The effects of wearing face masks on the body and brain of young adults

In a study published in PNAS, researchers report on measuring hemodynamics and oxygenation of the brain's microvasculature to see if the use of face masks could have a certain effect on the amount of oxygen reaching the brain.

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The Covid-19 pandemic has altered our daily lives considerably. From an almost complete halt in international travel for an entire year to the redefinition of remote work, we were obliged to readjust our routines and adopt new habits. As the pandemic evolves and successive numbers of waves follow, where there have been peaks in cases, some measures have been relaxed, while others have been ruled out. But there is one thing that seems to stick around for now: the use of face masks.

Following the first months of the pandemic, many governments started to require the mandatory use of face masks in public areas, attempting to mitigate the transmission and ease the consequences of the disease. But some questions arose. Do those measures entail a

risk? Were there adverse effects of wearing face masks? Some of these questions are, nowadays, still under discussion.

Studying brain hemodynamics and oxygenation

To address some of these questions, ICFO researchers Jonas Fischer and Lisa Kobayashi Frisk, led by ICREA Prof. at ICFO Turgut Durduran, collaborated with the University Hospital in Zurich and the Hospital de la Santa Creu i Sant Pau, aiming to shed some light on the potential effects of face masks. Using two non-invasive infrared bio-photonic technologies, they decided to measure the hemodynamics and oxygenation of the brain's microvasculature to see if the use of face masks could have a certain effect on the amount of oxygen reaching the brain. The results have been published this week in the journal Proceedings of the Natural Academy of Sciences. The team recruited a group of young and healthy adults as participants, who sat on a chair and read a scientific article, first without a mask and then wearing a mask. They tried both surgical and FFP2 face masks.

By placing two probes on their foreheads while the participants read they measured the changes in blood flow, oxygenation, and oxygen metabolism of the brain, using two non-invasive, near-infrared, bio-photonic technologies known as diffuse correlation spectroscopy (DCS) and time-resolved near-infrared spectroscopy (TR-NIRS). They also measured the general functioning of the body, such as the heart-rate, the respiration rate and the amount of oxygen and carbon dioxide in the body.

Small changes, similar to daily life activities

After monitoring the brain, they processed the data and carried out statistical analyses to see if there were any changes in the signals, analyzing both sets: with and without face masks. The researchers did not observe any changes in the oxygen and carbon dioxide levels of the body, but they found small but statistically significant changes in the amount of oxygen and blood flow of the brain, with both types of face masks. But, the researchers concluded that these observed changes in the brain are comparable to those that occur when doing any other daily life activity, like hearing a sound, seeing someone moving around, or ducking to tie your shoelaces.

The team underlines that their protocol might be useful to further investigate the effects of wearing face masks in other types of populations, such as elderly people, children, patients with pre-existing respiratory conditions, or when carrying out critical tasks. They also remark

that the use of face masks could affect the neuro-imaging or monitoring studies, and that in those cases their use should either be avoided or the subjects should be closely monitored.