PROF. DIMITAR HRISOHO, MD, PHD,
FOUNDER OF NEPHROLOGY IN THE R. N. MACEDONIA

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ABSTRACT

Prof. Dr. Dimitar T. Hrisoho was born on June 11, 1924 in Bitola, R. Macedonia. He died in Struga on September 22, 1986, and was buried in Skopje.
He completed primary and secondary education in Bitola. He graduated from the Medical Faculty in Belgrade in 1951 as one of the best students of his generation (average grade of 9.75). In 1953 he was employed at the Internal Clinic of the Medical Faculty in Skopje, where in 1955 he passed the specialist exam in internal medicine. He successfully defended his habilitation “Polyarthritis chronica evolutiva” and his doctoral dissertation “Clinical features of Vitina nephropathy”. The doctoral dissertation indicates that Vitina nephropathy is a new site of the Balkan Endemic Nephropathy entity and that more genetic testing of patients were needed. Based on numerous clinical and scientific researches published in over 200 papers, he was elected a Full Professor of internal medicine at the Medical Faculty of the Ss. Cyril and Methodius University in Skopje in 1971. In 1970, he formed the nephrology section of the Macedonian Medical Association (MMA), which grew into the nephrology Association of MMA. Through the
Association, the education of the medical staff from the field of nephrology was performed. He also set up a bio-cybernetics association.

He achieved his vision and desire to transfer and apply the achievements of modern nephrology in the diagnosis and treatment of kidney patients in Macedonia at the Clinic of Nephrology of the Medical Faculty in Skopje, which was the first specialized institution established for examination and treatment of kidney patients in the former Yugoslavia and the Balkans. The Clinic educated nephrological staff and examined and treated kidney patients with new methods and drugs that positively affected the development of nephrology as a subspecialty of the internal medicine. D. Hrisoho was actively involved in the introduction of new methods for examination of kidney patients, as well as in the treatment of patients with acute and chronic renal insufficiency with dialysis since 1965. He also participated in the first two kidney transplantsations from living donors performed in 1977. He wrote a chapter on “kidney examination”, printed in the book of Prof. A. J. Ignjatovski “Fundamentals of Internal Propedeutics” Part III, published by “Prosvetno delo”, 1963, in Skopje. This is the first text to investigate a patient with kidney disease published in a textbook in R. Macedonia. In 1984 he published the textbook “Clinical Nephrology” printed by the University of the Ss. Cyril and Methodius University in Skopje.

Prof. D. Hrisoho organized the First Scientific Meeting of Yugoslav Nephrologists with international participation, from 26 to 28 September 1977, in Struga, R. Macedonia. The meeting was attended by prominent nephrologists from the former Yugoslavia, the Balkans, Europe and the United States, among them: J.S. Cameron from UK, J.L. Funck-Brentano from France, M. Burg and P. Ivanovich from the USA, R. Kluthe from Germany and A. Puchlev from Bulgaria. The scientific meeting was the largest nephrology event until then organized in the former Yugoslavia. The meeting provided an exchange of experiences with world-renowned nephrologists. D. Hrisoho presented the paper Artificial intelligence in nephrology. The author tried to apply bio-cybernetics in nephrology. Prof. D. Hrisoho was Vice Dean of the Medical Faculty in Skopje in the period 1963-1965 and Vice Rector of the University of the Ss. Cyril and Methodius University in Skopje in the period 1974-1975. Prof. Hrisoho was also active in socio-political organizations. For his medical, educational and scientific activities he received several awards and recognitions in the country and abroad. Thus, the work of Prof. D. Hrisoho was permanently embedded in the nephrology of R. Macedonia.

**Keywords**: nephrology, dialysis, transplantations, interstitiopathies, endemic nephropathy, Vitina nephropathy, Clinic of Nephrology, First Scientific Meeting of Yugoslav Nephrologists, bio-cybernetics

Prof. Dimitar T. Hrisoho was born in Bitola, R. Macedonia, on June 11, 1924 by father Tomo and mother Marika as the first of two children (Dimitar and Aleksandar). The economically situated family provided a good education for the children.

He completed primary and secondary education in Bitola, and enrolled at medical studies and graduated from the Medical Faculty of the University of Belgrade in 1951, as one of the best students of his generation with an average grade of 9.75.

He has started a specialization in internal medicine in the general hospital in Bitola. In 1953 he was employed at the Internal Clinic of the Medical Faculty in Skopje. He completed his specialization in internal medicine in 1955.

![Fig. 1. Dimitar and Radmila Hrisoho (right) with Momir and Biljana Polenakovic (left)](image-url)
In 1955 he married Radmila Stavric, a graduate chemist with whom he had two daughters: Meri Georgievska-Hrisoho, a doctor who lives with her family in Switzerland, and Ida Hrisoho-Lozanski, a graduate engineer who lives in Skopje and works in an architectural company.

Prof. Dr. Radmila Hrisoho-Stavric became a close associate with Prof. D. Hrisoho and she has introduced a number of biochemical methods in the investigation of the renal function. From the Head of the Laboratory of the Clinic for Internal Medicine Prof. R. Hrisoho-Stavric became a Professor at the Faculty of Medicine and transformed the Laboratory into an Institute for Clinical Biochemistry at the Faculty of Medicine.

D. Hrisoho developed and worked at a time when medicine and genetics were rapidly evolving in the world with the application of new scientific and technical inventions, with the application of cybernetics in the examination and treatment of patients. In addition, conditions have been created for the creation of subspecialties in the internal medicine.

With the development and application of dialysis or blood purification, patients with terminally impaired renal function, previously without any possibility of survival, received the opportunity for chronic treatment and life. Kidney transplantation and new immunosuppressive drugs have been developed meaning prolonged life with a transplanted kidney.

The physiology and pathology of the kidneys have been intensively studied. Renal biopsy (especially percutaneous renal biopsy) has been introduced clinically, which has allowed the acquisition of renal tissue and its examination with light, immunofluorescence, and electron microscopy. This provided a better understanding of the morphology and the pathology of the kidneys and the classification of the kidney disease, as well as an appropriate treatment.

D. Hrisoho, dedicated to the investigation and treatment of the sick, humanist and visionary, considered all these nephrological achievements to be applied to our patients in R. Macedonia.

D. Hrisoho worked hard to educate younger colleagues to understand the kidney patients and to do their best in the investigation and the treatment.

D. Hrisoho successfully defended his habilitation on “Polyarthritis chronica evolutiva (our views on early diagnosis and specific forms)”, as well as his doctoral dissertation on “Clinical features of Vitina nephropathy”, required for obtaining and advancing in teaching titles [1]. Based on numerous clinical and scientific researches and published papers he was elected a full professor of internal medicine at the Medical Faculty in Skopje in 1971.

At the beginning of 1975 D. Hrisoho, together with his colleagues, established the Nephrology Clinic at the Medical Faculty in Skopje and became its first head in the period 1975-1981. The Nephrology Clinic was the first institution established to examine and treat patients with kidney disease in the
former Yugoslavia. Its work has given impetus to the development of the subspecialty of nephrology.

With his work at the Nephrology Clinic, Hrisoho achieved his vision to provide, to enable the examination and treatment of kidney patients in the most advanced way. He educated the personnel about the modern nephrology. New examinations, drugs, methods, equipment have been introduced at the Clinic, scientific papers have been written on our experiences to make them available to everyone around the world; and thus, D. Hrisoho created a nephrology school.

The basic ideas of the development of nephrology in R. Macedonia were set even within the Internal Clinic, so that immediately after the establishment of the new University Department of Nephrology, the units of the Department were stipulated in its Statute: a Unit for Chronic Maintenance Dialysis led by Gj. Masin; an Intensive Nephrology Unit led by J. Jovanovski; a Unit for Vascular Access led by A. Oncevski; an Etiological Unit (for Immune morphological examinations) led by M. Polenakovic and a Nephrology Functional Evaluation Unit led by K. Zafirovska. In time, the Unit for Renal Transplantation was established as well as the Daily Nephrology Outpatient Unit and the unit for Peritoneal Dialysis. From the beginning, there was also an Outpatient Unit at the department led by R. Grozdanovski.

Prior to the establishment of the Nephrology Clinic there had been considerable experience in the diagnosis and treatment of renal patients. The first haemodialysis (HD) in the R. Macedonia (RM) was performed in 1959 on a patient with acute renal failure (ARF) using a Kolff-Brigham rotating drum artificial kidney at the Blood Transfusion Institute in Skopje. In 1965 the Renal Unit at the Department of Medicine, Medical Faculty in Skopje obtained a new, modern “Websinger” artificial kidney with a sigma motor pump and possibilities for use of a disposable Kolff “twin coil” dialyser. Between 1959 and 1971, HD was performed only in patients with ARF [2].

In May 1971, a Unit for chronic HD was founded at the Renal Unit and the program of maintenance hemodialysis (MHD) was started with five Stuttgart Fresenius machines and 12 patients dialyzed on twin coil dialyzers. That was a great incentive for the development of HD in the R. Macedonia enforced by the great number of patients with end stage renal disease.

All doctors and renal nurses as well as technicians (engineers) were educated for HD at the Nephrology Department, Unit for Maintenance HD. The average distance between the centers and the patients’ place of residence was 30–50 km, in order to facilitate their access to treatment and ability to work. All patients who have had symptoms indicating the need for treatment with hemodialysis have been accepted on MHD. The Government was covering all the expenses of the treatment and the salaries of the staff.

Under the leadership of Dimitar Hrisoho the Nephrology Clinic soon crossed the borders of R. Macedonia and became an important center for development of nephrology and one of the leading institutions in the field of nephrology in the former Yugoslavia.

In 1970 Prof. Hrisoho formed and was the first President of the nephrology section of the Macedonian Medical Association (MMA), which later became the Association of Nephrologists at the MMA. He was active in the work of the MMA.

As President of the Association, he organized numerous scientific and educational meetings at the national and federal level, and took an active part in the formation and work of the Association of Nephrologists of Yugoslavia. As a result of these activities Prof. Hrisoho was awarded the organization of the First Scientific Meeting of Yugoslav Nephrologists with international participation in Struga, R. Macedonia, from September 26 to 28, 1977.

Prof. Hrisoho also formed the Association of Bio-cybernetics at the MMA.

Even as a young doctor D. Hrisoho showed interest in clinical and scientific research on the kidneys. As an assistant professor he wrote the first text in R. Macedonia about the “kidney examination”, published in the book of Prof. A. J. Ignjatovski “Fundamentals of Internal Propedeutics” Part III, published by “Prosvetno delo”, 1963, in Skopje, p. 347-428. The text “Kidney Examination” in a modern and understandable way has been described by chapters: anatomy, topography and physiology of the kidneys; examination of the renal patient; functional examination of the kidneys; vascular disease of the kidneys; diseases of the renal glomeruli; diseases of the renal tubules and the renal interstitium; renal failure; renal tuberculosis, nephrolithiasis, and renal tumors. This text was very important for the students and doctors to get acquainted with the work and diseases of the kidneys at a time when there was scarce literature data on kidney diseases.
His rich clinical experience and research D. Hrisoho has presented in over 200 printed works in journals from the country and abroad, 29 of which are on PubMed and we present them.

   Polenkaković M, Dzikova S, Hrisoho D.
   PMID: 1024924

2. Experiences with percutaneous renal biopsy by “Tru-Cut” needle with diascopy and TV monitoring.
   Polenaković M, Hrisoho D, Dimecevski D.
   PMID: 1213561

   Hrisoho D, Hrisoho R.
   PMID: 4571919

   Hrisoho D, Zafirovska K.
   PMID: 4663228

5. Distal urinary syndrome due to changed uro-genital relations.
   Hrisoho D, Zafirovska K.
   PMID: 4663212

6. Estimation of the acidoregulatory ability of the kidneys.
   Hrisoho R, Hrisoho D.
   PMID: 4663209

7. Analysis of the composition of patients hospitalized with kidney diseases in a 1-year period.


10. Genetic factors in the etiology of endemic nephropathy.

11. Acute diffuse glomerulonephritis and congenital kidney abnormalities.

12. Some aspects of nephroangioneerosis observed in our personal clinical material.


16. Diagnosis of obstructive uropathies (with special reference to Ormond’s disease).

17. Survey of cases treated for ankylopoetic spondylarthritis in a clinic for internal medicine in the course of 10 years.

18. Problem of pyelonephritis from some clinical observations.

19. Management of patients with clinically manifested chronic renal insufficiency.

   Arsov D, Hrisoho D, Guceva B, Popovski B.
   PMID: 5993231

22. Our experiences with pregnancy in kidney diseases.
   Arsov D, Hrisoho D, Kjurciev K.
   God Zb Med Fak Skopje. 1964;11:139-44.
   PMID: 5891118

   Tecev D, Grunevski M, Hrisoho D.
   PMID: 5837854

24. FORESTIER’S DISEASE AND DIFFERENTIATION FROM ANKYLOSING SPONDYLO-ARTHRITIS.
   ARSOV D, GRUNEVSKI M, HRISOHO D, VANOVSKI B.
   PMID: 14125240

   ARSOV D, HRISOHO D, GUCEVA B.
   PMID: 13862623

   HRISOHO D, MASIN G.
   PMID: 14036400

27. Contribution to the differential diagnosis of hypothyroid edema.
   HRISOHO D, MASIN D.
   PMID: 14449483

28. Proteinogram in pulmonary tuberculosis.
   NANOVIC R, HRISOHO D, NIKOLOVSKI S.
   PMID: 14425972

   MIRONSKI S, DAVCEV P, GEORGIEVSKI G, HRISOHO D.
   PMID: 13622031

He described for the first time the new location of the endemic nephropathy in the village of Vitina, Kosovo, along the Binachka Morava River. In his doctoral dissertation “Clinical Characteristics of the Vitina Nephropathy”, on 150 typed pages with 12 figures and 64 tables, he analyzed the clinical characteristics of 53 patients with Vitina nephropathy and over 256 patients with other types of chronic nephropathy.

Prof. Hrisoho proved that was a separate nosological unit from the interstitial pathology. In the discussions about the etiopathogenesis of the disease he insisted on the role of heredity / genetic factors, among other external factors [1]. In his other papers, too, D. Hrisoho sought to investigate the genetic factors in the development of the endemic nephropathy, among other environmental impacts [3, 4, 5, 6].

D. Hrisoho with his associates J. Jovanovski, S. Dzikova, Gj. Massin, M. Polenakovic and K. Zafirovska successfully organized the “First Scientific Meeting of Yugoslav Nephrologists”, held from 26 to 28 September 1977 in Struga, R. Macedonia. The meeting was attended by prominent nephrologists from the former Yugoslavia, the Balkans, Europe and the United States, among them: J. S. Cameron from UK, J. L. Funck-Bren-
tano from France, M. Burg and P. Ivanovich from the USA, R. Kluthe from Germany and A. Puchlev from Bulgaria, who enriched the specialized part of the meeting with their lectures and discussions. The scientific meeting was the largest nephrology event ever organized in the former Yugoslavia and an opportunity to learn and share experiences with world-renowned nephrologists.

At the meeting were presented papers in the fields of nephroimmunology, renal hypertension, dialysis and kidney transplantation. Proceedings of papers from the meeting was also published. Prof. D. Hrisoho presented several papers, including the paper “Artificial intelligence possibilities to clinical judgment in nephrology” [7]. The paper attempts to apply a bio-cybernetic approach in nephrology, i.e. in the investigation of kidney disease. This was one
Fig. 7. V. Danilovic – Belgrade (left) and D. Hrishoho – Skopje (right)

Fig. 8. From left to right in the first row: JS. Cameron – London, R. Kluthe – Freiburg, I. Tadzer – Skopje, and D. Hrisoho – Skopje

Fig. 9. From left to right in the first row: R. Kluthe – Freiburg, I. Tadzer – Skopje, D. Hrisoho – Skopje, F. Brentano – Paris, P. Ivanovich – Chicago, M. Polenakovic – Skopje
of the first attempts to incorporate bio cybernetics into kidney research.

On July 7, 1977 the first two kidney transplantations from living donors were performed at the Surgical Clinic of the Medical Faculty in Skopje.

The surgical and urological team was composed of Ivan Vlashki, B. Badiev, Gj. Vasilev and the anesthesiologist, V. Andonov. V. Franciscovic, a surgeon at the Medical Faculty of the University of Rijeka, Croatia, was a consultant of the team.

The nephrology team was led by D. Hrisoho, and the team included: J. Jovanovski, Gj. Massin, M. Polenakovic and K. Zaﬁrovska.

The immunological team was led by P. Kolevski.

The first kidney transplantation in the R. Macedonia from a living donor, and later from cadaver, introduced the nephrology from the R. Macedonia in the modern world nephrology flows [8].

Prof. Hrisoho’s vision to diagnose and treat renal patients was performed with good clinical assessment, morphological functional diagnosis, drug treatment, dialysis, and renal transplantation.

Then, the emphasis was on accomplishing the prevention of the kidney disease, i.e. on the early detection of the kidney patient.

Prof. D. Hrisoho also wrote the first textbook on nephrology: “Clinical Nephrology” [9]. The textbook was published by the Ss. Cyril and Methodius University in Skopje, 1984, where on page 301 clearly are presented the basics of understanding of the anatomy and physiology of the kidneys; the

clinical examination of the kidney patients and the connection of the kidneys with other organ systems in the body, as well as the kidney disease and its treatment. The textbook had a positive effect on the development of nephrology in R. Macedonia.

In addition to the commitment to the investigation and treatment of the patients, Prof. D. Hrisoho found the strength and time to contribute to the development of the Medical Faculty in Skopje, where he served as Vice Dean in the period 1963-1965, and he was also Vice Rector of the University of the Ss. Cyril and Methodius University in Skopje in the period 1974-1975.

He was a member of the National health council for social policy and education.

He was a member of the Executive Board of the Republic Conference of Socialist Society of the Working People of Macedonia, member of the Central Committee of the League of Communists of Macedonia and a member of the Commission of the

Fig. 10. Clinical nephrology by Dimitar Hrisoho
Presidency of the League of Communists of Yugoslavia for social issues (he was also active in social organizations).

For his great contribution to the organization of health, the education of medical staff and for the activities in the society Prof. D. Hrisoho received high recognitions and has been awarded several times. We will mention only: Order of labor with a golden wreath (1966), Order of merit for the people with silver beams (1969) and Order of labor with a red flag (1979). He has received other awards, diplomas and plaques in R. Macedonia and abroad.

Prof. D. Hrisoho died at the Institute of Nephrology in Struga on September 22, 1986, and was buried in Skopje.

Prof. D. Hrisoho, as a doctor, humanist, visionary and great teacher, is the founder of nephrology in the R. Macedonia, for which we are all grateful.

Today, the Clinic of Nephrology at the Medical Faculty in Skopje holds his name as “Department of Nephrology Prof. D. Hrisoho”.

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REFERENCES

Резиме

ПРОФ. Д-Р МЕД. ДИМИТАР ХРИСОХО,
ОСНОВАЧ НА НЕФРОЛОГИЈАТА ВО РС МАКЕДОНИЈА

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Основно и средно образование завршил во Битола. Дипломирал на Медицинскиот факултет во Белград во 1951 година, како еден од најдобрите студенти во неговата генерација (просечен успех 9,75). Од 1953 година се вработил на Интерната клиника на Медицинскиот факултет во Скопје, каде што во 1955 г. го положил специјалистичкиот испит по интерна медицина. Со успех го одбранил хабилитационитон труд „Polyarthritis chronica evolutiva“ и докторската дисертација „Клинички карактеристики на Витинската нефропатија“. Во докторската дисертација укажува дека Витинската нефропатија е нов локалитет на ентиитет Балканска ендемска нефропатија и дека е потребно повеќе да се вршат генетски истражувања на болните. Врз основа на бројни клиничко-научни истражувања публикува в о над 200 труда избран е за редовен професор по интерна медицина на Медицинскиот факултет на Универзитетот „Св. Кирил и Методиј“ во Скопје во 1971 година. Во 1970 година ја формирал нефролошката секција при Македонското лекарско друштво (МЛД), која прераснала во Здружение на нефролозите на МЛД. Преку Здружението се вршеле едукацијата на медицинските кадри од подрачјето на нефрологијата и секцијата за биокибернетика.

Својата визија и желба да ги пренесе и примени постигнувањата на современата нефрологија во дијагностицирањето и лекувањето на бубрежните болни во Р Македонија најмногу ја реализирал на Клиниката за нефрологија при Медицинскиот факултет во Скопје, која била првата специјализирана институција формирана за исследување и лекување на бубрежните болни во поранешна Југославија, и на Балканот. На Клиниката се едуцираа нефролошки кадри и се исследуваа бубрежни болни со нови методи и лекови што позитивно влијаа на развојот на нефрологијата како супспецијалност на интерната медицина. Д. Хрисохо активно учествувал во воведувањето на нови методи за исследување на бубрежните болни, како и во лекувањето на болните со акутна и хронична бубрежна инсуфициенција со дијализа од 1965 година. Учествувал и во исследувањето на првите две бубрежни трансплантации од живи дарители, во 1977 година. Напишал поглавје за „исследување на бубрежните болни“, отпечатено во книгата на проф. А. Ј. Игњатовски „Основи на интерната пропедевтика“ III дел, објавена од „Просветно дело“ 1963 г. во Скопје. Ова е прв текст за исследување на болни со бубрежна болест објавен во учебник во Р Македонија. Во 1984 година ја објавил книгата, учебник „Клиничка нефрологија“ отпечатена од Универзитетот „Св. Кирил и Методиј“ во Скопје.


Ключни зборови: нефрологија, дијализа, траснплантација, интерстициопатии, ендемска нефропатија, Витинска нефропатија, Клиника за нефрологија, Прв научен состанок на нефролозите на Југославија, биокибернетика