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Turkish Nephrology on the Centenary of the Republic

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A B S T R A C T

After the establishment of the Turkish Republic on October 29, 1923, the main targets in the field of health were determined as combating contagious diseases, increasing the number of physicians and healthcare personnel, improving the interregional distribution of physicians, giving women the right to receive medical education, and granting only Turkish citizens the right to practice medicine (except formerly working foreign physicians and those working in hospitals established by foreign states). Modern medical education was introduced in the Ottoman Empire with the "Tıphane ve Cerrahhane-i Amire (Mekteb-i Tıbbiye-i Şahane)" school opened on March 14, 1827. After the implementation of the University reform in Turkey in 1933, Istanbul University Faculty of Medicine became one of the most important centres in Europe with the contributions of well-known foreign scholars and Turkish faculty members. After World War II, the first medical school of the republican era was opened in Ankara in 1945. This article provides a chronological review of the developments in Turkish nephrology during the Republican period.

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Nephrology specialisation, obtained by completing a three-year subspecialty training after internal medicine specialisation in Turkey, focuses mainly on diagnosing and treating kidney diseases. For thousands of years before the advent of the nephrology speciality, doctors struggled to diagnose kidney disorders. Nephrology is a term of Greek origin, nephros, meaning "kidney," combined with the suffix -logy, meaning "the study of." The word "kidney" appears for the first time in Turkish in the Orkhon inscriptions as "bögür," which indicates the name of the space between the rib bone and the hip. In the historical periods of Turkish, it is in the form of words meaning "kidney, bögür, böğür, bügür, bögr, yan." Later, in the Ottoman Period, the word "böğrek" was probably used in the sense of kidney by adding the suffix "-ek" to the word "böğür." Although the term "böğür" is still widely used among the public to associate it with where the organ is located, it is now referred to as "kidney = böbrek".[1,2]

Kidney biopsy, dialysis, and kidney transplant treatments have been milestones in the advancement of nephrology science.[3] By the mid-1960s, kidney biopsies increased the experience in kidney histopathology. Kidney biopsy has transformed the diagnostic approach to kidney disease from a clinical methodology to an approach based on morphological analysis. In the 1980s, with the understanding of the immunopathological mechanisms of glomerular diseases, immunological agents began to be used in treatment. With the advances in molecular biology tests and molecular genetics in the 1990s, it became possible to distinguish between hereditary and acquired diseases.[1]

In addition to hereditary or acquired primary kidney diseases and many systemic diseases that affect the kidneys secondarily, the frequency of health problems such as diabetes, hypertension, obesity, atherosclerotic heart disease, rheumatological diseases, and cancer, which negatively affect our kidneys, is increasing as a result of today's modern lifestyle. To raise awareness about kidney disease, "World Kidney Day" was celebrated for the first time on March 9, 2006, with the joint initiative of the International Society of Nephrology (ISN) and the International Federation of Kidney Foundations (IFKF). Since then, it has been celebrated every year on the 2nd Thursday of March. Chronic kidney disease (CKD) is an increasingly important public health problem worldwide and in Turkey and is a significant cause of morbidity and mortality. World Kidney Day, celebrated on March 9, 2023, focused on the theme "Healthy Kidneys for All". The fact that awareness of the disease in society is below 10% makes it difficult to detect the condition in the early stages and leads to the progression to end-stage kidney disease. The CREDIT study conducted in our country estimated the prevalence of CKD in adults as 15.7% (~7.5 million people) and the awareness of kidney diseases as 1.6%.[4] In recent years, end-stage kidney disease (ESKD) incidence rates have remained relatively stable in many high-income countries but have increased significantly, predominantly in East and Southeast Asia. This global increase is likely due to increased survival rates in patients with ESKD, population demographic shifts, higher prevalence of ESKD risk factors, and increased access to renal replacement therapy (RRT) due to economic growth.[5] The total and per capita treatment expenditure amounts for central hemodialysis, home hemodialysis and peritoneal dialysis patients across Turkey 2020 USD (TRY) were calculated as 311,539,594/6,337$ (2,190,813,676/44,563 TL), 4,378,976/6,328$ (30,798,372/44,506 TL) and 42,496,272/11,844$ (298,855,007/83,29 TL), respectively.[6] Today, it is estimated that approximately 10% of the world's population (850 million people) suffers from CKD.[7] The annual cost of dialysis usually exceeds $25,000.[8] In our country, the General Directorate of Public Health of the Ministry of Health has initiated the Turkey Kidney Diseases Prevention and Control Program action plan with the contributions of public institutions and organisations, universities and non-governmental organisations to increase awareness and early diagnosis rates of kidney diseases and to reduce the adverse effects of diseases on the society.[9]

Development of nephrology in Turkey

Erich Frank was invited to our country in 1934 and served at Istanbul University Internal Medicine Clinic for 23 years.[10] He trained hundreds of students and scientists, some of whom were first-generation Turkish nephrologists, and pioneered the establishment of the discipline of nephrology.[11] Kurt Steinitz, a prominent internist in chemistry and Erich Frank's assistant opened new testing laboratories in Turkey with Erich Frank and Erica Bruck. He used the measurement of endogenous creatinine clearance and glomerular filtration rate, showing that progressive loss of kidney function caused a hyperbolic increase in creatinine level. He contributed to Turkish medicine by establishing the infrastructure for transferring conserved blood. He immigrated to Israel in 1943, where he performed the first artificial kidney and dialysis on patients.[12,13] Elisabeth Wolff, one of the founders of modern dietetics and brought with her by

Erich Frank as a dietitian, trained many nurses as dietitians and wrote a Turkish diet treatment book, including kidney diseases. Erich Frank has researched orthostatic proteinuria, albuminuria, essential hypertension, hypertension due to renal parenchymal diseases, renal glycosuria and pregnancy glycosuria. Frank gifted two books to Turkish medicine: "Medical Kidney Diseases Clinics (1941)", which contained wholly original and modern information and was considered the first Turkish nephrology textbook, and "Carbohydrate Metabolism Pathology", published in our country the same year it was published abroad.[13] Then, Dr Cavit Sökmen, who worked at Ankara University Faculty of Medicine, wrote the book "Internal Kidney Diseases" in 1950.[14]

Studies in the field of nephrology in our country began in the 1950s. Peritoneal dialysis was applied to two patients with septic abortion and acute renal failure at Istanbul Haseki Hospital. The first kidney biopsy was performed by Dr Selahattin Koloğlu (Ankara University) in 1954. Dr Necdet Koçak laid the foundations of the branch of nephrology by establishing a department in 1958 to research "Kidney diseases, water and electrolyte metabolism", and in 1960, he studied "Kidney functions in diabetes insipidus, mechanism of action of mercury diuretics in diabetes insipidus, phosphorus excretion of renal tubules, renal tubular asthenia and juxtaglomerular filtration.".[15] In 1958, Dr Nihat Sipahi applied acute peritoneal dialysis in the style of peritoneal lavage to a young patient (Ankara University). In June 1962, Dr Ergün Ertuğ and his team performed the first acute hemodialysis treatment with Kolff's artificial kidney device. Subsequently, acute peritoneal dialysis was performed in 1963, and percutaneous kidney biopsy was performed in 1964.[15,16]

The Istanbul University Faculty of Medicine Treatment Clinic is Turkey's first legal nephrology institution. In 1967, the Turkish Ministry of Health and Social Assistance accepted Nephrology as one of the postgraduate branches. In 1968, Dr Kemal Önen established the first official nephrology unit at the Internal Medicine Clinic of Cerrahpaşa Faculty of Medicine. Between 1970 and 1982, Dr Saim Yeğinboy (Ege University), Dr Cemil Kobal (Çukurova University), Dr Şali Çağlar (Hacettepe University), Dr Aydoğan Öbek (Bursa Uludağ University), Dr Ergün Ertuğ (Ankara University) and Dr Ayla San (Atatürk University) were other founders of the science of nephrology in our country.

In 1973, Dr Şerafettin Tuna and Dr Ergin Ark introduced intermittent peritoneal dialysis into routine practice in patients with chronic renal failure. In 1981, a patient-administered chronic intermittent peritoneal dialysis application using the Tenckhoff catheter was initiated at the Istanbul Faculty of Medicine under the responsibility of Dr Ahmet Kadıoğlu. Dr Nejdet Koçak et al.[17] published the results of 18 patients who performed bottle dialysis by keeping the dialysate in the abdomen for 6-8 hours with a Tenckhoff catheter, as described by Popovich and Moncrief. In 1985, Dr Bülent Erbay and Dr Oktay Karatan from Ankara University initiated continuous outpatient peritoneal dialysis treatment in its current sense.[18] In 1965, Istanbul University Cerrahpaşa Medical Faculty Dr Kemal Önen initiated the first hemodialysis application. Dr Şali Çağlar at Hacettepe University started Turkey's first continuous hemodialysis program in 1973. Shunts were used as vascular access in hemodialysis treatment until October 30, 1972, and then, arteriovenous fistulas were used. Dr Selahattin Çetin and his team performed the first arteriovenous fistula operation in 1975.[19,20] Dialysis science boards were officially established under the Ministry of Health in 1993, and the Dialysis Science Board Dialysis Centers Regulation was published in the Official Gazette.[15]

The first living donor transplant in Turkey was performed in 1968 by Istanbul Medical Faculty 1st Internal Medicine and Surgery Clinic. After successful operations, the first patient died 5 hours later due to ventricular fibrillation, and the second patient died 27 days after the transplant due to gastrointestinal bleeding and infection.[21] Dr Mehmet Haberal and his team performed the first successful kidney transplant from a living donor (from mother to son) on November 3, 1975, at Hacettepe University. In the following years, the same team performed the first kidney transplant from a deceased donor.

After the department of nephrology was officially established in 1982 by the decision of the Council of Higher Education, Turkish nephrology managed to reach world standards in the 1990s.

Nephrology associations around the world began to be established in the 1960s. On March 3, 1970, the " Turkish Society of Nephrology (TSN)" was founded in the pharmacology and treatment clinic of Haseki Hospital affiliated with Istanbul University (Founding members; Dr Ekrem Şerif Egeli, Dr Sedat Tavat, Dr Reşat Garan, Dr Kemal Önen, Dr Osman Barlas, Dr Ferhan Berker, Dr Gıyas Korkut, and Dr Necdet Koçak).[22] In 1976, Dr Mustafa Yurtkuran founded the "Kidney Diseases Diagnosis and Treatment Foundation", and then in 1980, Dr Ayla San founded the "Chronic Kidney Diseases Treatment Foundation". The first international Nephrology meeting was held on 6-11 January 1964 under the

name “Paris and Ankara Medical Faculties Cardiology and Nephrology Week”. The first physician in Turkey to receive Nephrology subspecialty training abroad was Dr Kemal Önen, and the first person to take the nephrology specialisation exam was Dr Şali Çağlar. The first international meeting (EDTA and EDTNA Meeting) was held by Dr Kemal Önen at the Atatürk Cultural Center on 4-7 June 1978. On 4-6 June 1980, “1. National Dialysis and Transplantation Congress” was held in Bursa under the chairmanship of Dr Aydoğan Öbek.[15]

The close relations established by the Turkish Nephrology community with international associations such as the International Society of Nephrology (ISN) and the European Renal Association–European Dialysis and Transplant Association (ERA-EDTA) have enabled our young scientists to advance nephrology education or conduct research in Europe and the USA. Association members have taken active roles in international associations, boards, congresses and journals. Together with ISN and EDTA–ERA, the TSN organised a Nephrology Course in Istanbul in 1997, an International Summer School in Izmir in 1998, and a congress at the Aegean Faculty of Medicine jointly with the Balkan Cities Congress (BANTAO) in 1999. On June 5, 2000, the TSN celebrated its 30th and ISN’s 40th anniversary and a joint congress was held with ISN. After 27 years, the TSN had its 42nd ERA-EDTA Congress, the largest Nephrology Congress in Europe, for the second time in Istanbul on 4-8 June 2005. On June 21-25, 2008, TSN hosted the 12th International Society for Peritoneal Dialysis (ISPD) Congress in Istanbul.[22] Turkey is among the countries that submitted the most abstracts at ERA-EDTA Congresses.[23]

The TSN supported the establishment of the Nephrology–Dialysis and Transplantation Nursing Association, and nurse congresses are still held together. Association branches continue to update physicians’ knowledge in the nephrology field in their region through educational activities. In addition, many important books in the field of nephrology continue to be translated into Turkish and many national books and guidelines continue to be published as TSN publications.[22] Turkish Journal of Nephrology (formerly Turkish Journal of Nephrology, Dialysis and Transplantation), the official publication of TSN, started its publication life in 1992 under the editorship of Ekrem Erek. Turkish Journal of Nephrology is indexed in the “Web of Science-Emerging Sources Citation Index”.

Another association, the Turkish Society of Hypertension and Renal Diseases, was founded in Ankara in 1995 to combat hypertension, kidney diseases and their negative consequences. It was accepted as a member of the “World Hypertension League” in 2006 and the “World Initiative on Salt and Health” in 2007. It has been regularly organising “World Hypertension Day” events since 2006. This association has carried out critical scientific studies on hypertension in our country (“Turkish Hypertension Prevalence Study [PatenT], Turkish Hypertension Incidence Study [HinT], Salt Consumption and Hypertension in Turkey [SALTurk] and Turkey Home Blood Pressure Measurement Devices studies).[24]

In 1990, Dr Ekrem Erek laid the foundation of the TSN National Registration and Statistics Board, which has been operating successfully for more than 30 years. In addition, Turkey’s RRT data has been included in the ERA annual registration reports since 2001 and in the ‘International Comparisons’ section of USRDS yearly reports since 2003. Thus, our country’s RRT results can be compared with world data.[25]

During the 17 August 1999 Marmara earthquake, nephrologists, under the coordination of the TSN, made an intense effort for the treatment of patients with acute kidney injury due to Crush syndrome and achieved a relatively low mortality rate of 15%. Dr Mehmet Şükrü Sever pioneered many scientific studies that contributed significantly to the medical literature in this field after the 1999 Marmara Earthquake. He was appointed as a field doctor and disaster relief coordinator by the Turkish and World Nephrology Societies and contributed to the preparation of the largest disaster database in the world. He was the co-chairman of the group that prepared the world’s first and only guide on the prevention and treatment of crush syndrome, and this guide, published in 2012, began to be used as the “Disaster Field Guide” by Medecins Sans Frontieres (MSF) Rescue Teams. Turkish nephrologists actively participated in many domestic and international disasters in the following years.

Pediatric nephrology became a subspecialty of paediatrics in Turkey in 1983. The Pediatric Nephrology Association was established in 1990. Today, there are 107 pediatric nephrology centres, 265 well-trained specialists, 28 pediatric hemodialysis units, 39 pediatric peritoneal dialysis units, and 26 pediatric transplant centres in Turkey.[11]

Hemodialysis is available in 98% of countries, peritoneal dialysis is available in 79%, and kidney transplantation is available in 70%. 63% of countries provide public financing for hemodialysis, 55% for peritoneal dialysis, and 59% for kidney transplantation. Nephrologists are primarily responsible for kidney failure care in 87% of

countries worldwide, and primary care physicians are responsible for 7%. While 5.8% of nephrologists treat children, the proportion of female nephrologists (treating adults and children) is 35%. The density of nephrologists increased worldwide from 9.5 pmp (rate per million population ≥18 years) to 12.4 pmp (30.4% increase) between 2019 and 2023. The median prevalence of nephrologists worldwide is 11.75 pmp. It is highest in North and East Asia (28.7 pmp) and lowest in Africa (1.1 pmp). The prevalence of nephrologists varies significantly across regions and income groups. The density of nephrologists in high-income countries is 80 times higher than in low-income countries. The prevalence of nephrology trainees is 1.15 pmp despite a 0.74% increase and varies widely between countries.[8] In our country, as of the end of 2022, there are 921 hemodialysis (18,736 machines), 81 home hemodialysis, 134 peritoneal dialysis and 78 transplantation centers (Ministry of Health, University and Private) where RRT is applied.[25] The prevalence of nephrologists in Turkey is between 1.8-11.7 pmp.[8] Currently, some science branches provide nephrology speciality training in many centres in Turkey. However, considering the increase in CKD results and ESRD patients, it is clear that the number of nephrologists[26] and their regional distribution are not at the desired level. In more than half of the world’s countries, there is a need for more key health professionals required to provide optimal care, including nephrologists (who treat adults and children) and transplant surgeons, dietitians, transplant coordinators and dialysis nurses.

CONCLUSIONS

In the 100th year of our Republic, our country’s nephrology has come a long way and has reached a level that competes with the world in every field. Today, the decrease in interest in nephrology, depending on various reasons, may become a severe problem in the coming years. Ways should be sought to overcome the lack of interest in this speciality among young physicians worldwide. Focusing on genetics, molecular studies, and applications of new technologies, especially computer software and artificial intelligence, is critical in nephrology.

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Study Conception: AE, İİ; Study Design: AE; Literature Review: AE; Critical Review: AE; Data Collection and/or Processing: AE,; Analysis and/or Data Interpretation: AE; Manuscript preparing: AE.

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