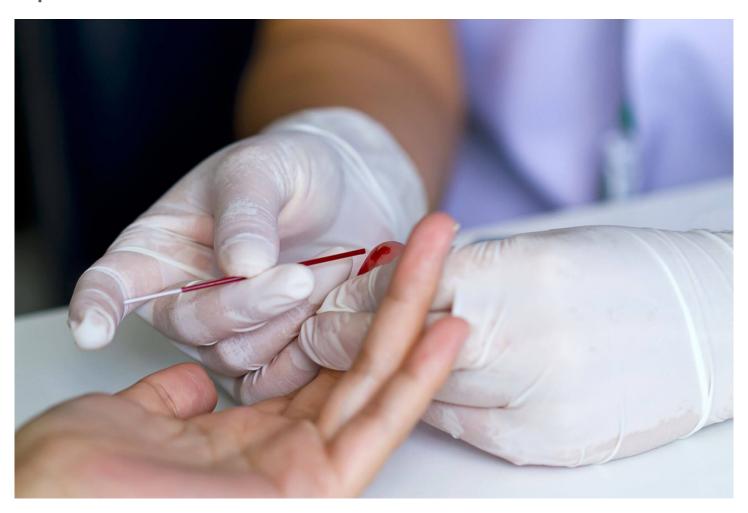**Saint Petersburg chemists learned to diagnose kidney diseases using improvised means**

Chemists from three leading Saint Petersburg universities (Saint Petersburg State University, Polytechnic University, and ITMO University) developed a method of diagnosing kidney diseases with the help of improvised means: a juice box, a piece of a CD, and a smartphone.

This was told to TASS by the SPbU press service. "The method allows fast and reliable testing body fluids for creatinine (a breakdown product of protein metabolism in muscle – TASS comment); its accumulation indicates kidney pathology. The scientists think that their method could be very useful to doctors, working in remote corners of the planet, where it is not always possible to promptly run tests required for diagnosis," – the press service explained. Normally, creatinine is fully removed from the body but can accumulate in the case of some kidney pathology. Therefore, indicators of creatinine level in urine or blood is an important clinical biomarker, used to estimate muscle metabolism and diagnose various kidney diseases. Improvised diagnosing: a juice box acts as a lightproof case, a piece of a CD serves as a diffraction grid (streaked surface helps it), a smartphone is needed to make a photograph of the resulting spectrum. A reagent – picric acid - is also required (it is available in pharmacies).

The scientists explained that the principle of the device operation is quite simple: a sample of urine or blood is poured into a transparent container and then picric acid is added, which forms brightly colored complexes with creatinine. A narrow slit is cut in the juice box, the piece of a CD

and the smartphone are put into it. Then the sample is placed against the slit and illuminated with an ordinary glow lamp, for example. The light, going through the sample and falling on the CD, creates a rainbow-like an image on the walls of the juice box. This image is photographed with the smartphone and processed using an ordinary PC.

The scientists discovered that there is a direct dependence between the length of spectral lines and the intensity of the sample's coloring by the picric acid, which is directly connected with the creatinine concentration. The operation takes several hours along with making the device. The device is quite accurate, relative errors of detecting creatinine are less than 10%. This is enough for primary diagnosing and understanding the true dimension of the problem.

The leader of the project is SPbU postdoctoral researcher Bruno Debus, a graduate of Lille University (France), he works at the Laboratory of Chemical Sensors in SPbU under the guidance of Andrey Legin and Dmitriy Kirsanov. The work is done in cooperation with the scientists from Saint. Petersburg Polytechnic University and ITMO University. TASS