

Duilio Pagano¹, Rosalia Busà², Margot Lo Pinto³, Agita Jukna⁴, Ivan Vella¹, Sergio Calamia¹, Salvatore Piazza¹, Paola Salis¹, Barbara Buscemi¹, Pier Giulio Conaldi², Valentina Agnese², Massimo Pinzani², Fabrizio di Francesco¹, Sergio li Petri¹, Simone D. Scilabra³, Salvatore Gruttadauria^{1, 5}.

1. Department Abdominal Center, IRCCS ISMETT (Istituto Mediterraneo per i Trapianti e Terapie ad alta specializzazione) Palermo, Italy, UPMC (University of Pittsburgh Medical Center), via E. Tricomi 1, 90127, Palermo, Italy. 2. Research Department, IRCCS ISMETT (Istituto Mediterraneo per i Trapianti e Terapie ad alta specializzazione), via E. Tricomi 1, 90127, Palermo, Italy. 3. Proteomics Group of Ri.MED Foundation, Research Department IRCCS ISMETT (Istituto Mediterraneo per i Trapianti e Terapie ad Alta Specializzazione), via E. Tricomi 5, 90145 Palermo, Italy. 4. Pathology Unit, IRCCS ISMETT (Istituto Mediterraneo per i Trapianti e Terapie ad alta specializzazione), UPMC (University of Pittsburgh Medical Center), via E. Tricomi 1, 90127, Palermo, Italy. 5. Department of Surgery and Medical and Surgical Specialties, University of Catania, 95124, Catania, Italy.

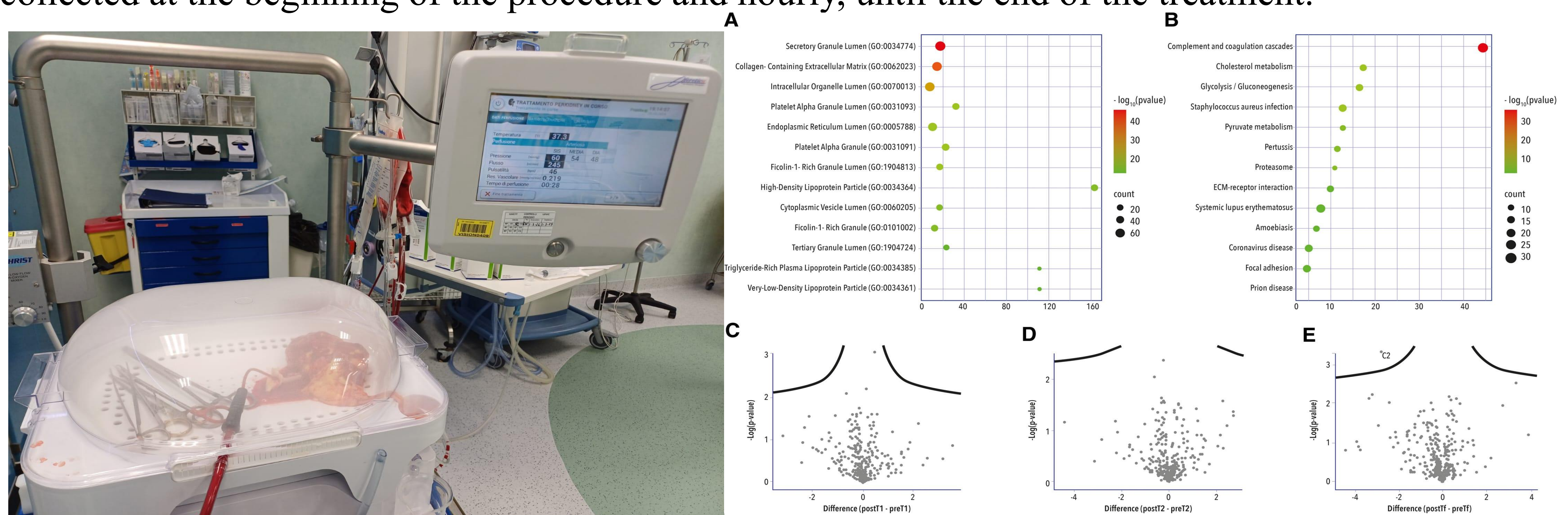
Introduction

Kidney transplantation faces challenges due to the shortage of donor organs, leading to the increased use of ECD organs. Recent advancements in ex-situ organ perfusion technologies have facilitated the use of ECD kidneys by preserving organs in near-physiological conditions to tackle ischemia-reperfusion injury (IRI), a process that triggers inflammatory responses. This study focuses on the application of an inflammatory mediators' modulation (IMM) integrated in a NMP for the recovery of an ECD kidney graft before transplantation.

Methods

Right kidney from an ECD donor (75-year-old female; cerebrovascular accident; haemodynamic instability; extreme hypotension) was recovered for transplantation. The discrepancy between right kidney and left kidney Karpinski score (3 vs 7 respectively), together with irregularity of the cortical surface, the presence of severe aortic atherosclerosis without a renal cortex color uniformity after perfusion of preservation liquid, with suspicious areas of remnant donor blood such as lividities, and the presence of a double ureter were key factors in the decision to perform NMP for a more comprehensive assessment of the organ's viability.

A NMP treatment was performed using PerLife ® (Aferetica, Bologna, Italy), in the PerKidney operational mode integrating IMM with PerSorb ® (Cytosorbents Inc., Princeton, NJ, USA), using a blood-based perfusate with a target hemoglobin level of 4-7 mg/dl. Perfusion parameters (pressures, flows, resistance, temperature) were continuously monitored. Perfusate samples were collected at the beginning of the procedure and hourly, until the end of the treatment.



Results

After 320 minutes of NMP, the kidney was successfully transplanted in a 74-year-old woman with a history of end-stage renal disease and a history of 617 days on the waitlist. No side effects were observed associated with the use of PerSorb. The post-operative course was uncomplicated with no delayed graft function (DGF), with 1,1 mg/dl serum creatinine level at 6 months follow up

Conclusions

NMP treatment with PerLife integrating PerSorb for inflammatory mediators' modulation resulted in a safe and feasible treatment of recovery of an ECD kidney for transplantation. Further studies are needed to explore the long-term clinical impact of this approach on graft survival and function.