How blood group A might be a risk and blood group O be protected from Coronavirus (COVID-19) infections

by Peter Arend

In the case that O-glycosylation plays a key role in the pathogenesis of coronavirus infections, as was discussed already 14 years ago¹ and is currently again predicted,² this would result in the formation of a serologically A-like, O-GalNAcα1-Ser/Thr-R, Tn (”T nouvelle”) antigenic structure; the virus cannot survive outside of its hosts and hypothetically utilizes the host cell’s machinery via hijacking its A-like/Tn formation by serine-rich motifs. Similar suggestions are subject of the recent review,³ published by Watanabe et al. (2019). The adhesion of the virus to host cells would primarily occur independent of the ABO blood group through this intermediate, evolutionary/developmental structure, which is common to all metazoan growth processes and apparently acts as a host-pathogen functional bridge in different, unrelated infectious diseases.⁴ While susceptibility to an infection and its severity depend on many factors, individuals with blood group A could not respond with either acquired or innate antibodies to the synthesis of hybrid A-like structures due to clonal selection and phenotypic, glycosidic accommodation of plasma proteins. Blood group A individuals would thus become a preferred target for the virus, which utilizes the phenotype-determining glycotransferase, creating a hybrid blood group-A-specific (A-allelic) mucin-type binding ⁵. Apart from a corresponding or similar observation in a rotavirus infection⁵, a first statistical study indicates that people with blood group A have a significantly higher risk for acquiring COVID-19, whereas people with blood group O have a significantly lower risk for the infection compared with non-O blood groups.⁶ These observations might raise new questions on the immuno- and pharmacotherapeutic target, while blood group O people, assumingly infected at the same level, maintain the anti-A/Tn cross-reactive, complement-dependent isoagglutinin activity, which is
exerted by the polyreactive, nonimmune immunoglobulin M (IgM), representing the humoral spearhead of innate immunity and a first line of defense.

References:
Proposed (virtual) adhesion and/or response

Blood group O

Blood group A
Figure 1. The virus cannot survive outside of its hosts and hypothetically utilizes the host cell’s machinery via hijacking the host’s A-like/Tn formation by serine-rich motifs. This figure was constructed according to figure 2 in a previous article, in which this mechanism may be similarly utilized by a non-viral pathogen, such as the protozoan parasite *Plasmodium falciparum* (See reference 3).