. Assessment and analysis of the patient’s androgen status, according to the patient’s physical status and relevant laboratory hormonal tests;
2. Assessment of bone density, using generally accepted imaging methods;
3. Measurement of bone metabolic status, using appropriate laboratory bone markers;
4. Collection of retrospective lifestyle and dietary information, using relevant validated questionnaires;
5. Determination of the nature and relationships between the parameters studied and their impact on the fracture risk.

The subjects of the study are patients with prostate cancer who are cured with androgen deprivation therapy (with levels of male sex hormones comparable to that after castration) and a control group, patients not taking medications affecting androgen levels.

In the course of the project, the following established **methods** and technologies will be used:

1. History and physical status, giving information about risk factors associated with fractures, as well as signs of hypogonadism;
2. Laboratory tests – hormone analysis, markers of bone metabolism, prostate specific antigen, etc.;
3. Imaging methods – osteodensitometry;
4. Statistical analysis and graphical presentation of results.

Expected results: to obtain data on male sex hormone levels among different groups of patients and their correlation with bone strength and future fracture risk.

Androgen deprivation therapy (ADT) is a cornerstone in the treatment of advanced and high-risk prostate cancer and has been shown to significantly improve survival outcomes. However, profound suppression of androgen production is accompanied by substantial systemic adverse effects, most notably cardiometabolic disturbances and deterioration of skeletal integrity. As the number of patients receiving ADT continues to increase, these

complications are becoming increasingly important determinants of morbidity and quality of life.

Men undergoing ADT develop rapid and clinically significant alterations in body composition, including increased fat mass, sarcopenia, and impaired glucose metabolism. These changes markedly elevate the risk of metabolic syndrome, type 2 diabetes mellitus, and cardiovascular disease. Compared with age-matched controls and prostate cancer patients not receiving hormonal therapy, men treated with ADT exhibit a substantially less favorable cardiometabolic profile.

In this context, the assessment of serum markers such as fasting plasma glucose and fasting insulin, as well as the performance of a standardized oral glucose tolerance test (OGTT), is of particular clinical relevance. Evaluation of fasting glucose alone may underestimate early disturbances in glucose homeostasis, especially in the presence of compensatory hyperinsulinemia. Measurement of fasting insulin enables earlier identification of insulin resistance, while OGTT provides a dynamic assessment of postprandial glucose utilization and facilitates the detection of impaired glucose tolerance or overt diabetes mellitus. Evidence suggests that insulin resistance may develop within months following the initiation of ADT.

Androgen deprivation is also associated with accelerated bone loss, averaging approximately 3–5% during the first year of therapy, and with a significantly increased risk of osteoporotic fractures. Metabolic abnormalities further compromise bone health through impaired remodeling, deterioration of bone microarchitecture, and chronic inflammation that promotes bone resorption. Insulin exerts anabolic effects on bone tissue, whereas insulin resistance and hyperglycemia inhibit osteoblast activity. The coexistence of sarcopenia and an increased risk of falls substantially amplifies the likelihood of fractures and their associated consequences.

In conclusion, patients receiving androgen deprivation therapy represent a high-risk population in whom cardiometabolic abnormalities and skeletal integrity are closely interconnected. Routine assessment of fasting plasma glucose and insulin, together with the use of OGTT, is essential for the early detection of metabolic disturbances and the timely implementation of targeted interventions. A multidisciplinary approach is required to optimize long-term outcomes in men with prostate cancer.