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MIF proteins as prototypical innate chemokines in inflammatory and cardiovascular disease

Inflammatory processes such as those promoting atherosclerotic lesion formations are pivotally driven by components of the innate and adaptive immune axis. Chemokines and their receptors are particularly prominent part of the innate immune arm. While the role of classical chemokines, i.e., belonging to the CC or CXC families is increasingly well understood, an emerging family of chemokine like inflammatory mediators termed ‘innate chemokines’, CLF chemokines or micro-chemokines, which additionally structurally and functionally overlaps with the mediator class of alarmins, has been identified, but it yet has to be comprehensively characterized regarding its molecular mechanism and role in disease. For example, innate chemokines modulate inflammatory reactions in the atherogenic arterial wall and numerous other inflamed tissues, but the precise receptor signaling mechanisms are still only poorly understood. What is known is that many innate chemokines share functional homology with classical chemokines and signal through classical chemokine receptors, whereas they do not exhibit conserved structural features such as N-terminal tandem cysteine residues or the chemokine fold. Thus, important receptor binding motifs yet have to be characterized. This lecture will give an overview of the mechanisms underlying “molecular hijacking” of classical chemokine receptors by innate chemokines, featuring their pathophysiological role. Examples will encompass high mobility group binding protein-1 (HMGB1), macrophage migration inhibitory factor (MIF), MIF-2/D-DT and certain β -defensins. Receptor usage, binding domains, signaling, innate immune cell regulation and involvement in various inflammatory conditions, including atherosclerosis will be discussed. The lecture will outline strategies to target such mediators in disease either in conjunction or explicit exclusion of the co-targeting of classical chemokines. Finally, a cross kingdom analysis will be shared offering more general understanding of some of these mediators.

Biography

Jurgen Bernhagen has studied Biochemistry and Immunology at the University of Tübingen, Germany and at Queen Mary College, London, UK. He has performed a sandwich PhD thesis at the University of Tübingen and at the Picower Institute for Medical Research, Manhasset, NY, USA and trained as a Post doctorate at the Picower. He is currently a full Professor of Biochemistry and Molecular Cell Biology at RWTH Aachen University, Germany, and the Chair and Director of the homonymous institute. His main research interest has been on cytokines, chemokines and their role in inflammation with a focus on MIF and the biochemical and structural features and mechanisms of such inflammatory mediators. He has also studies the COP9 signalosome, disease models encompass rodent model of atherosclerosis, sepsis, liver and kidney disease as well as colitis and colorectal cancer. He has authored more than 120 peer-reviewed papers in these areas, several of them published in leading journals such as *Nature*, *Nature Medicine* or *PNAS*. He serves on the Editorial Board of several journals and serves on several Review committees for extramural funding and various fellowship organizations.