# IYNO

Journal of the International Youth Neurosurgical Organization

# AN INTRODUCTION

# About the Journal

*There are so many great neurosurgery journals like CNS Journal of Neurosurgery, Frontiers in Surgery Neurosurgery section, Neurosurgical Focus, Pakistan Journal of Neurosurgery just to name a few. The problem is that all these journals teach how to apply neurosurgical practices, they don't teach you how to get there.*

*This journal was created by the International Youth Neurosurgical Organization (IYNO) for the sole purpose of providing students with the resources required to study and learn neurosurgery. It was established to fulfill the curiosity of students if they would like to know more about neurological surgery.*

*My name is Muhammad Saqib Hussain; a second-year medicine student and a neurosurgery enthusiast. I am the creator and the sole contributor to this journal (up till now; I hope that as more people join IYNO, this can change). My story might resonate with so many neurosurgery aspirants who do not know where to start.*

*When I learned about neurosurgery, I just did not know where to start. There were so many resources for people who were already in medical school or were neurosurgical professionals but there were none for people just starting out. As a high school student, I just could not convince my parents, my teachers and even myself that I loved neurosurgery. I was really passionate about it but, in my opinion, I was not making much progress. I was not learning much. I was not getting to that level of proficiency that was required to understand neurosurgical literature.*

*This organization aims to provide you with a starting point and a rough roadmap to study neurosurgery. We at IYNO will try to provide you with all the help you could possibly need. This journal will provide you with all the learning materials and strategies to learn neurosurgery.*

*Thank you for reading this journal*
*MSH*

# Who exactly is a neurosurgeon and what skills are required for this profession?

Muhammad Saqib Hussain

*Introduction*

*A neurosurgeon specializes in disorders of the nervous system. This profession is a demanding endeavour with years of specialized training. A physician who hopes to treat disorders of the brain requires many specialized skills the surgical procedures being performed on the brain leave no room for error. There are also some differences between a neurosurgeon and other physicians who treat Neurosurgial disorders.*

## Who is a Neurosurgeon?

A neurosurgeon is a physician who specializes in the diagnosis and surgical treatment of disorders of the central and the peripheral nervous system including genetic anomalies, trauma, tumors, vascular disorders, infections and degenerative diseases of the brain and the spine [1].

It is common knowledge that a neurosurgeon is a brain surgeon. What most people forget is that the neurosurgeon also operates on the spinal cord. Now there is some overlap of the procedures with an orthopedic surgeon but if the restore of function is involved, a neurosurgeon might be better suited for the operation.

The neurosurgeon treats various anomalies including but not limited to:

1. genetic: various birth defects relating to the formation of the nervous system.
2. trauma: hitting the skull with a hard surface, gunshot wounds etc.
3. tumors: this term is rather self explanatory. One point to note here is that tumors can be superficial or deep.
4. vascular disorders: cerebrovascular disease includes damage to the arteries of the brain. One condition where this is prevalent is stroke.
5. infections: encephalitis is a condition where the brain swells because of fluid build-up.
6. degenerative diseases of the brain: alzheimers's and huntington's disease are very common and serious neurodegenerative diseases.

## Education for becoming a Neurosurgeon

A neurosurgeon requires 4 years of undergraduate studies in a medicine or health related field. Then, 4 years of medical school are required to obtain a M.D. or D.O. qualification. After that, around 7 years of neurosurgical residency is required. Many neurosurgeons decide to continue their education into a neurosurgical sub-specialty. All neurosurgeons also have to continue their journey of learning with annual meetings, conferences, scientific journals and research.

## Difference between a Neurologist and a Neurosurgeon

A neurologist provides neurological care to patients without surgery while a neurosurgeon, as the name implies, performs neurological procedures that require surgery.

## Where to learn more about Neurosurgery

Almost every hospital has a neurosurgical department website. Also, the website of the American Board of Neurosurgery is also a great place to learn more about becoming a physician.

## Skills required for Neurosurgery

The first one being physical and mental toughness. Neurological surgery is a tough, high-stakes and outright grueling and long operation. It requires the surgeon's utmost focus and physical endurance. The neurosurgeon must work with a high level of focus for the entire length of the procedure. Any slip of hand could quite literally cause the patient to lose an important neurological function or even die.

Next on the list are the medical diagnostic skills. The neurosurgeon must have a vast amount of medical knowledge. This will allow the surgeon to interpret signs of symptoms of disease, provide a differential diagnosis, order tests to confirm the diagnosis and provide medical interventions to cure the patient. The neurosugeon, as the name suggests, should also be good at performing surgeries. Being accustomed with surgical techniques is a pre-requisite for performing the job of a neurosurgeon.

Another skill for the neurosurgeon is knowledge of computers and different kinds of technologies. Manual dexterity is also important for control of sophisticated instruments and technologies. One example are robotic arms which require a high level of hand-eye coordination to be used properly. Computers are really powerful machines and can help the neurosurgeon provide better care to patients. They can be a valuable asset if the neurosurgeon knows to use them properly.

Lastly, the neurosugeon has to work on one of the most sophisticated structures of the brain. Critical thinking and split second decision making are also crucial skills for the neurosurgeon and practicing these skills can aid in becoming a better physician.

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References

1: https://www.urmc.rochester.edu/highland/departments-centers/neurosurgery/what-is-a-neurosurgeon.aspx

2: https://abns.org

3: https://careertrend.com/what-skills-do-you-need-to-become-a-neurosurgeon-13654856.html

# So you want to be a Neurosurgeon?

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Abstract

*Neurosurgery is ranked among the hardest surgical residencies. In part because of the sheer time commitment to complete the core official training (7 to 8 years) and then 2 to 3 years afterwards if a person wants to specialize further into an area of neurosurgery. This article will guide you through the general requirements and prerequisites for getting a neurosurgical residency in the United States.*

## Introduction

The most often asked question to neurosurgeons is: "How did you become a Neurosurgeon?" Neurosurgery is constantly included in the list of hardest and most demanding specialties. It takes a minimum of almost 15 years of education after completing your secondary school; 4 years of undergraduate education, 4 years of postgraduate education and 7 years of neurosurgical residency (± 1 year depending on special circumstances). It is also considered to require superhuman capabilities.

## Overview of Neurosurgery

Neurological Surgery, or neurosurgery for short, is more than just brain surgery. The nervous system is composed of two main parts: the central nervous system (CNS) and the peripheral nervous system (PNS).

CNS includes the brain and the spinal cord. The PNS, on the other hand, includes all other nerves in the body. Neurosurgery includes both; many people just consider it to be surgeries of the brain, even novice neurosurgery enthusiasts.

Neurological surgeries can be classified into:

1. Cranial Surgery

   It involves operating on structures within the head and includes a few subcategories: tumor surgery, vascular surgery and functional surgery. Tumor and vascular surgery are well known but functional is relatively new. It is known as the "science fiction of the field".

2. Spine surgery

   The spinal cord can be treated by neurosurgeons as well as orthopedic surgeons. There is not much difference between the surgeries carried out by both the specialists. If the problem is deep into the spinal cord, a neurosurgeon may be preferred.

3. Peripheral nerve surgery

    This specialty includes all nerves outside the brain and the spinal cord. These nerves can sprout tumors, or become injured in an accident.

How to become a neurosurgeon

A neurosurgical residency will have to be completed. It is the longest residency start to finish. Neurosurgery candidates are top students with very high USMLE Step 1 and Step 2 scores. What truly sets neurosurgical aspirants apart is the number of research papers published. A very high number of publications is the standard for acceptance into neurosurgery. This is because neurosurgery is a highly academic field. This is in part because there is so much room to improve in the field.

Who becomes a Neurosurgeon?

Medical students who end up applying to neurosurgery are a unique bunch and a self-selecting group. These words sum up neurosurgery really well: "Neurosurgical aspirants take the meaning of workaholic to the next level." [1]

While a career in Neurosurgery can be very rewarding, it can also have some negative attributes.

What neurosurgeons love about neurosurgery?

Neurosurgeons work on arguably the most fascinating and mysterious organ of the body. Neurosurgeons are able to help patients who might be in arguably the most serious conditions a human being can be in and the surge of dopamine after a successful surgery is what drives neurosurgeons in their toughest days. It is a saying that no two surgeries are ever the same and this is especially true in neurosurgery. Patients might have subtle differences in the anatomy of other parts of their bodies but no two brains can ever be alike. Functional Neurosurgery takes it a step further by confirming that the brains of two patients can have same anatomies but markedly different functional signatures. This constant and extreme challenge is what neurosurgeons love.

Another thing that neurosurgeons love about neurosurgery is their colleagues. Neurosurgery is a small community of elite resident students and doctors with extreme self-discipline and work ethic. Neurosurgery is not a very crowded discipline and many neurosurgeons become friends as they constantly meet at cross-hospital, national and international conferences.

Neurosurgeons also love the fact that neurosurgery is at the forefront of innovation. This is the closest the real world comes to the sci-fi world. The boundaries of reality and fiction are sometimes blurred as brain implants for specific diseases change people's abilities and sometimes personalities (as a side effect).

Neurosurgery is financially rewarding as well but almost none of the current and aspiring neurosurgeons are in it for the financial gains.

What are the negative attributes of becoming a Neurosurgeon?

As rewarding as neurosurgery is, it requires great sacrifice.

Neurosurgery requires extensive training. It is lengthy and difficult. Becoming a neurosurgeon takes about 16 years of higher education from completing high school to becoming an independent self-confident surgeon.

Neurosurgeons are the first to enter the hospital and last to leave. Sometimes emergency surgeries can drastically alter a day's schedule. In neurosurgery, surgeons are usually on call and work long hours. This leads to the highest rate of mental disorders among any other specialty.

Neurosurgeons have to make personal sacrifices as long and inconsistent hours leave little time for personal relationships. A really popular comment by a neurosurgeon was that he missed his baby's first steps as he was in a surgery. This is the level of sacrifice required for this profession.

Neurosurgeons work on the most interesting but the most complex organ of the body. It is not uncommon that the neurosurgical procedure has poor outcomes which is overwhelmingly stressful for the surgeon.

So you still want to become a neurosurgeon. By all means, continue your quest!

References

[1]https://medschoolinsiders.com/medical-student/so-you-want-to-be-a-neurosurgeon/

# What should you read and where should you start?

Abstract

*As stated in So you want to become a Neurosurgeon [1], neurosurgery is a truly demanding field. If neurosurgery is someone's part time on off interest, know this: Neurosurgeons don't really believe in part time anything. Neurosurgery is a self selecting specialty. If you still want to become a neurosurgeon, where should one start?*

## Introduction

Dozens of books are published every year on the human brain. Books range from easy books for kids to highly specialized books for neurosurgery residents and fellows. If someone wants to become a neurosurgeon, they should first set out their firm foundation.

One single piece of advice that every neurosurgery aspirant should live by is never to start with highly advanced books on neurosurgery but start with books on neuroscience. It will not only develop your basic understanding of the brain but will also not demotivate you from reading more if the book is too difficult.

## Books for complete beginners

The book can be given to any student at any grade level is the BrainFacts book by BrainFacts.org. It does a great job of providing a thorough overview of the field of neuroscience and paints a clear picture of what to expect if someone decides to study the brain. This book is a complete overview.

## Books for the curious

This category includes people who are not complete beginners but have read basic neuroscience and would like to know how to reach the next level. At this level, Essential Neuroscience [1] can be a great resource. It builds on the foundations of The BrainFacts book and will provide all the information for getting to the next level.

Another amazing resource is Fitzgerald's Clinical Neuroanatomy and Neuroscience [2]. As early as the second chapter, "the objective is that you become able to recite all the central nervous system items identified in the MRI pictures without looking at the labels." This is not easily accomplished but it is certainly possible.

One important thing to note is that if one is trying to prove their interest in neurosurgery to their parents, to their friends or even to higher education colleges like Harvard College or Johns Hopkins, (just to name a few) reading and understanding these books will greatly help you

with that. A word of caution: just reading about a subject will not help a student get into a good college. Extracurricular activities like participation in competitions and community work play a great role in the acceptance as well. That will be discussed in the next issue.

This is not recommended at this level but the most comprehensive neurosurgical book is Youmans and Winn Neurological Surgery [3] and it can be looked up online and read to get an idea of how much information a neurosurgeon needs to know to operate on the most complex organ of the human body. It might be daunting to see the sheer amount of information required that is the reason it is not recommended.

Books for students of medicine

Students in this category will not need much information if their future plan is to go into surgery and specifically neurosurgery. The students should already have access to information like what books their medical school uses to teach neurosurgery, in what year the students are taught this specialty and also who is the head of department and other faculty members of the department of neurosurgery. An email to any faculty member can yield very valuable information.

These were some categories where students know that they love neurosurgery but cannot find proper resources to learn about it. The next issue will provide some resources if someone has recently found their passion in neurosurgery.

[1] Third Edition by Allan Siegel and Hreday N. Sapru
[2] Seventh Edition by Estomih Mtui, Gregory Gruener and Peter Dockery
[3] Seventh Edition by H. Richard Winn, M.D.