Why do some Covid-19 patients lose their sense of smell?

Loss of the sense of smell (and taste), one of the more recently identified symptoms of Covid-19, is now recognised as such by the World Health Organization (WHO) and the health authorities of some countries, including the US.

Tracking the proteins

SARS-CoV-2, the virus that causes Covid-19, hijacks two human proteins to invade cells.

1. One is the ACE2 “receptor” on the cell surface (it opens the door for the virus)
2. The other is called TMPRSS2, which the virus uses to replicate its genetic material.

• In mice, the researchers found, these two proteins are produced by certain cells of the nasal cavity that contribute to the mice’s sense of smell (and ours).
• Within the olfactory epithelium, which is a tissue lining the nasal cavity that is involved in smell, the “sustentacular cells” had the highest level of SARS-CoV-2 receptors.
• The sustentacular cells help transfer odours from the air to neurons.
• The mature olfactory neurons do not express ACE2, while the sustentacular cells do.
• The sense of smell in Covid-19 patients appears to be lost, because the sustentacular cells assist neurons in sensing odours, probably by processing odour-binding proteins.
• Identifying these cells could help in the development of more accurate diagnostic tests, the researchers said.
• They have called for future studies should examine whether sustentacular cells can pass the virus to neurons, which could provide SARS-CoV-2 a route to infect the brain.

Age is a factor

• The researchers also found that larger amounts of the proteins are made in older mice than in younger ones.
• These are significant findings, because the more entry proteins a host cell has, the easier it is for the virus to bind, enter and infect that cell. The high levels of entry proteins in the nasal epithelium may explain why older humans are more likely to become infected with the novel coronavirus than younger humans.

Why the nose matters

There are two kinds of cells in the nose as the likely first entry points for the virus. These are:

1. Goblet cells (which produce mucus) and
2. Ciliated cells (which help sweep mucus to the throat so it can be swallowed).

That study, too, had drawn its conclusions from the expression of the two entry proteins. Using the Human Cell Atlas database, it looked at data from different tissues of non-infected people. It found that these two proteins had the highest presence in goblet and ciliated cells.