level of demand for patented technical solutions in the international arena and interest in their practical use.

In the process of analyzing (on the research topic. The largest number of patents were issued for devices for the introduction of drugs into the body (821), methods, devices, tools for diagnostics (727), drugs and medicines for therapeutic purposes (313).

Summary. It should be emphasized that scientists from many countries of the world have made a significant contribution to the development and patenting of new methods, devices and substances related to the problem of blood oxygenation in normal and pathological conditions of the cardiovascular system. The most productive period in terms of obtaining patents was the period of 2019-2021 (107, 172 and 177 patents, respectively).

The information presented in this paper can be useful to specialists in the field of studying the cardiovascular system and related disciplines, since patent information is reliable, up-to-date, has world novelty, and is widely used to analyze the inventive activity of scientific organizations and identify trends in the world development of science and technology.

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GENES CAGA AND CAGE HELICOBACTER PYLORI IN PATIENTS WITH GASTROINTESTINAL PATHOLOGY IN PATIENTS IN AL.KUT CITY/IRAQ

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Introduction. Helicobacter pylori, is a Gram-negative bacterium with a spiral shape, where colonize in gastric mucosa of the host. The bacterium is one of the most frequent pathogen infected approximately half of the world population, which can cause chronic gastritis, peptic ulcer and gastric cancer. H. pylori genotypes cagA and

CagE are present in the bacterial genome and, which are associated with increased pathogenicity of the microorganism.

Cytotoxin associated gene-A (CagA), is a highly immunogenic protein with a molecular weight reaches to 120 – 140- kDa. Cag-A is injected into cytoplasm of the host cells through a rigid syringe-like structure, is established by secretion system. Upon translocation CagA into host cells via type IV secretion system, undergoes to Src-dependent tyrosine phosphorylation as well activates a eukaryotic phosphatase (SHP-2), resulting to dephosphorylation of host cell proteins and cellular morphological alterations [1]. Furthermore, based on several studies, cagA seems to be involved in the neutrophil infiltration, the formation of free radicals, and DNA damage by stimulating the production of interleukin 8 (IL-8) in the inflamed region. Consequently, the existence of cagA gene has been linked to a higher level of inflammation, which could lead to increase the risks of digestive system diseases including peptic ulcer disease, gastric cancer and gastric MALT lymphoma [2].

CagPAI is a DNA insertion element with an estimated size roughly 40 kb, having nearly 32 genes that encode to type IV secretion system (T4SS). This system is a crucial for transmission peptidoglycan and CagA oncoprotein into host stomach epithelial cells. One of these proteins, CagE, is a structural component of the functional type IV secretion system that leads delivery of H. pylori virulence factor(s) into host cell. Several studies have described an association between H. pylori CagE and gastritis, duodenal ulcer, and peptic ulcer disease [3].

The aim of the study: was conducted a comparative analysis to the frequency of occurrence genes CagA and CagE Helicobacter pylori in patients with gastrointestinal pathology in Iraq.

Research methods. The study was conducted on clinical specimens (stool samples) during the period from July to September 2021. The examination of samples was carried out at the laboratories of Al.Karama teaching hospital and Red Crescent hospital Al.Kut city/ Iraq and the specimens conserved at -40 Celsius. All participants were screened on the basis of certain criteria, such as age, sex, the purity of water and condition of the stomach in order to select symptomatic patients with H. pylori. The study focused on patients with gastric disorders or patients who were diagnosed with gastrointestinal diseases by a specialist doctor within the last three months. The total number of cases was reached 85 involving 70 patients with gastrointestinal diseases and 15 cases as control group (asymptomatic). The non-invasive methods were used to detect the genotypes of H. pylori in stool samples. These methods include stool antigen detection (SAT) and polymerase chain reaction (PCR) in faecal specimens. Moreover, detection of bacterial antigens in faecal specimens was done by using H. pylori testing OnSite lateral flow kits made in the USA. Whereas, the polymerase chain reaction was used to figure out the genotype of H. pylori-associated with gastrointestinal diseases. The PCR primers were designed according to the Macrogen Company of South Korea. The primers were used for the detection and confirmation the presence Cag A and of H. pylori CagE genes in extracted DNA from stool samples.

Results and its discussion. In the current study, the genotypes of H. pylori were distributed on the basis of patients' genders. The cagA gene constituted up to

27.1% (n 19) , and the women were the most infected with CagA gene, where represented 10 patients out of 19. Whereas the CagE genotype demonstrated the lowest rate roughly 12.9% (n 9) among all H. pylori genotypes.

In addition, CagA is correlated to raise the risk of development atrophic gastritis and gastric cancer. Recent studies have pointed out that CagA is translocated directly into gastric epithelial cells via the type IV secretion system and undergoes tyrosine phosphorylation in the host cells [4]. We observed that CagA genotype was linked with gastrointestinal diseases peptic ulcer disease (55%), gastric cancer (5%) as well as Mucosa-associated lymphoid tissue disease (26%).

Numbers of researches have described a correlation between CagE genotype and gastrointestinal disorders involving: gastritis, duodenal ulcer, and peptic ulcer disease. However, few numbers of researches have described the relationship between this genotype with gastric cancer, but the number of cases included has been small and therefore the test results have often been combined with those of other diseases. In our study, we figured out CagE gene was shown a correlation with mucosa-associated lymphoid tissue roughly 18%. However, it appeared to be an equal percentage 4 % for each of peptic ulcer disease and gastric cancer.

Conclusions. Thus, we have shown that the occurrence of Helicobacter pylori CagA gene is higher than CagE in patients with gastrointestinal pathology in AL.Kut city/Iraq. Both genes are found in approximately equal proportions in diseases of the gastric cancer. However, it should be noted that CagA is associated with peptic ulcer disease of the intestinal tract, (55%). It is likely that the use of Helicobacter pylori CagA and CagE genotyping in patients with asymptomatic Helicobacter pylori infection may be one of the predictive factors for the development of infection in patients with gastrointestinal pathology in AL.Kut city/Iraq.

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