Department of Biomedical Sciences
presents a seminar

香港城市大學
City University of Hong Kong

Control of Innate Immune Cell Trafficking and Clearance by REG Proteins in the Diseased Heart

Thomas Braun, MD, PhD,
Max-Planck-Institute for Heart and Lung Research,
Bad Nauheim, Germany

DATE: 13 February 2025 (Thursday)
TIME: 10:30 am - 11:45 am
VENUE: P4703, 4/F, Yeung Kin Man Academic Building, CityU

Biography:

Thomas Braun is director at the Max-Planck-Institute for Heart and Lung Research, Bad Nauheim, Germany and Professor of Medicine at the Justus-Liebig-University Giessen, Germany. He studied medicine and philosophy at the Universities of Göttingen and Hamburg, where he obtained his MD and MD PhD. After postdoctoral training in Hamburg and in Boston in the lab of Rudolf Jaenisch at the Whitehead Insitute, MIT he became group leader at the Technical University of Braunschweig in 1992 before he moved on to an associate professor position at the University of Würzburg in 1996. After that he was appointed full professor and chair of Physiological Chemistry at the University of Halle-Wittenberg. In 2004 he was recruited by the Max-Planck-Society as founding director of the newly established Max-Planck-Institute for Heart and Lung Research in Bad Nauheim. Since 2004 he is also Professor of Medicine at the University of Giessen, Germany. So far, he has published more than 400 papers in leading journals including Nature, Science, Nature Medicine, Nature Immunology Cell, Cell Stem Cell, Developmental Cell, Cell Metabolism, EMBO J, Circulation, Circ. Res. and others His primary research currently focuses on the mechanisms driving skeletal and cardiac muscle development, regeneration and remodeling. He serves on various committees and advisory boards in Germany and abroad. He is an elected member of the German National Academy of Science, Leopoldina and the Academy of Europe and is editorial board member of several journals. Furthermore, he is in the steering board of several national and international research consortia and director of the Cardiopulmonary Institute Frankfurt, Bad Nauheim, Giessen).

Abstract

Heart failure, often triggered by acute myocardial infarction, is an increasingly prevalent disease characterised by loss of cardiomyocytes, inflammation, accumulation of fibrosis, chamber remodelling and reduced cardiac output. Adequate control of inflammation after myocardial infarction is critical for efficient repair and sets the stage for tissue regeneration. E.g., the ability of neonatal mouse hearts for regenerating critically depends on the immune system and differences in the regulation of inflammatory responses between neonatal and adults after MI might contribute to the failure of adult heart regeneration.
We previously found that Regenerating islet-derived proteins (REG) regulate recruitment of immune-modulatory macrophages to the site of myocardial damage. Reg3β, Reg3γ and Reg4 are expressed in a distinct, highly regulated temporal pattern after MI, which differs between neonatal and adult hearts. Loss– and gain–of–function studies combined with RNA sequencing of cardiac tissue macrophages revealed a selective recruitment of inflammatory–associated MHC–II^{hi}/Ly6C^{lo} and MHC–II^{lo}/Ly6C^{lo} macrophage subsets by Reg3β, Reg3γ and Reg4 after MI. Genetic inactivation of Reg3β caused prolonged persistence of neutrophil granulocytes (Nphs) within damaged regions, associated with cardiac rupture Nphs are no longer confined to the infarcted area in the absence of Reg3β but infiltrate the remote zone. Intriguingly, Reg3β binds to a subset of Nphs, which show dramatically decreased viability in contrast to Reg3β–low Nphs. Treatment of cultured Nphs with different Reg homologues indicate that Reg3β, Reg3γ and Reg4 induce cell death in a subpopulation of Nphs most likely via destabilization of the lysosomal membrane. Our data indicate that Reg genes are part of an endogenous regulatory loop that restricts the persistence of Nphs in the infarcted heart to ensure efficient myocardial healing and/or regeneration.

3442-4985 vivian.woo@cityu.edu.hk All are Welcome!