INSTITUTE OF ZOOLOGY, JAGIELLONIAN UNIVERSITY

On behalf of our Institute we invite you to join us for the next Distinguished Lecture.
On December 19th 2016 (Monday) we welcome

Prof. **Paul Kubes**

from the University of Calgary (the Snyder Institute for Chronic Diseases, Faculty of Medicine), for a lecture

Immune cell recruitment to a site of sterile injury

Location:
Institute of Zoology, ul. Gronostajowa 9
Lecture room 0.14 (ground floor)

Time: 11 a.m.

Note! For those who are interested to discuss science less formally, there will be a ***working lunch*** following the lecture in the conference room (first floor). Due to organisational reasons, please let us know if you are interested to join (ela.kolaczkowska@uj.edu.pl)

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Paul Kubes received his Ph.D. from Queen's University Ontario, Canada), and his postdoctoral training from Louisiana State University (LSU) in Shreveport (Louisiana, USA). As part of a group at LSU, he developed a system to visualize the behaviour of white cells in blood vessels under normal conditions and during low flow states. He returned to Canada in 1991. He now holds a position as a full professor at the University of Calgary (Alberta, Canada) and currently serves as the Director of the Snyder Institute for Chronic Diseases. He also holds a Canada Research Chair in Leukocyte Recruitment in Inflammatory Disease.

Paul Kubes has published over 200 peer-reviewed papers in journals including Science, Nature Medicine, Nature Immunology, Nature Communications, Blood, Cell and Journal of Experimental Medicine. His papers were cited over 24.600 times and his Hirsch index is 83. He is regularly invited to national and international meetings and universities to present his research findings. He was awarded Canada's Health Researcher of the Year (2011).

Paul Kubes' research utilizes intravital microscopy (aka *in vivo* microscopy) to elucidate the mechanisms underlying the responses to sterile and infectious injury and the recruitment of leukocytes to these inflammatory sites, and their functions under both physiological and pathological disease states.

His lab is leading the way in directly imaging the immune system using cutting edge technology, including spinning-disk confocal and multi-photon microscopy. By imaging complex cellular behaviors in real time, both *in vitro* and *in vivo*, we can now begin to understand how immune cells, such as neutrophils, monocytes, macrophages, NKT cells and Kupffer cells function under physiological and pathological disease states.

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Abstract

Sterile injury refers to non-infectious inflammation. It is used very generally and most investigators study dysregulated sterile injury including atherosclerosis, liver toxicity, lung fibrosis models to name a few. Yet we still really do not understand what happens in a sterile injury that completely resolves and which immune cells are involved. Using intravital microscopy and killing approximately 200 cells allowed us to examine the recruitment of immune cells over a 14 day time point. Platelets enter the injury site in the first 30 seconds completely surrounding the injury. They then aid neutrophils in entering the site. The neutrophils dismantle dead and dying vessels and also phagocytose small pieces of cells before leaving the injury site. Next inflammatory monocytes infiltrate the site and slowly convert to less inflammatory more repair type monocytes by receiving appropriate cytokine signals from iNKT cells that detect self-antigens and help the repair process. Despite these monocytes not becoming macrophage for the first 72 hrs a prevalent population of macrophage do enter the injury as early as 1 hr. These cells very rapidly take on an M2 phenotype and help to rip apart dead cells enveloping the area with a large meshwork of DNA. Disruption of any of these processes leads to poor revascularization and delayed repair. Comparing this very systematic repair process with aberrant sterile injury will provide insight into where problems arise to induce inappropriate inflammation and disrepair.

Selected publications

1.Wang J, Kubes P. *A Reservoir of Mature Cavity Macrophages that Can Rapidly Invade Visceral Organs to Affect Tissue Repair*. **Cell**. 2016; 165(3):668-78.

2.Surewaard BG, Deniset JF, Zemp FJ, Amrein M, Otto M, Conly J, Omri A, Yates RM, Kubes P. *Identification and treatment of the Staphylococcus aureus reservoir in vivo.* **J Exp Med**. 2016; 13(7):1141-51.

3.Slaba I, Wang J, Kolaczkowska E, McDonald B, Lee WY, Kubes P. *Imaging the dynamic platelet-neutrophil response in sterile liver injury and repair in mice.* **Hepatology**. 2015; 62(5):1593-605.

4.Kolaczkowska E, Jenne CN, Surewaard BG, Thanabalasuriar A, Lee WY, Sanz MJ, Mowen K, Opdenakker G, Kubes P. *Molecular mechanisms of NET formation and degradation revealed by intravital imaging in the liver vasculature.* **Nat Commun**. 2015;6:6673.

5.Dal-Secco D, Wang J, Zeng Z, Kolaczkowska E, Wong CH, Petri B, Ransohoff RM, Charo IF, Jenne CN, Kubes P. *A dynamic spectrum of monocytes arising from the in situ reprogramming of CCR2+ monocytes at a site of sterile injury.* **J Exp Med**. 2015;212(4):447-56.

6.Wong CH, Jenne CN, Petri B, Chrobok NL, Kubes P. *Nucleation of platelets with blood-borne pathogens on Kupffer cells precedes other innate immunity and contributes to bacterial clearance.* Nat Immunol. 2013;14(8):785-92.

7.Kolaczkowska E, Kubes P. *Neutrophil recruitment and function in health and inflammation.* **Nat Rev Immunol**. 2013;13(3):159-75.

8.Yipp BG, et al. & Kubes P. *Infection-induced NETosis is a dynamic process involving neutrophil multitasking in vivo.* **Nat Med**. 2012;18(9):1386-93.

9.Wong CH, Jenne CN, Lee WY, Léger C, Kubes P. *Functional innervation of hepatic iNKT cells is immunosuppressive following stroke.* **Science**. 2011;334(6052):101-5.

10.McDonald B, Pittman K, Menezes GB, Hirota SA, Slaba I, Waterhouse CC, Beck PL, Muruve DA, Kubes P. *Intravascular danger signals guide neutrophils to sites of sterile inflammation.* **Science**. 2010;330(6002):362-6.