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ABSTRACT

The development of neurosurgery in the Republic of Moldova has gone through some challenging pioneering stages. It gradually separated from the Society of Neurology, and its evolution has been extensive; it currently meets international standards.

Neurosurgery in Moldova has undergone a transformative journey from its humble beginnings to a globally recognised discipline, largely driven by the relentless dedication of visionaries. Among these, Prof. Grigore Zapuhli^h stands out as a trailblazer who shaped the neurosurgical landscape of Moldova, merging tradition with innovation and integrating the nation into global neurosurgical networks. His contributions, spanning decades, encompass clinical practice, academic mentorship, pioneering technologies, and international collaboration.

This article provides an in-depth exploration of the evolution of Moldovan neurosurgery, paying homage to Prof. Zapuhli^h's unparalleled contributions. It traces the historical context of the field, the milestones achieved through collaboration with the Romanian Society of Neurosurgery (RSN), and the modernisation of neurosurgical practices under his leadership. Prof. Zapuhli^h's role as a mentor, innovator, and global ambassador for Moldovan medicine has not only elevated the field locally but has also secured Moldova's place on the international stage. This tribute underscores the profound impact of his life and work, which continue to inspire the next generation of neurosurgeons.

INTRODUCTION

Context and importance

The Republic of Moldova, a nation defined by resilience and progress, has carved out a unique place in the world of medicine, particularly in

Keywords

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the field of neurosurgery. Despite its geographical and economic challenges, Moldova has emerged as a regional hub of medical excellence, owing much of this success to the tireless efforts of pioneers who dared to dream beyond limitations.

Neurosurgery in Moldova began in the mid-20th century, with rudimentary facilities and limited expertise. Over the decades, the discipline evolved through the contributions of visionary leaders, culminating in its integration with international neurosurgical communities. Prof. Zapuhlih was instrumental in this transformation, leading Moldova into the modern era of neurosurgery (1). Monitoring techniques and spinal stabilization options contribute to a high surgical success rate.

Historical data of Moldovan neurosurgery

The origins of neurosurgery in the Republic of Moldova are deeply rooted in the post-World War II period, reflecting the resilience of a nation rebuilding its healthcare infrastructure. The pivotal moment occurred in 1945, when a group of highly skilled physicians arrived in Chisinau from the Leningrad Institute No. 2 (now St. Petersburg), bringing with them knowledge of neurology and neurosurgery. Among these pioneers was Professor Boris Sarapov, who is celebrated as the Founder of the National School of Neurology in Moldova. His contributions laid the groundwork for the integration of neurology and neurosurgery into Moldova's medical education and clinical practice (Photo 1) (2).



Photo 1.
Boris Șarapov
(1897-1969)

By 1953, Moldova witnessed the establishment of its first neurosurgical ward.

Located within the Clinical Psychiatry Hospital in Codru, this 40-bed unit was headed by Associate Professor Zahar Sosonschin, a graduate of the prestigious Burdenko Institute in Moscow. Professor Sosonschin is remembered as the Father of Moldavian Neurosurgery, as his leadership and expertise were instrumental in shaping the early

direction of the field. His collaboration with other notable figures, such as Dr. Abram Cuciuc, contributed to the development of basic neurosurgical services during this foundational era (1-3).

The Institute of Neurology and Neurosurgery was inaugurated in 1958, marking a significant milestone in Moldovan medicine. Located at 2 Korolenko Street, Chisinau, this institute became the focal point for neurosurgical education, research, and clinical practice (Photo 2).



Photo 2. Institute of Neurology and Neurosurgery

The pioneers of Moldovan neurosurgery

The early neurosurgical teams in Moldova were composed of passionate and skilled individuals who worked under challenging conditions to build a solid foundation for the discipline. The first generation of neurosurgeons (1958-1990) included: Valerii Timirgaz, MD; Ilarion Gorea, MD; Fiodor Osadciuc, MD; Avram Cuciuc, MD; Mina Lia Bondaret, MD

These professionals were instrumental in establishing the neurosurgical protocols and practices that formed the backbone of Moldova's medical infrastructure. They focused on addressing urgent needs such as cranial trauma, intracranial tumors, and degenerative spinal diseases, often relying on limited resources.

The second generation of neurosurgeons (1990-present) includes notable figures such as: Iulian Glavan, MD; Eduard Eftodiev, MD; Grigore Zapuhlih, MD; Vladimir Rimari, MD; Vladimir Parpaut, MD. This generation, led by Prof. Grigore Zapuhlih, brought modernization, advanced techniques, and international collaborations to Moldovan neurosurgery (4).

Facilities and infrastructure development

The initial neurosurgical ward within the Clinical Psychiatry Hospital was the cornerstone of Moldova's neurosurgical efforts. However, it became evident that a dedicated institute was necessary to address the growing demand for specialized neurosurgical care. This led to the establishment of the Institute of Neurology and Neurosurgery (INN) in 1958, which became the central hub for all neurosurgical activities in Moldova.

The modern era of neurosurgery in Moldova commenced in 1999 with the construction of a new building for the INN. The institute's inauguration was attended by several prominent international figures, including Prof. Rudiger Lorenz, Prof. Prof. Alexandru Constantinovici, Prof. Daniel Rosenthal, and Prof. Ion Poeată, marking a significant milestone in the development of neurosurgery in the region (Photo 3) (5,6).

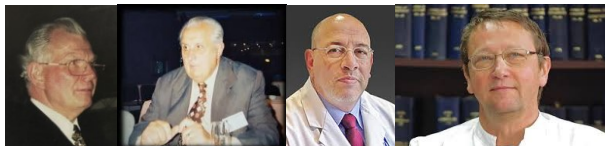


Photo 3. Prof. Rudiger Lorenz / Frankfurt, Prof. Alexandru Constantinovici / Bucharest, Prof. Daniel Rosenthal / Bad Homburg, Prof. Ion Poeata / Iasi

Under the directorship of Prof. Zapuhlih from 2015 onwards, the institute underwent substantial modernization, including: installation of a 3 Tesla magnetic resonance imaging (MRI) systems; introduction of advanced diagnostic tools such as 3D spiral CT and transcranial ultrasound Dopplerography; development of specialized departments for vascular neurosurgery, spinal neurosurgery, and neurorecovery; digitalization and neuroimaging, enabling precise diagnostic and surgical planning (6).

The INN has 170 hospital beds, including 30 dedicated to emergencies and intensive care. The facility is staffed by 44 neurologists, 20 neurosurgeons, and 14 anesthesiologists, making it one of the most advanced medical centers in the region.

Key historical scientific events in Moldovan neurosurgery

1. Affiliation with International Neurosurgical Organizations

- In 1995, Moldova became a member of the European Association of Neurosurgical Societies (EANS), facilitated by collaborative efforts with the Romanian Society of Neurosurgery.

- In 1997, Moldova joined the World Federation of Neurosurgical Societies (WFNS), further integrating its neurosurgical community into the global network.

2. Significant Contributions of Moldovan Neurosurgery

- Focus on minimally invasive techniques for spinal degenerative pathology.
- Development of endovascular approaches for cerebrovascular diseases.
- Integration of digital neurosurgical systems to enhance precision and outcomes.

3. Recognition of Moldovan Neurosurgery

- The publication of the first international article on the history of Moldavian neurosurgery in *World Neurosurgery* in October 2024.

The common use of the Romanian language allowed seamless collaboration between Moldovan and Romanian neurosurgeons, enabling knowledge transfer, shared training programs, and mutual support in advancing neurosurgical practices. Prof. Zapuhlih leveraged these connections to create a robust pipeline for training young Moldovan doctors in Romanian neurosurgical centers (3,4).

Modernizing neurosurgical facilities: building for the future

In 2015, Prof. Zapuhlih assumed the role of Director of the "Diomid Gherman" Institute of Neurology and Neurosurgery, where his visionary leadership transformed the institute into a beacon of excellence. Under his guidance, the facility underwent substantial modernization with equipment such as: 3 Tesla Magnetic Resonance Imaging (MRI), 3D spiral computed tomography (CT) and transcranial Doppler sonography.

He also oversaw the creation of specialized departments tailored to address the full spectrum of neurosurgical needs: vascular neurosurgery, spinal neurosurgery, neurological rehabilitation (1,2). The actual institute, which now houses 170 hospital beds and employs 133 healthcare specialists, has become a hub for both emergency neurosurgical care and advanced treatments.

SHAPING THE FUTURE OF NEUROSURGERY

As director of the “Diomid Gherman” Institute of Neurology and Neurosurgery, Professor Zapuhlii’s most enduring contribution has been his role as an educator. With a belief that knowledge must be shared and nurtured, he dedicated himself to training the next generation of neurosurgeons. His initiatives included:

- Establishing English-language programs for neurosurgical residents, ensuring they could engage in international conferences and collaborate globally.
- Organizing hands-on training opportunities with international experts, exposing Moldovan neurosurgeons to the latest techniques and innovations.
- Mentoring young doctors, many of whom have gone on to lead neurosurgical departments in Moldova and abroad (6,7,8).

ROMANIAN SOCIETY OF NEUROSURGERY: CONTRIBUTIONS TO MOLDOVAN NEUROSURGERY

Historical Connections and Shared Vision

The development of neurosurgery in Moldova has been profoundly influenced by its close collaboration with the RSN. Moldova and Romania share not only a geographic proximity but also a deep cultural and linguistic bond, which has facilitated seamless cooperation in the field of medicine. This partnership has been instrumental in shaping Moldovan neurosurgery, providing the expertise, mentorship, and resources needed to establish a robust national neurosurgical program (2,3).

Since Moldova’s independence in 1991, RSN has actively supported the nascent neurosurgical community in Chisinau. By opening its doors to Moldovan neurosurgeons, the RSN has provided invaluable opportunities for training, knowledge exchange, and integration into the European neurosurgical network. These collaborative efforts were pivotal in bringing Moldovan neurosurgery onto the global stage (1,3).

Key milestones in collaboration

1. Integration into European and Global Neurosurgical Networks:
 - In 1995, under the guidance and support of RSN leaders such as Prof. Alexandru Constantinovici, Moldova was accepted into the EANS during the Berlin Congress. This

marked Moldova’s first significant step toward international recognition in the neurosurgical community.

- In 1997, RSN facilitated Moldova’s affiliation with the WFNS at the Amsterdam Congress. This achievement symbolized Moldova’s growing prominence on the global neurosurgical map.
- Training Moldovan Neurosurgeons in Romania:
RSN has consistently supported the education of Moldovan neurosurgeons by offering internships, residencies, and advanced training opportunities in Romanian neurosurgical centers. These programs have enabled young Moldovan doctors to learn from leading experts and adopt state-of-the-art techniques in fields such as: skull base surgery, vascular microsurgery, endovascular neurosurgical techniques (3,9).

2. Annual Bilateral Scientific Activities:

- Moldovan neurosurgeons have been actively involved in RSN’s annual scientific congresses, presenting research and participating in collaborative workshops.
- Notably, RSN leaders, including Prof. Alexandru Vlad Ciurea, have visited Chisinau on multiple occasions to share their expertise and foster deeper ties between the two neurosurgical communities (1,3).

Key figures in the collaboration

1. Prof. Alexandru Constantinovici (Photo 4): As a former president of RSN, Prof. Constantinovici played a pivotal role in mentoring Moldovan neurosurgeons and strengthening the partnership between the two nations. He was instrumental in organizing joint scientific events and ensuring that Moldovan neurosurgery gained international visibility.



Photo 4. Prof. Alexandru Constantinovici (1929-2018)

2. Prof. Alexandru Vlad Ciurea (Photo 5): A driving force in Moldovan neurosurgical development, Prof. Ciurea has been an unwavering supporter of the Moldovan Neurosurgical Association (ANM). His mentorship has shaped many Moldovan neurosurgeons, and his efforts have facilitated Moldova's integration into global neurosurgical networks.



Photo 5. Prof. Alexandru Vlad Ciurea

3. Prof. Diomid Gherman (Photo 6): The namesake of the "Diomid Gherman" Institute of Neurology and Neurosurgery, Prof. Gherman was a central figure in fostering the collaboration between RSN and ANM. His leadership ensured that the neurosurgical community in Moldova was equipped to participate in international forums and benefit from Romanian expertise (1-4).



Photo 6. Prof. Diomid Gherman (1928-2014)

IMPORTANT STEPS IN MOLDOVAN NEUROSURGERY

- 1994: The foundation of the ANM in Chisinau, initiated by Acad. Diomid Gherman.
- 1995-1997: Moldova's formal integration into EANS and WFNS, marking the beginning of its international journey.
- 2014: Moldova's affiliation with the World Academy of Neurological Surgery in Vienna, further solidifying its global standing (Photo 7).

- 2024: The publication of the first international article on Moldovan neurosurgery in *World Neurosurgery* (2,3,9).



Photo 7. WANS Congress in Vienna, 2014

Transformative Impact of the collaboration

The collaboration between RSN and Moldovan neurosurgery has not only enriched the professional capabilities of Moldovan neurosurgeons but has also fostered a culture of excellence and innovation. By bridging local practices with international standards, this partnership has enabled Moldova to:

- Introduce advanced surgical techniques such as minimally invasive approaches and endovascular procedures.
- Train a new generation of neurosurgeons who are well-versed in global best practices.
- Establish a reputation as a regional leader in neurosurgery, capable of addressing complex medical challenges with cutting-edge solutions.

The enduring relationship between RSN and Moldova exemplifies the power of collaboration in advancing medical science and improving patient care (1,2,4).

INTERNATIONAL COLLABORATIONS AND GLOBAL INFLUENCE

Global Vision:

Expanding Moldovan neurosurgery's horizons

Prof. Grigore Zapuhliu recognized early in his career that the future of Moldovan neurosurgery depended on building strong international relationships. Through relentless efforts, he established collaborations with leading neurosurgical centers across Europe, Asia, and North America. These partnerships not only enriched the capabilities of Moldovan neurosurgery but also positioned Moldova as a respected participant in the global neurosurgical community (4,10).

Key International Contributions

1. Participation in Global Neurosurgical Congresses
 - Moldovan neurosurgeons, under the leadership of Prof. Zapuhlii, attended and presented research at major international congresses (EANS&WFNS Congresses).
2. Hosting Bilateral and Multilateral Symposia
 - Moldo-German Neurosurgical Symposia (2002-2006): These events brought German experts, such as Prof. Ruediger Lorenz, Prof. Volker Seifert to Chisinau, fostering knowledge exchange on topics like cerebrovascular and spinal surgery (Photo 8).



Photo 8. Prof. Ruediger Lorenz (Left) And Prof. Volker Seifert (Right)

- Moldo-British Neurosurgical Symposium (2013): This initiative included distinguished neurosurgeons like Dr. Marcel Ivanov from the United Kingdom, highlighting a focus on endoscopic neurosurgery and minimally invasive techniques (Photo 9) (1,4).



Photo 9.
Marcel Ivanov
(United Kingdom)

3. Collaborations with Leading International Neurosurgeons
 - Prof. Zapuhlii built personal and professional relationships with globally renowned neurosurgeons, including:

- Prof. Jacques Brotchi (Belgium): An advocate for integrating neuroethics with surgical innovation; As president of WFNS, he has consistently supported the development of modern diagnostic and surgical neurosurgery. (Photo 10).



Photo 10.
Prof. Jacques Brotchi
(Belgium)

- Prof. Helmut Berthalanffy (Germany): Instrumental in advancing training programs in microsurgical techniques for skull base surgeries, particularly in the treatment of brain tumors (Photo 11).



Photo 11.
Prof. Helmut Berthalanffy
(Germany)

- Prof. Juha Hernesniemi (Finland – 1947-2023): Renowned for his exceptional expertise in vascular microsurgery, contributing significantly to the field (Photo 12)



Photo 12.
Prof. Juha Hernesniemi
(Finland)

- Prof. Kazuhiro Hongo (Japan): A pioneer in the development and application of endoscopic surgical techniques, revolutionizing minimally invasive neurosurgery (Photo 13) (1,4,6).



Photo 13.
Prof. Kazuhiro Hongo
(Japan)

neurosurgery. His vision and persistence ensured that Moldovan neurosurgery evolved from a local discipline to one that participates meaningfully on the global stage. Currently, neurosurgery in the Republic of Moldova is represented across 11 hospitals with dedicated neurosurgical departments, comprising a total of 239 beds and a team of 80 neurosurgeons (1,4).



Photo 14. “Diomid Gherman” Institute of Neurology and Neurosurgery

4. International Training Programs

- Moldovan neurosurgeons participated in specialized training courses in Germany, Japan, Canada, and Israel, focusing on cutting-edge practices in vascular and spinal neurosurgery.
- These programs enhanced local expertise and introduced state-of-the-art techniques, such as 3D image-guided surgery and robot-assisted neurosurgery (1,4,6).

Modernization through international influence

The exposure to global best practices and technologies had a transformative impact on Moldovan neurosurgery. “Diomid Gherman” Institute of Neurology and Neurosurgery (Photo 14) underwent significant modernization:

- Integration of advanced neuroimaging: the introduction of technologies such as 3 Tesla MRI and digital radiology was made possible through partnerships with European centers.
- Development of specialized units: departments dedicated to spinal surgery, neurorecovery, and vascular interventions were modeled after leading international institutes.
- Promotion of minimally invasive techniques: drawing from his training in Japan and Germany (4,6).

The Global Legacy of Moldavian Neurosurgery

Through international collaborations, Prof. Zapuhlii established Moldova as a respected voice in

CONCLUSION:

The Romanian Society of Neurosurgery’s unwavering support has been a cornerstone in the development of Moldovan neurosurgery. Through mentorship, training, and collaboration, RSN has helped shape Moldova’s neurosurgical identity, ensuring its integration into the international medical community. This partnership continues to thrive, driven by a shared commitment to innovation, education, and the pursuit of excellence. Neurosurgery in the Republic of Moldova can be considered to meet the highest current European standards.

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