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Pentraxin 3 induces morphological damage and vascular endothelial dysfunction through a P-selectin/matrix metalloproteinase-1 pathway

Francesca Biagioni[1], Paola Lenzi[2], Albino Carrizzo[3], Antonio Damato[3], Mariateresa Ambrosio[3], Maria Teresa Calierno[1], Marco Gesi[2], Gloria Lazzeri[2], Carmine Vecchione[3], Francesco Fornai[1]

[1] Department of Molecular Pathology-Unit of Neurobiology of Movement Disorders, IRCCS INM Neuromed, Pozzilli (IS), Italy - [2] Department of translational research and new technologies in medicine and surgery, University of Pisa, Pisa, Italy - [3] Department of Angio-cardio-neurology, unit of Vascular Pathophysiology, IRCCS INM Neuromed, Pozzilli (IS), Italy

Pentraxin 3 (PTX3), the prototype of long pentraxins, has been described to be associated with endothelial dysfunction in various disorders. However, no study has evaluated the direct effects of PTX3 on morphological changes and function of blood vessels.

Through in vitro experiments of vascular reactivity and ultrastructural analyses, we demonstrate that PTX3 induces dysfunction and morphological damage in the endothelial layer of resistance vessels of mice through a P-selectin/matrix metalloproteinase-1 pathway. The latter hampered the detachment of endothelial nitric oxide synthase from caveolin-1, leading to an impairment of nitric oxide signaling. In vivo we found that administering PTX3 to wild-type mice induces endothelial dysfunction and increases blood pressure, via P-selectin as demonstrated by electron microscopy. In isolated human umbilical vein endothelial cells, PTX3 significantly blunts nitric oxide production through the matrix metalloproteinase-1 pathway. Finally, using ELISA, we found that hypertensive patients constantly possess higher plasma levels of PTX3 compared with normotensive subjects.

These data show for the first time a direct role of PTX3 inducing vascular dysfunction and morphological damage identifying the molecular mechanisms involved.

These data strongly indicate a role for PTX3 in the pathophysiology of hypertension (Carrizzo et. Al., 2015).

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References

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Keywords

Biological markers; endothelium; hypertension; nitric oxide.