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The Effect of the Virus of SARS-Cov-2 on the Various Organic Systems of Human Beings

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COVID-19 disease has a significantly variable clinical presentation, with most patients being asymptomatic or having mild symptoms. However, severe acute respiratory disease, caused by severe acute respiratory syndrome SARS-CoV-2, is common and associated with high mortality in patients requiring hospitalization. The etiology of susceptibility to severe lung injury remains unclear [1]. Angiotensin II, converted by angiotensin-converting enzyme (ACE) from angiotensin I and metabolized by ACE2 that has a key role in the pathogenesis of lung injury. ACE2 is recognized as a key receptor for SARS-CoV-2 cell entry. The trigger of the process after binding is the cutting of two amino acids from the S protein by the action of the proteases of the host cell surface, which entails its structural remodeling. Therefore, the role of host cell membrane proteases in viral entry into the cell is crucial [2].

ACE-2 is mainly expressed in the cells of the lungs, heart, kidneys, intestine and arteries and its main role is to inhibit the action of Ang II which is the increase in blood pressure when the pressure in the kidneys falls. Therefore, the question is whether people on antihypertensive therapy with ACE inhibitors, which convert angiotensin I to angiotensin II, have an increased chance of morbidity and/or mortality from COVID-19. This may occur because ACE inhibitors may induce increased expression of ACE2 and thus the viral binding target, which is not seen with other antihypertensive drugs [3]. On the other hand, the enzyme ADAM-17 is key to regulating plasma levels of ACE2 by cleaving it from tissues and increasing its plasma levels. It is now believed that possibly SARS-CoV-2 activates the enzyme ADAM-17. This can be harmful as with the reduction of ACE-2 in the tissues, its cardioprotective effect is also reduced, causing excessive activation of the renin-angiotensin system resulting in the worsening of cardiovascular disease. In addition, many cases of pulmonary embolism, strokes, venous and arterial thrombosis have been observed during COVID-19 even in perfectly healthy people. This may be explained by the ability of angiotensin II to increase the expression of plasminogen stimulator inhibitor causing an increased tendency to clot. Therefore, it can be considered that ACE inhibitors also have a protective effect by increasing ACE-2 [4,5].

Based on the above it is proven that patients with hypertension should continue to receive their treatment normally because regardless of this they have an overactive renin-angiotensin-aldosterone system, which means that the levels of ACE2 are already elevated and it is worth noting that the biggest factor risk factor for COVID-19 is age.

Another factor that regulates the susceptibility to lung damage in patients with COVID-19 is the imbalance between ACE and ACE II levels which causes the overproduction of ATII enzyme that contributes to harmful conditions of the lung. This depends on the increased or decreased activity of the ACE enzyme which then has to do with the genotype of each individual. There are three possible genotypes for this enzyme in the general population determined by the insertion (I) or deletion (D) of a 287 bp Alu repeat sequence in intron 16 of the ACE gene. The insertion-deletion (I/D) polymorphism has been associated with circulating ACE levels where the D allele is associated with higher enzyme activity. Studies have shown that patients with genotype II have better survival than those with other genotypes [6,7]. The racial difference of the ACE gene polymorphism is well documented. For example, in the United States, African Americans are known to have the highest frequency of the D

allele (89%) compared to Indians (69%) and whites (69%). In Europe, populations in Italy, Spain, and France have a high D allele frequency of up to 82% to 87%. In contrast, in Asia, East Asian populations such as Chinese, Korean, Taiwanese, and Japanese have a high frequency of the ACE II gene allele, reported to be higher than European populations (33% to 51% vs. 13% up to 27%). It is apparent that racial variation in ACE I/D genotype appears to coincide with outcome differences where populations with a high frequency of D alleles appear to have higher mortality. For example, African Americans appear to have a disproportionately high death rate in the United States. Similarly, patients from Italy, Spain and France also have high mortality in Europe. In contrast, the low frequency of ACE D/D and high frequency of genotype II observed in Asian populations appears to be associated with relatively low mortality from COVID-19 in these nations [8,9].

In conclusion, it seems that treatment with ACE inhibitors or ARBs can reduce mortality in people hospitalized with COVID-19, but perhaps the treatment is more effective in those with the DD genotype with elevated ACE levels. It is therefore worth noting that the further study of the polymorphism of the specific gene through clinical studies can help to personalize the treatment and optimize the result [10,11].

In summary, there is evidence of multiple effects of SARS-COV 2 on receptors located in the lung, heart, kidney, gut and arteries. This explains the variety of clinical manifestations of the COVID-19 disease as well as the susceptibility of vulnerable groups to the complications of the disease. It is recommended that people who chronically suffer from circulatory, urinary and respiratory diseases receive intensive medical care, faithfully follow the full vaccination program and if they fall ill take special measures as well as go to the nearest hospital for treatment or advice [12] . SARS-COV-2 continues to multiply and therefore mutate, so the risk from the disease should not be considered over. Social distancing measures in addition to vaccination should not be omitted.

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