

## Association of endothelial glycocalyx integrity and microvascular perfusion with novel echocardiographic markers and carotid intima-media thickness in patients with psoriasis

Rafouli-Stergiou P.<sup>1</sup>; Ikonomidis I.<sup>1</sup>; Makavos G.<sup>1</sup>; Thymis J.<sup>1</sup>; Pavlidis G.<sup>1</sup>; Parissis J.<sup>1</sup>; Kostelli G.<sup>1</sup>; Vrettou AR.<sup>1</sup>; Frogoudaki A.<sup>1</sup>; Katsimbri P.<sup>2</sup>; Papadavid E.<sup>3</sup>

<sup>1</sup>Attikon University Hospital, 2nd Department of Cardiology, Athens, Greece

<sup>2</sup>Attikon University Hospital, Rheumatology and Clinical Immunology Unit, Athens, Greece

<sup>3</sup>Attikon University Hospital, 2nd Department of Dermatology & Venereology, Athens, Greece

**Funding Acknowledgements:** Type of funding sources: None.

**Introduction:** Psoriasis has been associated with vascular and myocardial dysfunction through mechanisms of inflammation and oxidative stress.

**Purpose:** We aimed to evaluate sublingual microvascular perfusion and glycocalyx barrier properties in psoriasis patients, as well as their correlation with coronary microcirculatory function, markers of myocardial deformation and atherosclerosis (carotid intima-media thickness, IMT).

**Methods:** We examined 241 patients with psoriasis and 160 controls, adjusted for age, sex, BMI, smoking, LV mass, heart rate, hyperlipidemia, and office SBP. Perfusion boundary region (PBR), a marker of glycocalyx barrier function, was measured non-invasively in sublingual microvessels with a diameter ranging from 5–25  $\mu$ m using a dedicated camera (Side field dark imaging, Micsoscan, Nedelrands). Increased PBR indicates reduced glycocalyx thickness. Indexes of microvascular perfusion, including red blood cell (RBC) filling percentage and functional microvascular density, were also calculated. We measured coronary flow reserve (CFR), carotid IMT and markers of myocardial deformation by speckle tracking imaging utilizing echocardiography [peak twisting, the percentage changes between peak twisting, and untwisting at mitral valve opening (%dpTw – UtwMVO), at peak (%dpTw – UtwPEF), and the end of early LV diastolic filling (%dpTw – UtwEDF)].

**Results:** Psoriasis patients had higher PBR (PBR5-25:  $2.131 \pm 0.296$  vs.  $1.769 \pm 0.306$ ; PBR5-9:  $1.183 \pm 0.150$  vs.  $1.051 \pm 0.132$ ; PBR10-19:  $2.318 \pm 0.581$  vs.  $1.993 \pm 0.365$ ; PBR20-25:  $2.650 \pm 0.461$  vs.  $2.269 \pm 0.492$ , all  $p < 0.05$ ) and impaired LV twisting-untwisting markers compared to controls (pTw:  $14.8 \pm 7.8$  vs.  $13.9 \pm 3.5$ ; UtwMVO:  $10.3 \pm 7.3$  vs.  $9 \pm 4.3$ ; %dpTw – UtwMVO:  $31 \pm 4.1$  vs.  $38 \pm 7$ ; pTwVel:  $105 \pm 83$  vs.  $89 \pm 21$ ; pUtwVel:  $-100 \pm 53$  vs.  $-93 \pm 31$ , all  $p < 0.05$ ).

In psoriatic population, levels of PBR5-25 and PBR10-19 were inversely correlated to CFR ( $r = -0.15$  and  $r = -0.17$ ). The first one was also reversely related to peak LV untwisting at aortic valve closure ( $r = -0.14$ ). Increased levels of PBR5-9 were associated with reduced untwisting at end of the mitral inflow E wave (UtwEDF,  $r = -0.13$ ) and reduced percentage difference between peak twisting and untwisting at MVO (%dpTw-UtwMVO) ( $r = -0.15$ ). Furthermore, decreased RBC filling percentage and perfused microvascular density were related to worse LV longitudinal strain (4-chamber) ( $r = -0.15$ ), and increased IMT ( $r = -0.14$ ). Finally, a positive correlation between perfused microvascular density and %dpTw-UtwMVO was observed in patients with psoriasis ( $r = 0.14$ ). All correlations were statistically significant ( $p < 0.05$ ).

**Conclusion:** Endothelial glycocalyx thickness is reduced in patients with psoriasis and is associated with impaired coronary and myocardial function, and vascular atherosclerosis.