**Single cell RNA sequencing of 13 human tissues identify cell types and receptors of human coronaviruses**

(ACE2)is the host receptor by (SARS-CoV-2) to infect human cells. This recpector is expressed in (lung, liver,stomach, ileum, kidney and colon), the expressing level are rather low especially in lung ,so (SARS-CoV-2) use coreceptors protein as partner to facilitate virus entry , ACE2 highly abundent on type 2 pneumocytes (important cell type within lung called alveoli .

to identifiy the potential candidates(co receptors for covid) ,they explored the single cell gene expression(atlas) for 119 cell types across 13 human tissues , and analyzed the single cell coexpression spectrum of 51 reported RNA virus receptors and 400 other membrane protiens.

It was found that the similar expression patterns with ACE2 are ANPEP and DPP4 , the known receptors for human COVs

there was an analysis to understand the the relations between COV-target and surround cells (using cellphone DB).

Macrophagets were found to be frequently communicating with cov targets (by chemkeine and phagcytosis), which shows its importance in the immune defense .

**Introduction :**

Coronavirus is a type of single-stranded RNA (ssRNA) viruses ,

highly contagious, it can infect various human tissues  **.**

Symptoms caused by covid include acute( respiratory distress syndrome, cardiac injury, kidney injury)

Infection of viruses is established by the virus binding to the receptor of the targeted cell.

Membrane proteins mediates membrane fusion allowing the entry of enveloped viruses .

Both sars-cov2 and sars-coc use ACE2 protein to enter the cell.

ACE2 is widely distributed in human tissues (lung, kidney, colon,...),

Indicating sars may infect multiple organs

Data shows that (the main target cells of sars-cov2 ) AT2 in lung has low expression of ACE2, so cov2 depends on co-receptors to facilitate the infection

viruses tend to hijack co-expressed proteins as their host factors.

Cov2 Infection requires other factors:

Understanding receptors' usage by viruses facilitates their development of intervention(entering and spreading) strategies

So single cell gene expression matrices from 13 relatively normal human tissues were collected ,and the single cell co-expression profiles of 51 known ssRNA viral receptors and 400 membrane proteins, including ACE2 were analyzed to identify the potential coreceptors

Then “CellPhoneDB” was conducted to identify immune cells crosstalk with CoVs-target cells