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Chromato-Mass Spectrometry Chromatek-Crystal 5000 in the Study of the Hormone Progesterone

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Abstract: An increase in the separation selectivity and a decrease in the limits of detection was studied on a model mixture of natural hormones similar in chemical structure, progesterone, used as drugs.

Keywords: separation selectivity, natural chemical structure, progesterone hormones, drugs, automatic dispensers.

Introduction

Hormones are known to be specific regulators biochemical processes in the body, ensuring their flow on relatively stable level[1]. Hormones of clinical importance in reproductive endocrinology are found in serum at concentrations calculated as pg and ng/ml. Diagnosis of diseases associated with impaired synthesis and metabolism of steroid hormones in endocrinology, gynecology and oncology is unthinkable today without determining the content of hormones in the body [2]. In addition, the quantitative determination of natural hormones is necessary in forensic forensics, in environmental objects [3-6].

Currently, mass spectrometry (GC/MS) remains the main method of screening biological fluids for the content of anabolic steroids. After extraction from the biological matrix, anabolic steroids are derivatized with the formation of trimethylsilyl derivatives, which are determined using the GC/MS method using quadrupole mass spectrometers in selective ion detection mode. When using this approach, the limit of detection is about 2–10 ng/ml depending on the compound [7], which is reflected in the requirements of the World Anti-Doping Agency for detection limits and demonstrated by a number of examples [8-14].

Methods and results

Increasing separation selectivity and lowering detection limits studied on a model mixture of natural hormones similar in chemical structure progesterone used as drugs.

Fig-1.

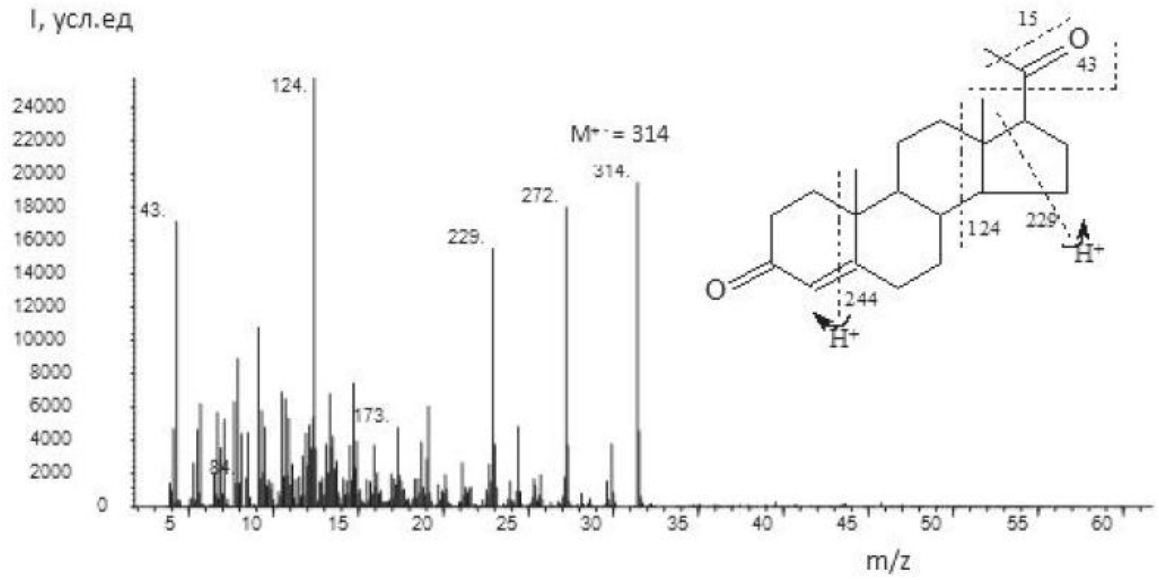

Fig-2. Spectrum of progesterone hormone

EXPERIMENTAL PART

Analysis time(Fig-1,2) min: 38 Pressure, kPa: 10.837, Waste flow rate, ml/min: 10.0 Membrane airflow, ml/min: 3.0, Temperature, °C: 250.0 Column – 1, Carrier gas mode: Constant flow, Flow, ml /min: 1,000 Analysis time = 38, Ion source temperature, °C = 200, Transfer line temperature, °C = 250 Emission Current = 20, Gain = 300000, Mass = 50 – 300, Vial number : 10, Sample volume, µl : 5, Sample collection speed : 1, Sample volume, µl : 1.

Standard solutions of estradiol drugs with different concentrations of the active substance were prepared by dissolving weighed portions taken from tablets in 10 ml of ethanol using an ultrasonic bath. The insoluble components of the tablets were filtered through an anesthetized "White Ribbon"

filter. Progesterone was used in the form of a 1% oil solution, and progesterone in the form of an alcohol gel; extraction was carried out according to the methods [2,6], ethyl alcohol was used, with the preliminary addition of chloroform, the extract was centrifuged, then evaporated in a thermostat at 50°C, and the dry residue was dissolved in 1 ml of alcohol.

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