Chitosan Nanoparticles:

Chitosan is a biocompatible, biodegradable polymer that is considered safe for use in the human diet and approved for dressing applications [1, 2, 3]. Chitosan polymer has been used as a transporter in polymeric nanoparticles for drug delivery by different routes of administration [4]. The Chitosan polymer has chemical functional groups that can be modified to achieve certain goals and make it a polymer with a wide range of potential applications in human health and various fields. The chitosan nanoparticles and chitosan derivatives nanoparticles have a positive surface charge and mucoadhesion properties that can stick to mucous membranes and release the drug load in continuous release [5]. Chitosan-based nanoparticles has several applications in non-parenteral drug delivery for cancer, lung diseases, gastrointestinal diseases, administration of the brain and treatment of ocular infections [6]. The Chitosan nanoparticles show low toxicity in both in vitro and some in vivo models.

Modified chitosan nanoparticles with antibody:

Drug delivery vehicles such as polymeric nanoparticles modified with specific ligands such as antibodies have been widely used for targeted therapy. When designing nanoparticle-antibody conjugates for drug delivery or medical applications, several properties of the structure of the nanoparticles are important. The NPs must be chemically and biologically inert, can be stable in physiological conditions, must move freely in the body, contain a surface that is easily conjugated to the targeting antibody [7]. Here, we design a new type of chitosan nanoparticles for treating the coronavirus disease (Figure 1), for this goal we'll binded the ACE2 receptor and RBD protein to the surface of chitosan nanoparticles by chemical method.

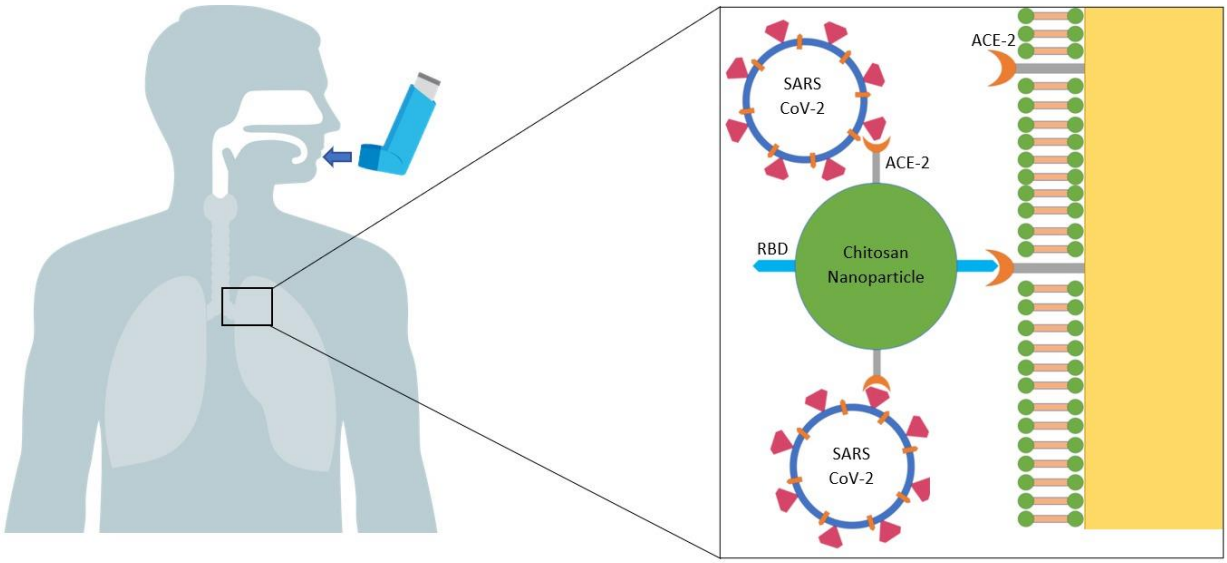

Figure 1: schematic illustration of CHT nanoparticles when bonded with covid-19

References:

[1] Nagpal, K., Singh, S. K., & Mishra, D. N. (2010). Chitosan Nanoparticles: A Promising System in Novel Drug Delivery. *Chemical and Pharmaceutical Bulletin CHEMICAL & PHARMACEUTICAL BULLETIN*, *58*(11), 1423–1430. doi: 10.1248/cpb.58.1423

[2] Zeng, Z. (2011). Recent advances of chitosan nanoparticles as drug carriers. *International Journal of Nanomedicine*, 765. doi: 10.2147/ijn.s17296

[3] Rytting, E., Nguyen, J., Wang, X., & Kissel, T. (2008). Biodegradable polymeric nanocarriers for pulmonary drug delivery. *Expert Opinion on Drug Delivery*, *5*(6), 629–639. doi: 10.1517/17425247.5.6.629

[4] Islam, N., & Ferro, V. (2016). Recent advances in chitosan-based nanoparticulate pulmonary drug delivery. *Nanoscale*, *8*(30), 14341–14358. doi: 10.1039/c6nr03256g

[5] Chen, M.-C., Mi, F.-L., Liao, Z.-X., Hsiao, C.-W., Sonaje, K., Chung, M.-F., … Sung, H.-W. (2013). Recent advances in chitosan-based nanoparticles for oral delivery of macromolecules. *Advanced Drug Delivery Reviews*, *65*(6), 865–879. doi: 10.1016/j.addr.2012.10.010

[6] Mohammed, M., Syeda, J., Wasan, K., & Wasan, E. (2017). An Overview of Chitosan Nanoparticles and Its Application in Non-Parenteral Drug Delivery. *Pharmaceutics*, *9*(4), 53. doi: 10.3390/pharmaceutics9040053

[7] Schiller, J. L., Fogle, M. M., Bussey, O., Kissner, W. J., Hill, D. B., & Lai, S. K. (2020). Antibody-mediated trapping in biological hydrogels is governed by sugar-sugar hydrogen bonds. *Acta Biomaterialia*, *107*, 91–101. doi: 10.1016/j.actbio.2020.03.002