

Conjunctival microvascular glyocalyx degradation in non-septic patients



A new study examined whether changes in glyocalyx thickness in non-septic critically ill patients are associated with microcirculatory alterations in conjunctival and sublingual mucosa. Researchers observed signs of conjunctival microvascular glyocalyx degradation in this patient population. They explain:

"Conjunctival microcirculatory perfusion abnormalities were present in patients with cerebral pathology, whereas sublingual microvascular alterations occurred during systemic endothelial damage. Alternatively, syndecan-1 levels during cerebral pathology were simply not high enough to provoke sublingual microvascular alterations. These results merit further investigation."

To date, the relationship between glyocalyx degradation and microcirculatory perfusion abnormalities in non-septic ICU patients is unclear. In addition, conjunctival sidestream dark field (SDF)-imaging for the purpose of glyocalyx thickness estimation has never been performed. It is conceivable that evaluation of conjunctival glyocalyx thickness and microcirculatory blood flow could be more sensitive to the changes in the cerebral microcirculation, due to its close anatomical proximity and common circulation route.

In this study, using techniques for direct in-vivo observation of the microcirculation, researchers performed a single measurement of microcirculatory perfusion parameters and visualised glyocalyx thickness in both ocular conjunctiva and sublingual mucosa in mixed cardio surgical (n = 18) and neurocritical patients (n = 27) and compared these data with age-matched healthy controls (n = 20). They also measured systemic syndecan-1 levels. Their key findings include:

- In the sublingual and conjunctival region, there was a significant increase of the perfused boundary region (PBR) in both neurocritical and cardiac surgical ICU patients, compared to controls.
- Higher levels of syndecan-1 were found in ICU patients compared with controls and in cardiac patients compared with neurocritical.
- A weak correlation between syndecan-1 and sublingual PBR but no correlations between global glyocalyx damage and conjunctival glyocalyx thickness.
- Significantly lower perfused vessel density (PVD) of small vessels in sublingual mucosa in patients after cardiac surgery in comparison with healthy subjects.

"These observations are in line with the idea that the microvascular effects of glyocalyx shedding (as detected with elevated systemic syndecan-1 levels and increased PBR) is organ or site specific," the researchers write. "Substantial rises in syndecan-1 levels after cardiac surgery are not accompanied by changes in conjunctival microvascular perfusion, despite significant loss of conjunctival glyocalyx integrity. On the other hand, shedding of glyocalyx during cerebral insults is not accompanied by alterations in the sublingual microcirculation. Such findings suggest a multifactorial origin of microvascular alterations under conditions of glyocalyx shedding."

Source: [Microvascular Research](#)

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