Aim. The purpose of this paper is to summarize the literature regarding chronopharmaceutical approach to drug delivery in arterial hypertension treatment.

Materials and methods. PUBMED, EMBASE, MEDLINE and Medscape resources have been applied for search and analysis.

Results and discussion. The chronopharmacology is the most advanced area in arterial hypertension therapy. It is based on round-the-clock blood pressure determination (data of daily monitoring blood pressure), establishing its circadian profile and identifying optimal time of drug delivery. Antihypertensive drugs are prescribed according to peaks in blood pressure and pharmacokinetics of the drugs in a way that the expected the maximum antihypertensive effect fell on periods of the day with the highest value of blood pressure. Prescription of the drugs of different pharmacological classes (β- and α-adrenoreceptor antagonists, clonidine, methyldopa etc.) 1-2 hours before acrophase (time of the highest value) of systolic blood pressure make it possible to achieve lowering blood pressure applying substantially smaller single, daily and course doses of appropriate drugs in a shorter time compared to traditional treatment.

Conclusions. Optimal timing for antihypertensive drugs dosing makes it possible to reduce frequency of cardiovascular complications, as well as mortality associated with arterial hypertension.

SARS-COV-2 VIRUS RAPID DETECTION METHOD BASED ON CRISPR/CAS SYSTEM

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Introduction. The outbreak of the coronavirus disease (COVID-19) has spread rapidly all over the world. Thus, it has a significant impact on population health. Coronaviruses are positive single-stranded RNA viruses of Coronaviridae family known as agent causing respiratory tract infection and are common called cold viruses. Currently available assays for COVID-19 diagnosis can be classified into three groups: virusological tests (detect genetic material or virus by polymerase chain reaction), antigenic tests (detect a specific protein of the virus, usually a nucleocapsid protein), serological tests (detect antibodies such as IgM or IgG). Therefore, to advance the diagnostics scientists introduce a CRISPR/Cas rapid detection assay.

Aim. The purpose of this review is to summarize the data of the scientific literature about the role of CRISP/Cas assays in COVID-19 diagnostics.

Materials and methods. The literature search and data analysis about CRISPR/Cas technology as a diagnostic tool for COVID-19 by using research databases (MIT Technology Review, Medline, PubMed).

Results and discussion. Rapid detection method based on CRISPR gene-editing technology is divided into three steps.

Step 1 – genetic material of SARS-CoV-2 virus is purified from patient and is amplified with polymerase amplification kit.

Step 2 – pre-amplified viral sample is incubated and detected using Cas13a-crRNA complexes which activate and cleave fluorescent RNA reporters. Cas12-mediated detection also can be used for COVID-19 diagnostics. Its advantage is weak collateral activity, enabling nucleic acid detection with low sensitivity.

Step 3 – fluorescence detection which can be performed either by colorimetric readouts that provide results or by visual readout using a test paper dipstick.

This analysis takes a short time, no more than 1 hour, and speeds up the diagnosis of disease caused by SARS-CoV-2 virus.

Conclusions. The literature data analysis shows that CRISPR-based technology creates a novel alternative for portable, simple, quick and specific detection of SARS-CoV-2 virus.

ANTIDIABETIC POTENTIAL OF SOME ANTIOXIDANTS IN THE PREVENTION AND TREATMENT OF DIABETES MELLITUS

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Introduction. Diabetes mellitus (DM) is one of the most important civilization diseases of today's world. The number of new cases grows up year by year. According to the International Diabetes Federation data, since the 1980s the number of new cases of DM has increased from 30 million to 380 million, and the number of 525 million is estimated to reach by 2050 (Cho et al., 2015). Many studies show a close relationship between DM and oxidative stress levels in the organism (Rehman and Akash, 2017; Umeno et al., 2017; Luc et al., 2019). Hyperglycemia can upregulate markers of chronic inflammation and contribute to increased reactive oxygen species (ROS) generation, which ultimately causes many dysfunctions (Luc et al., 2019). One outcome of excessive levels of ROS is the modification of the structure and function of cellular proteins and lipids, leading to cellular dysfunction including impaired energy metabolism, altered cell signaling, and cell cycle control, impaired cell transport mechanisms, and overall dysfunctional biological activity, immune activation, and inflammation (Newsholme et al., 2016).

ROS directly increases the expression of inflammatory and adhesion factors, the formation of oxidized-low density lipoprotein, and insulin resistance. They activate the ubiquitin pathway, inhibit the activation of AMP-protein kinase and adiponectin, decrease endothelial nitric oxide synthase activity, all of which accelerate atherosclerosis (Braunwald 2008, Everett et al. 2015; Yuan et al., 2019). Moreover, DM impacts also the metabolic pathways by modifying the activities of antioxidant enzymes involving in cellular responses to increased oxidative stress (Sena et al. 2013, Oh et al. 2017, Gumprecht et al. 2017, Kalbarczyk et al. 2018, Szmyjda et al. 2019). Increased intracellular ROS cause defective angiogenesis in response to ischemia, activates several pro-inflammatory pathways and causes long-lasting epigenetic changes that drive persistent expression of pro-inflammatory genes after glycemia is normalized ("hyperglycemic memory") (Giacco and Brownlee, 2010).

Aim. Aim of the study. Taking into account the topicality of the problem of DM worldwide and its serious complications, the current study aimed to analyze the possibility of using antioxidants in the prevention and treatment of DM-induced complications resulting from oxidative stress.

Materials and methods. To demonstrate the possibility of using antioxidants in the prevention and alleviation of chronic DM-induced complications, the available literature and the results of some clinical trials were analyzed.

Results and discussion. As already mentioned, since oxidative stress is one of the main factors causing DM complications, it seems justified to use antioxidants in therapy. In recent years, there has been an increase in the interest of scientists in the use of antioxidants in therapy and prevention in general. Despite the hopeful results obtained in studies using rats, the use of antioxidants to treat DM-induced complications has had dissimilar results. Research conducted by