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How *ex vivo* lung perfusion could play a significant role to decrease the incidence of renal injuries after lung transplantation?

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Lung transplantation is indicated for terminal stage lung diseases such as chronic obstructive pulmonary disease, idiopathic pulmonary fibrosis, cystic fibrosis, pulmonary hypertension and sarcoidosis, which have a significant impact on the pulmonary vasculature and may affect the function of the right ventricle and cardiac output. Accordingly, right ventricular and correspondingly the left ventricular parameters and functions have been reported to improve after lung transplantation. However, improved cardiac index, echocardiography and other cardiovascular parameters are not the only indicators of good prognosis. Renal functions may, in addition, provide more reliable clinical prognostic evaluation. When the cardiac output is improved, following lung transplantation, renal perfusion and the urine output would correspondingly improve. However, if renal injury develops, urine output would not be able to reflect the improvement of the cardiac functions and the cardiovascular system may instead be affected secondary to the renal injury. High rates of incidence of acute and chronic kidney injuries have been reported following lung transplantation; with complete recovery from the acute kidney injury did not decrease the risk for the development of chronic kidney disease or long term mortality. Though renal injury following lung transplantation depends on many risk factors, including the original status of the patient's kidneys and the effects of the immuno-suppression, especially calcineurin inhibitor therapy, the increased production of inflammatory cytokines due to the ischemic reperfusion injury and the donor-recipient contact can be propagated to significant levels that lead to renal and other organs injury, dysfunction and or failure. In addition, reducing the pro-inflammatory stimuli associated with lung transplantation, may affect the long term immuno-suppression regime. Hence, effective EVLP might, to some degree, affect the risk of acute and or chronic kidney injuries following lung transplantation. Taking these concepts into consideration, a non-randomized retrospective study has been recently reported by the Toronto team to compare 52 standard lung transplants to 13 EVLP transplants regarding the incidence of acute kidney injury following transplantation. The results showed no significant differences.

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Dual system of ex vivo lung perfusion: Describing Shehata model

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Due to the increased incidence of end stage lung diseases, lung transplantation has become a frequent intervention that constitutes the sole therapeutic strategy. Unfortunately, up to 80% of the available lung grafts could not be considered for transplantation. The introduction of ex vivo lung perfusion (EVLP) technique allowed the reconditioning of the otherwise declined grafts, which had a significant impact on the clinical outcome and the mortality within the waiting lists of the patients. Moreover, the value of reconstruction of the bronchial arteries during lung transplantation was previously documented, where it was found to protect the pulmonary endothelium and type II pneumocytes in the early phase after transplantation. The bronchial blood flow was also found to be important for the vitality of the airways, the fluid balance of pulmonary tissue and the metabolic functions of the lungs. Accordingly, the inclusion of the bronchial arteries in the ex vivo lung graft perfusion has been suggested to provide a significant functional improvement. Currently, there are only two dual EVLP systems that have been described; an experimental dual- EVLP system, which was designed for the ex vivo perfusion of rat heart-lung blocks and the Shehata- described model. The results of the experimental study confirmed the expected significant impact on the graft physiology and histology, including the attenuation of the cytokine production. The other (Shehata) model differs from the experimental model in the technique of the inclusion of bronchial arteries in the perfusion circuit.

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