



Կենսաբանական  
ԿՈԼՈՔՎԻՈՒՄ -2-

Հինգշաբթի | 14 հունիսի 2022 | 15:00  
ՔԵՆԴԼ սինքրոտրոնային հետազոտությունների ինստիտուտ

## Գոհար Ցականովա

ՀՀ ԳԱԱ Մոլեկուլային կենսաբանության ինստիտուտ  
ՔԵՆԴԼ սինքրոտրոնային հետազոտությունների ինստիտուտ

Ելույթի թեման`

**Գերկարճ իմպուլսներով լազերային  
տեխնոլոգիաների կիրառությունը  
կենսաբժշկության մեջ**

# **Biomedical applications of ultrashort pulsed laser technologies**

Nowadays, there is a raising interest in ultrafast lasers applications in a broad range of fields, including accelerator technology, medicine, biology and imaging. Particularly, ultrashort laser pulses can be used in the technology of two photon laser scanning microscopy and generation of ultrashort electron pulses in laser driven radio-frequency gun. It is assumed that accelerators of this type can make a revolution in radiation therapy of tumors by delivering an ultrashort low energy electron pulses. In our studies, using two photon microscopy technique, we demonstrated a novel approach for the investigation of oxidative stress in human living red blood cells (RBCs) that could efficiently be applied in clinical research and testing of antioxidant compounds. We showed that two-photon laser scanning imaging is a valuable tool for studying oxidative stress in living RBCs not only under oxidative stress related different pathological conditions, including aging and radiation exposure on the organism, but also in the studies of the effects of different natural or chemically synthesized compounds. Regarding the application of laser-driven ultrashort electron pulses, currently we study their biological effect on the whole body rat irradiation to understand the effect of ultrashort pulsed electron beam on the organism, which will serve as a good basis for future cancer treatment studies. Overall first results indicate that the LD50 for electron beam whole body rat irradiation is 2 Gy with 2 Hz repetition rate, which we used for the main experiments to maintain the optimal survival rate. After the whole body rat irradiation by the low energy ultrashort-pulsed electron beam, pathological processes in animals' immune system increase up to the 3rd day, and the processes of recovery start from the 7th day of exposure continuing up to 14th and 28th days, demonstrating partial recovery of immune system in shorter period than in case of irradiation with X-rays or gammarays. During the colloquium we will discuss not only our studies on the biological applications of ultrashort pulsed laser technologies but also other studies in this field conducted by groups both from Armenia and worldwide.