

University Hospital Zurich
Department of Plastic Surgery and Hand Surgery

Research Group, Jan Plock

Principal Investigator: Jan A Plock, MD

Basic Science

Investigators: Riccardo Schweizer (Research Coordinator), MD; Holger Klein, MD

Postdoc Research Fellow: Matthias Waldner, MD (Research Fellow at University of Pittsburgh)

Our primary focus is developing strategies to improve the feasibility and functional outcome of vascularized composite allotransplantation (VCA) such as face- and hand- and abdominal wall transplantation. The goal is reduction of immunosuppressive-related hurdles to enable wider application of these ultimate reconstructive efforts. For this purpose we investigate cellular therapies including adult adipose stem cells (mesenchymal stem cells) to modulate the immune-response and to improve nerve regeneration for optimized functional outcomes. In addition we strive to increase tissue preservation time and reduce its related ischemia-reperfusion injury through novel ex vivo perfusion systems and oxygen-carrier solutions in a strongly translational manner to expand the donor-pool for composite tissues and optimize functional outcomes.

As a side branch we explore potential applications of adipose stem cells for regenerative medicine and tissue reconstruction, respectively. Safety issues of adipose stem cell use with a strong translational aspect are one aspect we seek to cover in the post-cancer setting, e.g. for breast reconstruction.

Clinical

Investigators: Holger Klein, MD; Barbara Bichsel-von Arb, MSc;

Students: Nina Fuchs; Dario Simic

Clinical research topics are related to burn medicine and reconstruction of tissue defects. We investigate clinical outcomes and aim for optimization of process-management and health care.

National and International Collaboration

University of Zurich

Daniel Eberli (Department of Urology)

Peter Steiger (Intensive Care Unit)

Urs Schanz (Department of Hematology/Transplantation)

University of Bern

Robert Rieben (Department Clinical Research – Cardiovascular Research)

Jonas T. Schnider (Department of Hand Surgery)

University of Pittsburgh, USA

Peter Rubin (Department of Plastic Surgery, UPMC)

Vijay S Gorantla and Mario Solari (Vascularized Composite Allotransplantation Laboratory, UPMC)

Paulo Fontes (Liver Transplantation Program, McGowen Institute of Regenerative Medicine)

Nara University, Japan

Dr. Hiro Sakai (Department of Chemistry)

Recent Publications

Bone marrow-derived mesenchymal stem cells improve vascular regeneration and reduce leukocyte-endothelium activation in critical ischemic murine skin in a dose-dependent manner

Schweizer R, Kamat P, Schweizer D, Dennler C, Zhang S, Schnider JT, Salemi S, Giovanoli P, Eberli D, Enzmann V, Erni D, Plock JA
Cytotherapy, 2014, in press

Adipose-derived stem cells (ADSCs) and muscle precursor cells (MPCs) for the treatment of bladder voiding dysfunction.

Tremp M, Salemi S, Largo R, Andersson KE, Plock J, Aboushwareb T, Sulser T, Eberli D.
World J Urol. 2013 Nov 12. [Epub ahead of print]

Mesenchymal stem cells at the interface between regenerative medicine and reconstructive plastic surgery

Plock JA
JSM Regen Med. 2013 1(1), 1004

Perspectives on the use of mesenchymal stem cells in vascularized composite allotransplantation.

Plock JA, Schnider JT, Solari MG, Zheng XX, Gorantla VS.
Front Immunol. 2013 Jul 23;4:175.

Fat grafting and stem cell enhanced fat grafting to the breast under oncological aspects -recommendations for patient selection.

Krumboeck A, Giovanoli P, Plock JA.
Breast. 2013 Oct;22(5):579-84.

Botulinum toxin A and B raise blood flow and increase survival of critically ischemic skin flaps.

Schweizer DF, Schweizer R, Zhang S, Kamat P, Contaldo C, Rieben R, Eberli D, Giovanoli P, Erni D, Plock JA.
J Surg Res. 2013 Oct;184(2):1205-13.

Site-specific immunosuppression in vascularized composite allotransplantation: prospects and potential.

Schnider JT, Weinstock M, Plock JA, Solari MG, Venkataramanan R, Zheng XX, Gorantla VS.
Clin Dev Immunol. 2013;2013:495212.

Are cultured mesenchymal stromal cells an option for immunomodulation in transplantation?

Plock JA, Schnider JT, Schweizer R, Gorantla VS.
Front Immunol. 2013 Feb 26;4:41.

Ischemia/Reperfusion Injury of Porcine Limbs after Extracorporeal Perfusion

Müller S, Constantinescu MA, Kiermeir D, Gajanayake T, Bongoni A, Vollbach FH, Meoli M, Plock J, Jenni H, Banic A, Rieben R, Vögelin E.
J Surg Res. 2013 May 1;181(1):170-82.

Paracrine effects of mesenchymal stem cells enhance vascular regeneration in ischemic murine skin

Schlösser S, Dennler C, Schweizer R, Eberli D, Stein JV, Enzmann V, Giovanoli P, Erni D, Plock JA
Microvasc Res. 2012 May;83(3):267-75.

One hundred fascia-sparing myocutaneous rectus abdominis flaps: An update

Rufer M, Plock JA, Erni D
J Plast Reconstr Aesthet Surg. 2011 Feb;64(2):209-15

Hemoglobin vesicles improve wound healing and tissue survival in critically ischemic skin in mice

Plock JA, Rafatmehr N, Sinovic D, Schnider J, Sakai H, Tsuchida E, Banic A, Erni D
Am J Physiol Heart Circ. 2009 Sep;297(3):H905-10.