

MEDICATIONS USED IN DOPING AND METHODS FOR ITS DETERMINATION

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The aim of our study was the review of medications, which were used as doping and determination methods.

Doping – substances of different pharmacological groups, both natural and synthetic origin, used in sport for achieving best results. Such substances could extremely raise activity of nervous and endocrine system and muscular strength for a short time. Nowadays the number of doping drugs varies from 400 to 11004. The usage of such medicines can cause serious side-effects of healthy person and unexpected fatal outcome. Thus, most doping medications were prohibited by World Antidoping Agency (WADA) and Medical Commission of the International Olympic Committee (IOC). But doping drugs were also popular in amateur sport. The list of prohibited medications and doping methods of WADA contents such groups of preparations: stimulants (amphetamine, ephedrine), anabolic steroids (synthetic derivate of testosterone), actoprotector (bromantan), beta-agonists (salbutamol, salmeterol), peptide hormones (erythropoietin, insulin), psychotropic drugs, cannabinoides, narcotic analgetics (morphine, opiate), antiestrogen drugs (clomiphene, cyclophenil), diuretics (furosemide, acetazolamide) and other. Vitamins, antioxidants, antihypoxants, nootropic and adaptogenic were permitted preparations.

For rapid, accurate and effective determination of medicines and its metabolites in blood and urine samples gas (GC), gas-liquid (GLC), liquid (LC), high-performance liquid chromatography (HPLC), isoelectric focusing (IEF), mass-spectrometry (MS), isotope ratio mass spectrometry (IRMS) and combination (LS-MS, HPLC-MS and other) of this methods were used. The most widely applicable were combined methods. A preliminary isolation of substances from biological samples by solid-phase and liquid-phase extraction spends before the analysis. Chromatographic methods allow separating a mixture of substances, and mass spectrometry was used for determination structure of its compounds. Proteins (erythropoietin) can be determined by GC-MS. LC-MS was often used for analysis of diuretic substances, some anabolic steroids and corticosteroids. The analysis should be carried out in the presence of a standard sample. However, chromatographic methods do not allow to distinguish endogenous testosterone between injected from the outside. In such situations isotope ratio mass spectrometry or carbon isotope ratio method used.