

ACE-2-Receptors of the Epidermis, Dermal Vascular Walls and Sebaceous Gland Cells: The Way of COVID-19 Entry into the Body?

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Keywords

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Letter to the Editor

Since the outbreak near a fish market in Wuhan, China, in December 2019, researchers have been searching for an effective therapy to control the spreading of the new coronavirus SARS-CoV-2 and inhibit COVID-19 infection. Many countries like Italy, Spain and USA were ambushed by this viral agent. To date, more than 2.5 million people were infected with SARS-CoV-2. There is no clear answer, why SARS-CoV-2 infects so many people so fast. To date of April 2020, no effective drug has been found to treat this new severe viral infection. There are many therapy options under review and clinical trials were initiated to get clearer information, what kind of drug can help in this devastating and serious situation. The world has no time. Publications on angiotensin-II receptor blockers reveal a new aspect of treating COVID-19 viral disease and were analyzed closer, also with a special view to children [1-5]. In addition, several therapeutic options have been launched to stop the devastating potential of COVID-19 worldwide. Antibody-rich donated plasma from survivors; various different inhibitors are part of the therapy options to stop the virus entering the cell and disrupt the link between SARS-CoV-2 and angiotensin-2 receptor binding. Angiotensin II and the receptor play an important role in COVID-19 cell entry, which requires the presence of a well-known serine protease TMPRSS2 and cathepsin L [6-9]. ACE-2 receptors are found in many different organs (lungs, heart, kidney, brain, skin, mouth, tongue, vascular walls) and can lead to individual organ failure in COVID-19 patients, as published a few days ago by Jiao et al. and Poyiadji et al. [3,10]. To date, COVID-19 is well

known to get part and entry of the body by docking to ACE-2 receptors in the oral cavity and tongue [11]. Interestingly, ACE-2-receptors are also found in the skin, especially in the epidermis, the dermal vascular walls and the sebaceous gland cells and here show a high immunoreactivity. Both studies by Stecklings et al. investigated the expression of angiotensin receptors in human skin, the possible synthesis of angiotensin II (Ang II) at this time and these publications showed first insights into the physiological functions. AT-1 and AT-2 receptors were found in the epidermis and in the dermal vascular walls and were documented well by histological pictures with a high immunoreactivity [12,13]. The same expression pattern was found for angiotensinogen, renin and angiotensin converting enzyme (ACE). All components could be detected, at the mRNA level in cultured primary ceratinocytes, melanocytes, with the exception of AT2 receptors in melanocytes [12,13]. COVID-19 uses ACE-2 receptors. COVID-19 could use ACE-2 receptors of the epidermis. This hypothesis could explain why COVID-19 is so infectious and would explain the extremely rapid spreading of the virus. If this hypothesis is correct, all medical personnel must use skin protection equipment and all people should be aware that closer skin contact can transmit COVID-19. Health workers treating COVID-19 patients should, according to this hypothesis, close their parts of the skin completely in order to diminish the possibility of infection. Further research in this area is needed. Moreover, skin biopsy of severe COVID-19 patients and their possible binding to ACE-2 receptors in the skin regions described above. In an important study published 2013, done by Grzegorzowska et al, ACE2 immunoreactivity was present and noted in basal epidermal layers and in sebaceous gland cells in the normal skin [14], suggesting these regions could be part of COVID-19 docking site in vivo. ACE2 immunoreactivity reactions were appraised in this study by using the 12-point immunoreactivity (IRS) scale of Remmele and Stegner. The suggestions revealed in this study showed, that ACE and skin RAS may be involved in COVID-19 entry into the human body [14]. In the histological figures of the study [14], expression of ACE was found in different histological analysis. An impressive ACE immunoreactivity in basal epidermal layers were found and well documented. Moreover, ACE immunoreactivity in sebaceous glands was found and also presented histologically. In conclusion, ACE2 expression in skin is found especially in basal epidermal layer, epidermis and sebaceous glands, suggesting that COVID-19 could find a way into the human body by docking at these sites. Further studies with skin biopsies and molecular analysis of these regions and skin layers should follow soon.

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