Filippo Romeo (1908-1981): a pioneer and Teacher of Nephrology at Messina University

Glomerular and tubular function studied by Romeo's test

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ABSTRACT
Filippo Romeo was a prominent teacher of Medical Clinic of the University of Messina.
He devoted a lot of his time to study the renal function not only in acute and chronic kidney patients but also in patients affected by other pathologies as well in internal medicine, cardiology, in metabolic alterations and in pregnancy. He discovered an interesting renal function test named "prova di Romeo" that was considered original and unique kidneys function test in the Paolo Introzzi Treatise of Internal Medicine. His test needed only of 100 minutes urine collection and permitted contemporary and separately to study kidney glomerular and tubular function. Even if Romeo's test was considered contradictory because neither of the clearances (glomerular and tubular) were effective for evaluate exactly glomerular filtration it pushed nephrologists to evaluate two clearances to have more complete kidneys function evaluation.
Romeo showed the strictly relationship between kidney and heart and he could to be considered a pionier of cardio-nephrology.

KEYWORDS: glomerular function, tubular function, Romeo's test

Filippo Romeo, Internal Medicine and Nephrology teacher

Filippo Romeo was born in Taurianova, a village in province of Reggio Calabria, Italy, in 1908, the year of the disastrous earthquake in Messina. He graduated in Medicine and Surgery in 1933 at University of Messina, Italy, where he attended the school of Internal Medicine since his graduation. During the second world war he was assistant at the Institute of Medical Pathology University of Messina where he began his studies on the Kidney function. Contemporary he was teacher of Tropical and Semeiotics Medicine.

Professor Filippo Romeo (1908-1981) (Figure 1)

Figure 1

Filippo Romeo

In 1935 and 1943 he was recognized as eligible to teaching Medical Pathology and Medical Semeiotics at University of Cagliari, Palermo and Messina and in 1943 he became Director of Medical Clinic at University of Messina. In 1951 he became full professor in Medical Semeiotics and in 1953 in Medical Clinic.

Romeo was an enlightened mind, one the first directors of Medical Clinic in Italy, to understand the importance in creating multidisciplinary institutes of medicine. He actually founded the Institute of General Medical Clinic consisting of several specialized areas: nephrology, peritoneal dialysis, hemodialysis cardiology, angiography, histology, bacteriology,biochemistry, respiratory function, enzymology, radiology, nuclear medicine.

So his institute became such an important point of reference for the patients in southern of Italy.

Filippo Romeo devoted a lot of his time to study kidneys physiology and pathology. He has been the founder of one of the first postgraduate nephrology school called School of Specialization in Renal, Blood and Metabolic Diseases attended by many nephrologists from over the Italy. Several nephrologists attended this School and several became directors of nephrological divisions in Italy. He was one of the first nephrologist to introduce peritoneal dialysis in Italy for the treatment of acute and chronic renal failure.

In 1957 he founded the peritoneal dialysis center at Messina's Polyclinic which became a landmark for the territory. Subsequently, in 1976, he founded the hemodialysis center treating hundreds of patients. Professor Romeo was a point of reference of numerous Italian nephrologists who attended his nephrology school. He discovered an interesting renal function test named "prova di Romeo" that was considered original and unique kidneys function test in the Paolo Introzzi

Treatise of Internal Medicine (1, 2).

The test was based on the "Ambard formula" that is related to urine and blood concentration of urea during 24 hours. Romeo's test permit to study the glomerular and tubular function during 100 minutes using endogenous creatinine and to calculate separately and contemporary glomerular and tubular function, tubular diuresis and ratio between glomerular and tubular function (2-4).

To perform the Romeo's test the subject had to be fast and rested for at least 12 hours with the empty bladder. A bladder catheter should have been use to collect exactly urine especially in men affected by prostate hypertrophia. After 50 minutes of test beginning a blood draw was obtained to serum creatinine and azotemia dosage and after another 50 minutes the urine was collected. The volume of urine collected in 100 minutes was divided by 100 and multiplied by 60, thus having the amount of urine per hour. By yielding serum creatinine and azotemia the parameters reported in Table 1 were obtained.

Table 1 : Parameters obtained by Romeo's test

Uh	=	**Urine/ Hour (liters)**
Cs	=	**Serum Creatinine (g/ 1000 cm3)**
Cu	=	**Urinary Creatinine (g/ 1000 cm3)**
NUs	=	**Serum Urea (g/1000 cm3)**
NUu	=	**Urinary Urea (g/100 cm3)**

By using the parameters reported in Table 1 it is possible to calculate, Glomerular Output per hour (GGh), Cleaner Capacity for ureic nitrogen (CDNU), Renal Index (IR), Tubular Diuresis Index (IDT) and normal values (no) (Table 2).

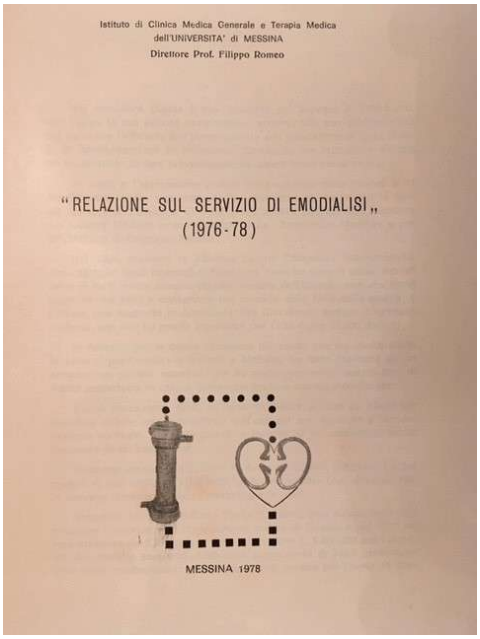
Table 2 : Renal function calculated by using Romeo's test

GGh = Glomerular Output /hour =	$\frac{Uh \times Cu}{Cu}$	**nv 5-8 liters**
CDNU = Urea Tubular Cleaning Capacity =	$\frac{Uh \times NUu \times 100}{GGh \times NUs}$	**nv 25%-35%**
IR = Renal Index =	$\frac{Cs \times 100}{CDNU \times Nus}$	**nv 0.08 – 0,12**
IDT = Tubular Diuresis Index =	$\frac{Uh \times 100}{GGh}$	**nv 1%-2%**

Applying Romeo's test in patients affected by Chronic Kidney Diseases Romeo concluded that in renal disease GGh and CDNU decrease according the extend of the renal lesions and that IR decrease it is considered a prognosis criterion too. In fact Romeo found IR decrease between 0.03-0.04 in the glomerular lesions evolving in chronic status while IR lesser decrease in acute glomerulonephritis.

According to the results of Romeo's test, he suggest to perform the test not only in nephrology but also in other pathologies as well in internal medicine, cardiology, in metabolic alterations and in pregnancy where the test was effective to detect early renal function alterations. Romeo's test was used for a long time because it was considered easy to execute and worthy of being used in daily clinical practice. Romeo showed the strictly relationship between kidney and heart and he could to be considered a pioneer of cardio-nephrology (Figure 2).

Figure 2



Activity of hemodialysis center in 1976 - 78 at University Policlinic of Messina. Romeo defined the relationship between heart and kidneys.

By the application of his test Romeo clarified renal functional changes during pregnancy, diabetes, heart dysfunction and kidney functional changes during use of diuretics especially diuretic mercury-based (5). Creatinine clearance was based on collection of 24 hours urine with possibility of errors in urine 24 hours collection while his test needed only of 100 minutes urine collection and permitted contemporary and separately to study kidney glomerular and tubular function. Romeo's test was easier and more complete to perform than Sundal and Rehberg-Tareeva test for glomerular filtration and tubular reabsorption evaluation (2) .

Even if Romeo's test was considered contradictory because neither of the clearances (glomerular and tubular) was effective for evaluate exactly glomerular filtration it pushed nephrologists to evaluate two clearances to have more complete kidneys function evaluation. Moreover Romeo was meritorious because underlined the importance of the kidneys function in internal medicine pathologies. He published 423 scientific papers.

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