10.20–10.50
Keynote Lecture 1

PLASTIC SURGERY & INNOVATION ANNO 2016: A CONTINUOUS RETURN TRIP BETWEEN BENCH & BED. A STORY ABOUT PERFORATORS, TRANSPLANTATION & TISSUE ENGINEERING
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11.10–13.00 SESSION 3 – STEM CELLS & TISSUE ENGINEERING
Moderators
Hans-Gunther MACHENS
Yves HARDER

11.10 EFFECT OF ADIPOSE STROMAL VASCULAR FRACTION ON RANDOM PATTERN FLAP VIABILITY IN RATS WITH DIABETES AND CHRONIC RENAL DISEASE: AN EXPERIMENTAL STUDY

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INTRODUCTION: Diabetes (DM) and chronic renal disease (CRD) are epidemic diseases with increasing prevalence. Wounds due to microangiopathy and macroangiopathy tend to heal slowly which can lead to severe morbidites such as amputations. High flap failure rates reported in the reconstruction of these wounds. Studies have shown increased flap viability by adipose derived stromal vascular fraction (SVF). However; there is no study in the literature about the effect of adipose stromal vascular fraction on skin flap viability in chronic renal disease and diabetes with chronic renal disease.

MATERIALS AND METHODS: 48 male Sprague Dawley rats were used. Diabetes was induced by 65mg/kg intraperitoneal streptozocin administration. Chronic renal disease was induced by 5/6 nephrectomy. Four groups consisting of 12 rats were formed. 2 rats were used for obtaining adipose tissue from the inguinal regions for stromal vascular fraction preparation in each group. Group I (Control group): Two dorsal flaps were elevated, phosphate buffered saline (PBS) were injected to the flaps. Group II (DM), Group III(CRD), Group IV(DM+CRD): After disease induction and period; two dorsal flaps were elevated, SVF were injected to the left flap, PBS were injected to the right flap. Flaps were harvested for macroscopic and histopathological assessments at postoperative 7th day. Percentage of flap viability measurement and microangiography were performed for macroscopic assessment. Capillary density assessment were evaluated in both hematoxylin-eosin and CD31 stained specimens for microscopic assessment. Plasma levels of VEGF were studied in all rats at day 1 and day 7.

RESULTS: SVF was improved flap viability significantly (p<0,05). New capillary formation found significantly more in SVF groups in capillary density assessment (p<0,05). This result was compatible with the scarcity of the vasculature in microangiography. When blood VEGF levels were compared, increase in day 1 and day 7 were significant according to control group (p<0,05). When groups were compared each other there were not significant difference except Group II(diabetes).

CONCLUSIONS: The result of the study has shown that DM and CRD impaired flap viability. Diabetes with chronic renal disease deteriorated the flap viability much more. It has shown that SVF were increased flap viability via neovascularization by endothelial differentiation. Flap viability percentage was found lower in diabetic and uremic groups when compared with healthy control group. Blood VEGF levels were not elevated in uremic groups. This results were indicated that in vivo function of stem cells were possibly impaired by uremia dominantly and diabetes due to microenviromental changings.

11.20 THE POTENTIAL OF ADIPOSE DERIVED STEM CELLS FOR CHRONIC WOUNDS

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INTRODUCTION: The use of Adipose Derived Stem Cells in regenerative medicine appears as an attractive alternative to use of stem cells derived from strains of bone marrow and skin wound
because they are thought to be present in large quantities in fat and can be obtained more easily.

MATERIALS AND METHODS: A retrospective review of all patients admitted during 2011–2014, who developed Ulcer of the leg and were treated by lipofilling in the National centre for burns and plastic surgery, University Hospital, Ibn-Rochd Casablanca, Morocco. Patients with large ulcers and those with exposure of bone exposure were omitted from the study. Patient demographic data and digital photographs were taken on the day of surgery and every other day thereafter. Each patient received 3 sessions of 20 cc of autologous Adipose stem cells injection in subcutaneous tissue surrounding the ulcer. Time to wound closure was defined as the time at which the wound bed was completely reepithelialized and filled with new tissue.

RESULTS: The mean age of patients was 24.3 years. The size of ulcer was about 3cm² with no exposure of bone. Our results revealed that the average time for wound closure in the ASCs group was 13 ± 10.87 days whereas the time in the control group was 19 ± 1.61 days.

CONCLUSIONS: This study suggests that accelerated wound healing could be achieved by local transplantation of autologous Adipose stem cells. Moreover, some clinical aspects of wound healing as well as the possibility of the therapy based on stem cells might represent a feasible therapeutic approach in treatment of clinical wounds.

11.30 TRACHEAL TISSUE-ENGINEERING: EPITHELIAL GRAFTING OF GENTLY-DECELLULARIZED RABBIT TRACHEA

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INTRODUCTION: Long-segment tracheal pathologies are associated with high morbidity and mortality. Despite a relatively straightforward anatomy of the trachea, reconstruction might be deceptive. Key elements of successful transplantation include the use of a biocompatible construct with little immune-reactivity, vascularization of the submucosal lining and creation of an inner epithelial covering. Our aim was to evaluate the in-vivo response of gently-decellularized rabbit trachea grafted with buccal mucosa, after revascularization within the lateral thoracic artery flap.

MATERIALS AND METHODS: Ten allogenic rabbit tracheae underwent two cycles of detergent-enzymatic decellularization with 4% sodium deoxycholate, 50 kU/ml DNase and distilled water. Subsequently, scaffolds were implanted within the lateral thoracic artery flap of ten New Zealand White Rabbits. After revascularization, decellularized tracheae were grafted with buccal mucosa. Macroscopical, histological analysis and immunohistochemistry were performed on explants at termination.

RESULTS: Revascularization of the inner lining was incomplete in the first two circular constructs. These tracheae showed only partial ingrowth of the graft on the edges. The following eight transplants were opened longitudinally before implantation. Consequently, the submucosal space of all constructs revascularized well within 14 days. Also graft-adherence was complete in these tracheae. Mild calcification of the cartilage was noted in three tracheae. Moderate lymphocytic infiltration within the buccal graft was detected in three specimens.

CONCLUSIONS: Gentle detergent-enzymatic treatment of rabbit tracheae efficiently removed all non-cartilaginous cells. Moreover, this technique preserved the submucosal scaffold and basement membrane, both essential to guide revascularization and reepithelialization respectively. Decellularized tracheae exhibited beneficial in-vivo properties. By opening the transplant, insufficient revascularization through inter-cartilaginous ligaments could be overcome successfully. The scaffold also proved to offer a suitable matrix for epithelial covering. To further enhance our results, the next step is to provide a functional epithelial covering. Therefore, we are currently focusing on respiratory epithelial cell seeding of gently-decellularized tracheae.