

## Nephrology and nephrologists in Italy between the two World Wars

Le nostre storie: vite di nefrologi

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#### ABSTRACT

The First World War was a turning point for medicine worldwide and the following 20 years brought many important innovations. Kidney studies in Italy were part of this general trend. In this contribution, all the papers relating to kidney physiology, pathology and therapeutics produced by Italian scientists in the years between the two World Wars are retrieved and examined. The authors who produced strictly nephrological articles are also singled out and their activity described. This research retrieved 638 articles dealing with kidneys and published by Italian scientists over the period described. The topics covered were up-to-date, and the level was consistent with that of foreign contemporaries. Among the authors, a group of young scientists particularly dedicated to the study of the kidney emerges. Most of them would subsequently be among the founders of the Italian Society of Nephrology and leaders of Italian nephrology.

**PAROLE CHIAVE:** history, nephrology, Italy, scientists, World Wars

## Introduction

World War I was a turning point for medicine. Giorgio Cosmacini, doctor and historian of medicine, in his book “War and Medicine” defines war as a “paradoxical” source of progress from a medical point of view [1]. The need to treat a huge number of soldiers wounded and/or suffering from serious and new pathologies forced doctors to seek new, previously unknown, answers to deal with new emergency situations. The results of this research had a tremendous impact on world medicine in the years following the conflict.

The Italian doctors, especially the younger ones, who found themselves serving in war zones also benefited from those experiences and from contacts with colleagues in the allied armies. The clinical and research approach changed, both in terms of timing and methods. Kidney diseases occupied a prominent position among war-related morbidities. For example, since the first months of the conflict, there had been reports of an apparently new type of “nephritis”: the “trench nephritis” or war nephritis. This new form of nephropathy attracted the attention of the greatest clinicians of the time including William Osler (1849-1919) [2]. Italian doctors promptly turned their attention to this new form and such was the interest that the first post-war congress of the Italian Society of Internal Medicine dedicated a session to it. Significantly, this meeting was held in Trieste that, at the time, had just become Italian (Fig. 1) [3]. Due to the techniques used and the progress achieved, we may consider this as the start of a new cycle of nephrology studies compared to the previous two decades [4].

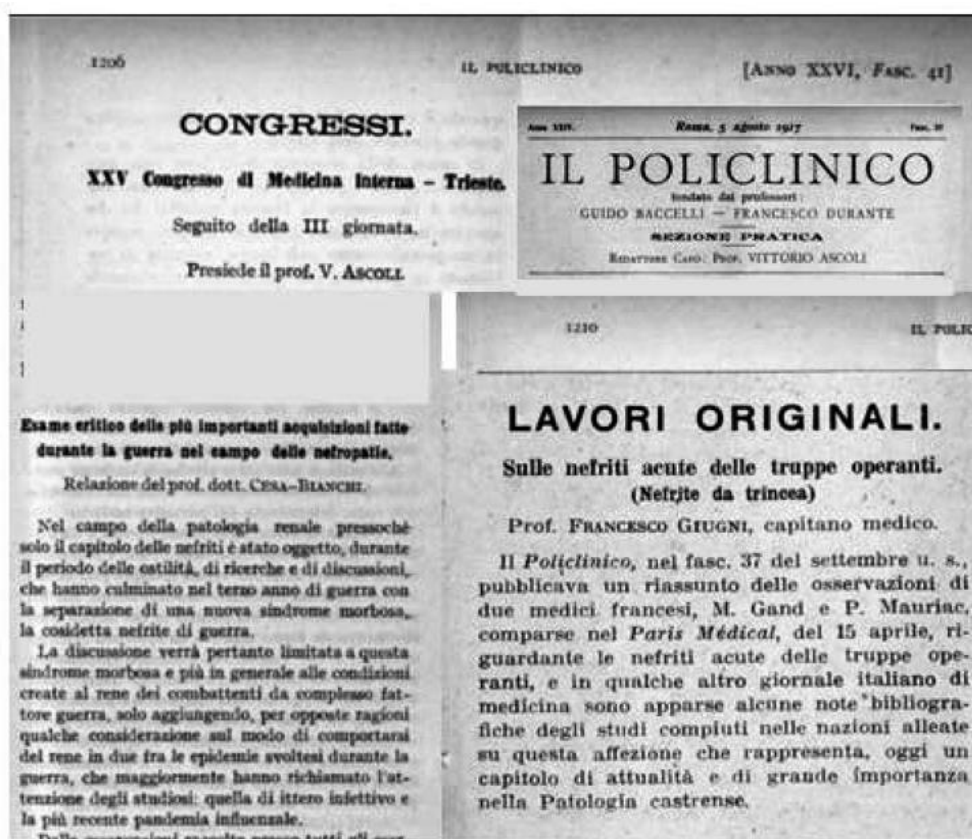


Figure 1: Session of the 1919 Internal Medicine Congress held in Trieste, dedicated to war nephritis

We, too, chose to start from this date for an excursus on Italian nephrology between the two wars.

## Materials and methods

We have searched all the scientific articles concerning kidney studies (anatomy, physiology, clinic) published by Italian authors between the two World Wars. The specific nephrological items searched in the literature between 1918 and 1939 are listed in Table I.

Subject	N. of Papers	%
Nephropaty (general)	118	18.4
Glomerulonephritis	82	12.8
Renal function	73	11.4
Hematuria	63	9.8
Kidney stones	45	7.0
Polycystic kidney	38	5.9
Diuretics	38	5.9
Albuminuria	36	5.6
Azotemia	37	5.7
Renal diabetes	26	4.0
Hypertension & Kidney	21	3.2
Creatinine	17	2.6
Nephrosis	15	2.3
Nephrosclerosis	12	1.8
Uremia	10	1.5
Pielonephritis	7	1.0
<b>Total</b>	<b>638</b>	<b>100</b>

**Table I: Kidney studies published by Italian authors between World War One and World War Two**

Within these subject areas, we have also singled out specific issues, emerged during the observed period, that were not dealt with in previous years and that are still of scientific interest today. We also examined the respective chapters of two major Italian medical treatises, published in 1931 and 1939.

Of each author we have encountered, we have reported the age and the subsequent professional development, searching for those who, in the second post-war period, would have a role in modern Italian nephrology and in the foundation of the Italian Society of Nephrology (SIN) in 1957 [5].

## Results

We retrieved 638 published papers dealing with kidney studies published by 343 Italian authors (Table I). The mean number of papers per author was 1.6.

### Subject of the papers

The largest group has been labeled “general nephropathies” and includes different types of conditions, investigations, and therapies.

The second group concerns glomerulonephritis. This includes 10 papers on “trench nephritis”. These are of particular interest since they show that their authors were up to date on research carried out in other countries and that their pathogenetic hypotheses were sufficiently well founded [6]. It was believed that the conditions of the soldiers in the war environment had created a general and/or renal vulnerability and that this favored infectious processes, causing glomerulonephritis. Histologically it was identified as a diffuse proliferative form. The long-term prognosis was considered poor. Most concepts, especially those concerning the infective etiology, were in good keeping with the conclusions drawn on the matter by the top medical figures of the time [7].

The investigation of renal function is the subject of 11.8% of the papers. The analysis shows that in Italy in the mid '30 this was a much-debated topic. In a 1931 medical treatise, the concentration-

dilution test was deemed the most reliable assessment of renal function [8]. No clearance tests were taken into account. In the following years new concepts and new tests came into play. The urea clearance as a measure of the efficiency with which the kidneys remove urea from the blood stream was introduced after the WW1 and spread rapidly [9]. Its precision in assessing glomerular filtration was however invalidated by the rate of urea reabsorption by the tubules.

Rehberg had tried to overcome this drawback by devising a clearance method aimed at measuring the glomerular filtration based on an administration of a substance only filtered by the glomeruli [10]. Unfortunately, the load of creatinine administered was so large that the high blood concentration attained caused a tubular excretion of the substance together with glomerular filtration, altering the results [11]. Therefore, in Italy, the assessment of glomerular filtration through the recently proposed formula caused enthusiasm and controversy at the same time. Some studies did not fully support the results obtained by applying Rehberg's method to the measurement of glomerular filtration in renal diseases [12]. On the other hand, other scientists found that this method could be improved to provide reliable results. In this way, by introducing the concentration of naturally occurring plasma creatinine in the formula of Rehberg, the Italian doctor Ferro-Luzzi was the first in the world to describe the clearance of endogenous creatinine and to obtain reliable results (Fig. 2) [13,14,15]. These studies were among the few to be published on foreign journals. The same applies to a basic science study on glomerular filtration published on an American journal and that deserves particular attention as it was written by a young Italian scientist destined for a very brilliant academic career Fig. 3 [16].

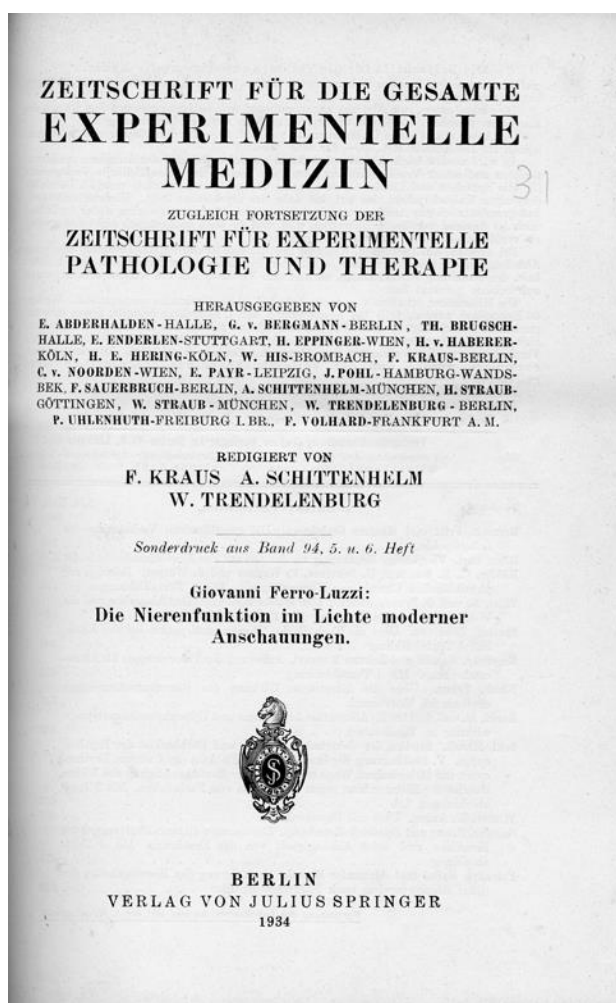
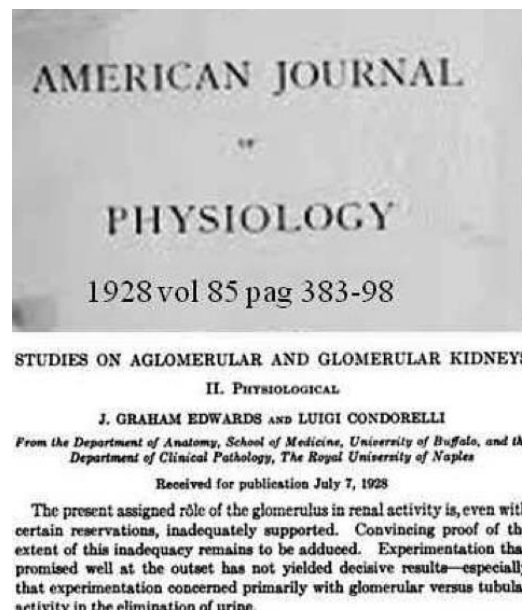


Figure 2: One of the papers on the use of the creatinine clearance by Ferro-Luzzi published in German journal



**Figure 3: The first nephrological paper published by an Italian scientist in an American Journal**

Azotemia (BUN) and creatinine are the subject of 8.3% of published research and are closely related to the studies of semeiology and renal physiology.

Among the other studies, those dealing with the relationship between kidney and hypertension should be highlighted. These 21 papers represent 12.5% of all hypertension articles and provide interesting insights into the research trends of the time. Renal denervation was attempted as a treatment for arterial hypertension [17]. The possibility of irradiating the carotid sinus to reduce blood pressure was also explored [18]. Finally, attempts at surgical therapy for arterial hypertension proposed by important clinicians of the time also deserve to be reported [19]. Other subject listed in table I are of lesser relevance or are tainted by concepts that have completely disappeared in the evolution of nephrology. An example is represented by the “nephrosis” group: this word, at the time, indicated conditions completely different from what we mean today. The progress made in Italy, with the aforementioned studies, and abroad during the decade 1930-40 is well evidenced and discussed in the ponderous section (397 pages) on the kidney of the “Ceconi and Micheli” internal medicine treatise of 1940 [20]. From those pages, and the relative bibliographic references, we could also identify the Italian authors considered as “opinion leaders” in kidney studies at the time.

### Authors

In order to single out the authors with a greater nephrological interest, we have arbitrarily selected those with a number of publications on the topic equal to or greater than five. In Table II these authors are listed along with their age and research location. All of them came from the most prestigious Italian universities, where studies on the kidney had already developed in previous years [4].

Author	N°papers	Birth and death	City of work
Ferro-Luzzi Giovanni	28	1903-2000	Roma-Messina
Marcolongo Fernando	23	1905-1969	Torino
Condorelli Luigi	17	1899-1985	Napoli-Catania
Cesa-Bianchi Domenico	6	1879-1956	Milano
Gavazzeni Mauro	6	1904-1935	Pavia
Bufano Michele	5	1901-1993	Parma
Fieschi Aminta	5	1904-1991	Pavia

**Table II: Authors with 5 or more nephrological papers**



Interestingly, all but one were quite young at the time of the nephrological research we have retrieved. Three of them stand out for the number of published articles and their quality: Ferro-Luzzi, Marcolongo and Condorelli.

Ferro-Luzzi produced a series of studies on the kidney published in important international German-language journals between 1931 and 1939. The most interesting were those on plasma creatinine and its pioneering use in the calculation of clearance [13, 22]. Ferro-Luzzi is also the most cited Italian author in the chapter on renal function of the aforementioned treatise by Ceconi and Micheli [20]. For historical purposes, it should be noted that Filippo Romeo (1908-1981), who was a little younger than Ferro-Luzzi, conducted some nephrological research in association with him and, many years later, was one of the founders of the SIN [22]. This collaboration was interrupted when Ferro-Luzzi went to direct the Italian hospital in Asmara in 1939, where he founded the local medical school and remained until 1955.

Marcolongo belonged to the Turin academic school of Ferdinando Micheli (1872-1937). Since his degree in medicine in 1927, he devoted much of his research activity to the study of the kidney under all its physio-pathological, clinical and therapeutic aspects. In recognition of his experience in the nephrology field, he was entrusted with writing the chapter on kidney diseases of various medical treatises, first of all the Ceconi-Micheli of 1939 [20]. He obtained the academic position of professor of medicine in Siena and, years later, he appears among the members of the first board of the newly formed SIN.

Condorelli appears in this list not only for the number of kidney studies published, but also because he is the first Italian to publish a nephrological article in an American journal (Fig. 3, above) [16]. After this early interest in nephrology, Condorelli extended his research to other organs, especially the heart, where he obtained even more brilliant results. At the height of his career, he became a renowned professor of medicine at the University of Rome.

The presence of Bufano and Fieschi in our list of authors is of particular interest, since both of these researchers played an important role in post-war nephrology. Bufano created one of the most important Italian nephrological schools in Parma and was one of the founders of SIN. From an academic point of view, he achieved the position of professor of medicine in Rome. Fieschi, later a member of the first board of the SIN, was a pioneer of renal dialysis. In fact, in 1947, before becoming professor of medicine in Genoa, he conceived and built his original model of artificial kidney [23].

A sad fate awaited the last of these authors. Gavazzeni, who had carried out some brilliant research in the department of Adolfo Ferrata (1880-1946) in Pavia, died as a hero in the war of 1935 [24]. The city of Bergamo named a street after him.

Finally, after having considered some of the most prolific authors in the nephrological field, we cannot forget those who were taking their first steps back then. Among them, especially noteworthy are Domenico Campanacci (1898-1986) and Cataldo Cassano (1902-1998) who, in the early '30s, had proposed their theories on the nature of lipoid nephrosis [25]. Years later, both authors founded important nephrological schools.

## Conclusions

From the results of this investigation on kidney studies in Italy between the two World Wars we can draw a few conclusions. Italian scholars were very active in this area of medicine and their knowledge was up to date and on the same level of their colleagues abroad. The most productive researchers were young, which may indicate that the complex issues inherent to kidney function

required a fresh and prepared mind. Therefore, only few selected researchers chose to approach this field. All of them carried out their research in the context of the most advanced medical schools in Italy. Here, a fruitful synthesis took place between these researchers' new ideas and the structures most suitable for supporting their work. The quality of these young researchers is also confirmed by their success in their subsequent academic career. It is astonishing that all of them obtained positions of great importance in Italian medicine and inspired internal clinical schools or, more specifically, nephrological institutions. Finally, the names of many of these scholars appear in the formal act of foundation of the SIN, which ratified the existence of a substantial number of clinicians and researchers dedicated to the study of the kidney in Italy. This confirms the very close connection existing between "modern" Italian nephrology and what was achieved in this field between the two World Wars.

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