**Project title:** LUNG WATER by Ultra-Sound GUIDED TREATMENT TO PREVENT DEATH AND CARDIOVASCULAR COMPLICATIONS IN HIGH RISK END STAGE RENAL DISEASE (ESRD) PATIENTS WITH CARDIOMYOPATHY (LUST)

**Estimated length / Total length (if the project was already concluded):** 6 years  
Starting date: 08/03/2013  
Ending date: 08/03/2019

**Name of the Principal Investigator:**  
Carmine Zoccali

**List of the collaborators:**  

**List of the centres / institutions involved:**  
1. Azienda Ospedaliera “Bianchi-Melacrino-Morelli” & CNR di Reggio Calabria, Italy  
2. University Hospital Strasbourg, France  
3. Shaare Zedek Medical Center - Jerusalem, Israel  
4. University Clinical Centre Maribor - Maribor, Slovenia  
5. IASIO Hospital – General Clinic of Kallithea, Greece  
6. ASL Parma - Parma, Italy  
7. University Hospital of Ioannina, Greece  
8. Hannover Medical School - Hannover, Germany  
9. Medical University - Wroclaw, Poland  
10. Centre d'Investigation Clinique Plurithématique Pierre Drouin - INSERM CHU de Nancy, France  
11. C.T.M.R. Saint-Augustin - Bordeaux, France  
12. Paris-Ile-de-France-Ouest University (UVSQ), Boulogne Billancourt, France  
13. Saarland University Hospital, Germany  
14. Dr. C.I.Parhon Hospital - Iasi, Romania  
15. Bellvitge’s University Hospital - Barcelona, Spain  
16. Centre Hospitalier F.H. Manhès, France  
17. Medical University of Silesia in Katowice, Poland  
18. ASL 12, Versilia Hospital – Viareggio, Italy
Proposed research: Volume overload is a leading risk factor for death and cardiovascular events in end stage renal disease patients maintained on chronic dialysis, particularly in those with myocardial ischemia and heart failure which represent a substantial fraction of this population. Early identification of volume overload may prevent cardiovascular sequela in these patients but clinical signs of volume expansion are unsatisfactory to reliably identify patients at risk and to monitor them over time. On the other hand, however reliable, standard techniques for measuring extracellular or circulating (blood) volume do not convey information on fundamental heart function parameters that determine the individual hemodynamic tolerance to volume excess and the response to ultrafiltration, i.e. left ventricular (LV) filling pressure and LV function. Extra-vascular lung water is critically dependent on these parameters and represents a proxy of both, circulating volume and LV filling pressure and function, and may therefore be a better criterion to identify patients at a higher risk of volume-dependent adverse clinical outcomes and to monitor the effect of therapy aimed at preventing these outcomes. A fast (< 5 min.), easy to learn, simple and non-expensive technique which measures extra-vascular lung water by using standard ultrasound (US) machines has been validated in dialysis patients. Whether systematic measurement of lung water by this technique may translate into better clinical outcomes in ESRD patients has never been tested.

Aim of the research: The aim of this randomized clinical trial is that of testing a treatment policy guided by extra-vascular lung water measurements by ultrasound to prevent death, decompensated heart failure and myocardial infarction as well as progression of LVH and LV dysfunction and hospitalization in high risk dialysis patients with myocardial ischemia (a history of myocardial infarction with or without ST elevation or unstable angina, acute coronary syndrome documented by ECG recordings and cardiac troponins or stable angina pectoris with documented coronary artery disease by prior coronary angiography or ECG) or overt heart failure (NYHA class III-IV).

Progress and results as of September 2016 (if still ongoing) or at the Study conclusion (if concluded):
LUST Study, officially started in in 2013, currently involves 20 European Centres. The number is still unmodified because, even though two centres (the “Fundación Jiménez Díaz” - Madrid, Spain and the “Hospital S. Maria della Scalaletta” - Imola, Italy) left at the end of last year, two additional centres have completed all bureaucratic procedures to obtain the approval by their Ethical Committee (Aristotle University - Thessaloniki, Greece and Ospedale “A. Manzoni” - Lecco, Italy) so they have recently become part of the workgroup. Excluding all patients recruited by the centres which withdrew the study, 318 patients have been enrolled so far. To date, 291 out of 318 enrolled patients (92%) have had a baseline visit, 211 (65%) has had the first follow-up visit and 164 (52%) had the second follow-up visit. Eighty-six patients (27%) have completed the study so far. All patients in Reggio Calabria and Maribor have completed the study. Centres of Homburg, Iasi, Ioannina, Parma and Wroclaw should complete the study and data entering in next few months. In order to compensate the unexpectedly low enrolment rate in some LUST centres, the enrolment of new patients is still continuing in centres that have already completed the study (Reggio Calabria, Maribor and Homburg). Thanks to the constant surveillance and the WEB meetings the completeness of the database is continuously improving.

Of note, the first two LUST publications, the first describing the WEB-based training of nephrologists and cardiologists for the measurement of lung water by ultrasound, and a second manuscript investigating the agreement between auscultation and lung ultrasound, have been submitted to NDT and CJASN and are currently in press.

List of the papers published in peer review journals:
1) Efficacy of a remote web-based lung ultrasound training for nephrologists and cardiologists: a LUST trial sub-project (submitted to NDT – in press)
2) The agreement between auscultation and lung ultrasound in hemodialysis patients: the LUST study (submitted to CJASN – in press)

List of the presentations done at major congresses/meetings: none

As of September 2016