ANNEX A

PUBLIC SELECTION BASED ON QUALIFICATIONS AND INTERVIEW FOR THE AWARDING OF NO. 1 EXPERIENCED GRANT LASTING 20 MONTHS FOR CONDUCTING RESEARCH PURSUANT TO ART. 22 OF LAW NO. 240/2010 AT THE DEPARTMENT OF MANAGEMENT, INFORMATION AND PRODUCTION ENGINEERING (A.R.F. 09/G2 – BIOENGINEERING - A.D. ING-IND/34 – INDUSTRIAL BIOENGINEERING - CUP: F52F16001350001) TYPE A WITHIN THE FRAMEWORK OF THE 2017/2018 STARS PROGRAMME – II PART 2017

announced with decree of the Chancellor Rep. no. 490/2019 of 25.07.2019 and posted on the official registry of the University on 26.07.2019

RESEARCH PROJECT

Developement of Organ-on-chip technology for the study of renal disease progression

Research structure: Department of Management, information and production engineering

Duration of the grant: 20 months

Scientific Area: 09 – Industrial and information engineering

Academic recruitment field: 09/G2 - Bioengineering

Academic discipline: ING-IND/34 – Industrial Bioengineering

Scientific Director: Prof. Andrea Remuzzi

The limits of renal replacement therapies, and their costs, require that new strategies are urgently studied to find more effective treatment. The main cause of these pathologies is the loss of permeability of the kidney filtering membrane to plasma water. The functions of this membrane depend on endothelial cells and podocytes, and the progression of the disease is caused by the loss of podocytes that detach from the membrane and are lost in the urine. The drugs available today are able to only partially slow down the disease. Studies so far have failed to take account of the mechanical stresses induced on these cells by the passage of filtered fluid through the membrane. Direct observations of these phenomena are not possible because of the very small size (in the order of nanometers) of these structures and the difficulty of conducting studies in living organisms such as experimental animals. The aim of the project is to develop an innovative system based on organ-on-chip technology to grow endothelial and podocytes cells adhering to a semi-permeable elastic membrane and expose them to controlled flow and pressure conditions. The microfluidic system will have to reproduce the structure and function of the glomerular filtration wall to study the effect of filtration on the cell biology that compose it. The system will also be able to test in vitro new molecules that may favor the mechanical strength of these cells under conditions that simulate pathological ones. The system will also allow us to study in vitro the behavior of kidney-derived kidney cells. In fact, the differentiation of induced pluripotent cells (iPS, obtained from patients with chronic nephropathy) in endothelial cells and podocytes, can be used to better understand the mechanisms responsible for these pathologies and to study the response to pharmacological treatments at the individual patient level.