Why ACE-inhibitors could work against Corona infection.

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(10)(2e)

Although infections with Coronavirusses are common and seldomly lethal (human coronavirusses cause approximately 30% of upper respiratory tract infections), too often a lethal Coronavirus evolves to cause a pandemic, like with SARS and MERS, and at this moment Covid19.

History learns us that when we start looking for a vaccine, the virus has an enormous head start and a vaccine is seldom available when the virus extinguishes, and the pandemic ends by itself.

Since there is no way to develop a vaccine prior to the evolvement of a new deathly virus, I think we should aim at finding the common Achilles heel of Corona viruses.

The most sensible place to attempt to inhibit infection, is the site where Corona enters the cell. HCoV-229E uses CD13 as a receptor(Jia, 2005). CD13 is also called aminopeptidase N (APN) (Danziger, 2007), SARS-CoV and NL63 use ACE2 (Jia,2005). The cellular receptors for HCoV-OC43 and HKU1 are still unknown.

ACE2 and APN are both part of the renin angiotensin system (RAS). ACE2 converts angiotensin II to angiotensin 1-9. It also converts angiotensin I to angiotensin 1-7. APN converts angiotensin III to angiotensin IV.

Jia et al found that infection of human airway epithelia by SARS coronavirus correlates with ACE2 expression.

In case of stress and hypertension, ACE2 plays a protective role, in contrast to angiotensin II (ATII), which is associated with cardiovascular disease (Patel, 2015).

Reducing ATII by ATII antagonists or ACE-inhibitors, would automatically induce downregulation of ACE2 and APN. Decreased expression of ACE2 and APN may be expected to reduce the number of entrance-sites for SARS-CoV, NL 63 at ACE2 and HCoV-229E at APN, reducing its potency to infect.

ACE-inhibitors and ATII antagonists are readily available in large quantities and have been found to have few side effects. There are no limitations to use these agents during an epidemic in an attempt to reduce the virulence of the corona virus.

For every known and new coronavirus, the receptor it uses to enter the cell, should first be looked for in the RAS system.

Recomendations:

1. Research should be done on the possible effect of ACE-inhibitors and ATII antagonist to prevent known coronavirusses to enter the cell.
2. If they do prevent coronavirusses to enter the cell, patients and their contacts should be given ACE-inhibitors or ATII antagonists to limit disease and prevent spreading.
3. In the meantime, the site of entrance for the new coronavirus should be established.
4. Finding a vaccine should still be attempted.

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Danziger RS. Aminopeptidase N in arterial hypertension. Heart Fail Rev. 2008 Sep;13(3):293-8. Epub 2007 Nov 16.

Patel VB et al. Antagonism of angiotensin 1-7 prevents the therapeutic effects of recombinant human ACE2. J Mol Med (Berl). Sep 2015.