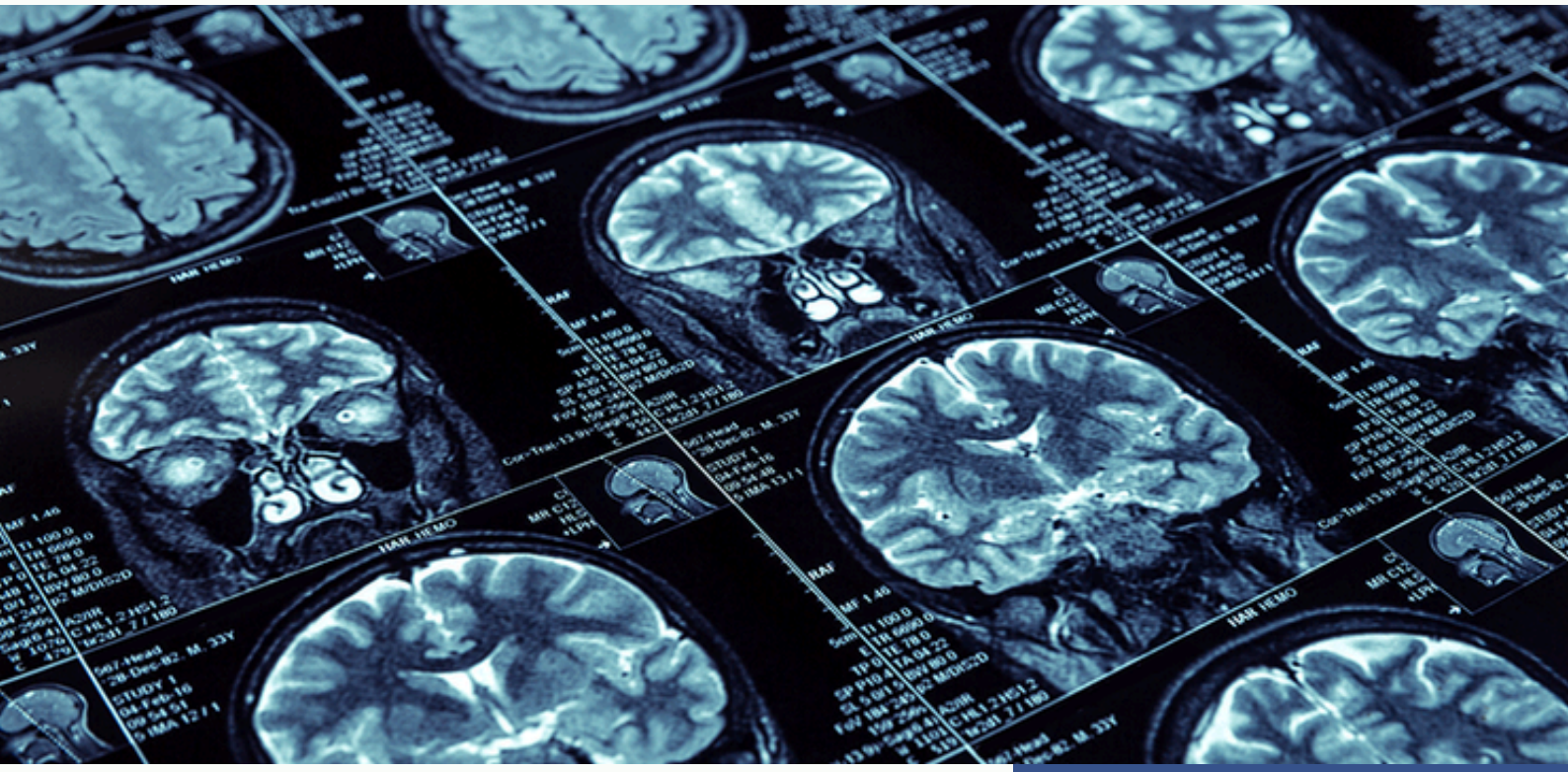
Neurobulletin

MARCH 2026

Dandy Netherlands Neurosurgical Club



Case: Oncolytic DNX-2401 Virus for Pediatric Diffuse Intrinsic Pontine Glioma

An 8-year-old girl presents with progressive diplopia, facial weakness, and gait instability over 4 weeks. Neurological examination shows a CNVI palsy and ataxia. MRI reveals an expansile pontine lesion consistent with diffuse intrinsic pontine glioma (DIPG), a highly aggressive pediatric brain tumor not amenable to surgical resection.
A stereotactic biopsy is performed, followed by intratumoral injection of the oncolytic virus DNX-2401. She subsequently receives radiotherapy. Over the following months, her symptoms stabilize, and imaging shows partial tumor regression.

Insight:
DIPG has a dismal prognosis, with median survival of only 8–10 months using standard radiotherapy alone. DNX-2401 is an oncolytic adenovirus that selectively infects and destroys tumor cells while stimulating an anti-tumor immune response . Early phase I clinical trials in children show tumor reduction or stabilization in most patients and a median survival of ~17.8 months, suggesting a potential survival benefit. This case highlights a shift in pediatric neuro-oncology: from purely cytotoxic treatments toward immunovirotherapy.

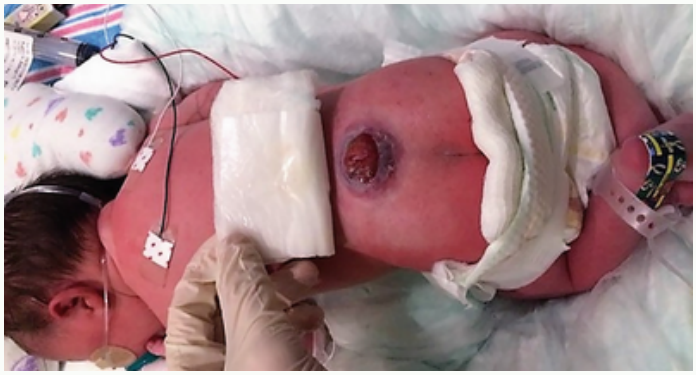
Reference
Gállego Pérez-Larraya J, Lang FF, Tejada S, Alonso MM. Oncolytic DNX-2401 Virus for Pediatric Diffuse Intrinsic Pontine Glioma. N Engl J Med. (2022)

IN THIS ISSUE:

NEUROSURGERY THROUGH HISTORY: THE DEVELOPMENT OF INTRA-UTERINE SURGERY FOR MYELOMENINGOCELE

Advances in fetal surgery for myelomeningocele (MMC) have challenged established views on timing, indications, and acceptable risk more than most developments in neurosurgery. For decades, pediatric neurosurgeons were trained to intervene within hours after birth, accepting neurological deficits as largely predetermined by embryology. The emergence of intra-uterine repair forced the field to reconsider a fundamental assumption: that neurological injury in spina bifida may not be static at birth, but progressive throughout gestation and that this could be managed for. Myelomeningocele arises from failure of primary neurulation during the third to fourth week of embryonic development. The resulting vertebral defect leaves the neural placode exposed, most commonly in the lumbosacral region. In the majority of cases, MMC is associated with hindbrain herniation consistent with Chiari II malformation, and most patients develop hydrocephalus requiring cerebrospinal fluid (CSF) diversion. For most of the twentieth century, management consisted of postnatal closure within 24–48 hours, with goals of infection prevention, neural tissue protection, and preservation of residual function. However, even meticulous early closure did not reverse paralysis, sphincter dysfunction, or the cascade of hindbrain-related pathology that had already developed in utero.

The conceptual breakthrough that reshaped the field was the “two-hit hypothesis.” The first hit is the embryological failure of neural tube closure. The second, more provocative in its implications, is the idea that the exposed neural placode undergoes ongoing damage during gestation. Experimental observations suggested that mechanical trauma from fetal movement, hydrodynamic stress, and chronic exposure to amniotic fluid contribute to progressive neural degeneration. If true, covering the lesion before birth might interrupt this secondary injury and preserve neurological function that would otherwise be lost. This hypothesis moved from theory to experimental validation largely through pioneering work at the University of California, San Francisco. In the 1980s and 1990s, fetal surgeon Michael R. Harrison and colleagues developed reproducible ovine models of MMC. Surgically created defects in fetal lambs produced progressive neurological impairment and hindbrain herniation when left unrepaired, while in-utero closure mitigated these changes and improved



postnatal motor function. For neurosurgery, these findings were striking: part of the disability associated with MMC appeared not inevitable, but acquired.

Early human attempts at prenatal repair in the late 1990s were cautiously encouraging. Investigators reported reduced hindbrain herniation and a lower need for ventriculoperitoneal shunting compared with historical controls. Yet these early attempts also revealed considerable maternal morbidity, high rates of prematurity, and uterine complications. The ethical and clinical question was apparent: could major maternal surgery via laparotomy and hysterotomy be justified for a fetal benefit that still lacked level I evidence?

The answer began to become clear with the Management of Myelomeningocele Study (MOMS), conducted between 2003 and 2010 at the Children’s Hospital of Philadelphia, Vanderbilt University Medical Center, and the University of California, San Francisco. Published in 2011 in The New England Journal of Medicine, this randomized controlled trial fundamentally altered the landscape for this treatment. Prenatal repair before 26 weeks’ gestation significantly reduced the need for CSF shunting according to predefined criteria and increased the likelihood that children would walk independently at 30 months. Importantly, a substantial proportion of fetuses demonstrated radiographic improvement of hindbrain herniation, reinforcing the mechanistic link between spinal CSF leakage and posterior fossa crowding. The trial was halted early for efficacy, underscoring both the magnitude and significance of these findings.

WRITTEN BY:
AKIN SÖNMEZDAĞ

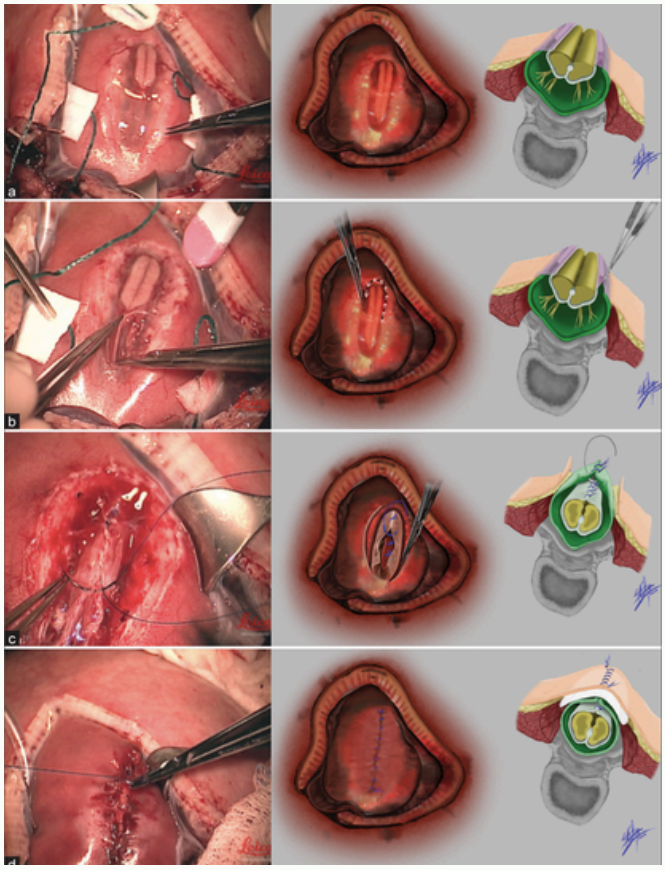
From a neurosurgical standpoint, the motor outcomes were particularly fascinating. Children in the prenatal group more often exhibited functional levels better than those predicted by their anatomical lesion level. This suggested that intra-uterine intervention did more than modify hydrocephalus rates; it suggested preservation of segmental motor circuitry that would otherwise have deteriorated.

The benefits, however, came at maternal cost. Prenatal surgery was associated with significantly higher rates of preterm birth, uterine thinning at the hysterotomy site, and an obligatory cesarean delivery for both the index and subsequent pregnancies. The uterus, in effect, became a neurosurgical access corridor with long-term reproductive implications. Patient selection therefore became and remains stringent, with attention to balancing lesion level, gestational age, fetal anatomy, and maternal health.

Technically, open fetal repair mirrors postnatal closure in principle but differs in context. Following maternal laparotomy and limited hysterotomy, the fetus is positioned while remaining on placental circulation. The neurosurgical steps include careful dissection and tubularization of the neural placode, watertight dural closure, and layered myofascial and skin reconstruction. Tissue fragility at mid-gestation, limited working space, and the imperative to minimize operative time introduce unique challenges. Achieving durable, tension-free coverage is essential, as persistent CSF leakage can negate the intended benefit.

More recently, efforts have focused on minimizing maternal morbidity through fetoscopic techniques. Centers in Europe and South America have advanced percutaneous approaches using small trocars and endoscopic visualization. The theoretical advantage lies in avoiding a large hysterotomy scar and potentially reducing risks in future pregnancies. These methods, however, introduce new technical and physiological complexities, including fetal positioning, maintaining amniotic integrity, and managing CO_2 insufflation when applied. Long-term comparative data continues to increase, and open repair remains the most established reference standard against which newer approaches are judged.

Beyond technical advances, intra-uterine MMC repair represents a philosophical shift in neurosurgery. It reframes the surgeon's role from repairing established structural defects to preventing secondary neurological injury before birth. At the same time, it intensifies ethical scrutiny: the mother undergoes major surgery



without direct somatic benefit, accepting real risks for a projected improvement in her child's neurological trajectory. Counseling must therefore integrate surgical data, obstetric risk, neurodevelopmental uncertainty, and family values into a shared decision-making process.

Looking ahead, refinement rather than revolution will likely define the next phase. Advances in biomaterials, prenatal imaging selection and regenerative approaches may further improve outcomes. Ongoing multicenter trials, including hybrid fetoscopic studies across Europe and North America, aim to balance maternal safety with sustained neurological benefit and long-term neurocognitive and urological outcomes remain an active frontier of investigation. What is more than clear is that the central insight of the field, that neurological injury in MMC is at least partially preventable, has permanently altered its trajectory.

The development of intra-uterine surgery for myelomeningocele stands as one of the most consequential achievements in modern neurosurgery. From experimental ovine models to randomized evidence, its development reflects rigorous scientific investigation alongside technical innovation. For neurosurgeons in training and practice, it underscores that progress does not only depend on operative technique, but also on the timing of intervention.

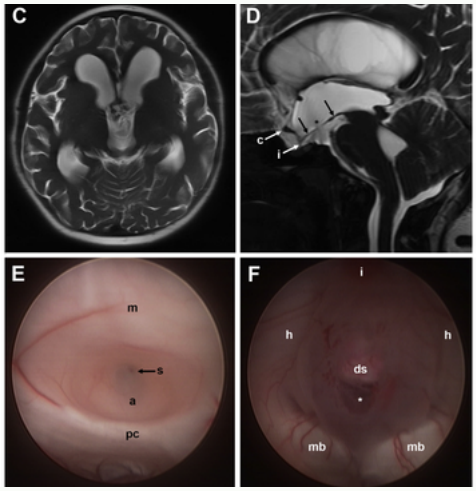
Minimally invasive pediatric neurosurgery

Minimally invasive pediatric neurosurgery has undergone a remarkable evolution over the past decades. Once dominated by large craniotomies and invasive surgical exposures, the field now increasingly relies on refined imaging, endoscopic techniques, and advanced navigation systems to treat complex neurological conditions in children with less disruption to healthy tissue. These innovations have broadened the therapeutic possibilities and have also significantly improved recovery times, reduced complications, and enhanced overall patient outcomes.

In the past, pediatric neurosurgeons were heavily reliant on broad exposures of the structures in the brain for an accurate localization. After the MRI and CT were invented, a more convenient visualization was made possible. Now with functional MRI's and DWI (diffuse weighted imaging) it has been even more refined using preoperative planning mapping the relevant structures beforehand.
The treatments of pediatric neurosurgical issues like hydrocephalus were still full of risks and challenges. Shunts often fail, especially in infants. The regular treatment of hydrocephalus used to be a shunt system diverting the cerebrospinal fluid to a body cavity or into the venous system. Problems associated with this solution include infections, clogging, displacement or breakage and slit ventricle syndrome or subdural hygromes.[4] These latter complications are due to excessive drainage of the fluid.
Without any treatment, the mortality rates can vary between 20-87%. [3] Therefore it is important to be able to treat it effectively without too many complications. Minimally invasive endoscopic techniques could offer better alternatives for children with hydrocephalus. [1] It is proven to decrease the amount of time spent in surgery, damage to the tissues, and recovery time while being just as effective as the traditional open surgery. In the article written by Lance S. Governale, multiple minimally invasive techniques are discussed, focussing on obstructive hydrocephalus in children.

Endoscopic Third Ventriculostomy (ETV)

An ETV is the minimally invasive treatment for an obstructive hydrocephalus where a fenestration is made in the base of the third ventricle between the mammillary bodies and the infundibulum.



By making this connection, the liquor can flow to the suprasellar cisterns and the obstruction gets bypassed. It is especially effective in aquaductal stenosis, obstruction of the fourth ventricle or the Luschka / Magendie foramina, hydrocephalus caused by tectal tumors or cysts blocking the liquor. It's not as effective in postinfectious hydrocephalus and premature infants with posthemorrhagic hydrocephalus. This treatment is safe for children under the age of one but a bit less successful.

How the procedure works: a burr hole is made via the lateral fontanelle, through this an endoscope will be led through the foramen of Monroe where an opening in the third ventricle base will be made by the surgeon and in the Liliequist-membrane, in the midline at the tuber cinereum. No shunt will be placed for a persistent flow. It only requires a linear surgical incision behind the hairline of 25 millimeters. The risks are still present as in almost every surgical procedure, including bleeding, infection, seizures, neurological injury and spinal fluid leak. The approximate structures vulnerable for the risks are the fornix, hypothalamus, pituitary, midbrain, cranial nerves and the basilar artery. The rates for these range from 8-16%, however, most of these are treatable or transient.

Recent research has looked into the results of an endoscopic third ventriculostomy in children and adults. Here it concluded that the endoscopic ventriculostomy resulted in no need for a shunt in pediatric patients. Imaging showed significant improvement in mamillopontine distance, Evan's index and the diameter of the third ventricle. [2]

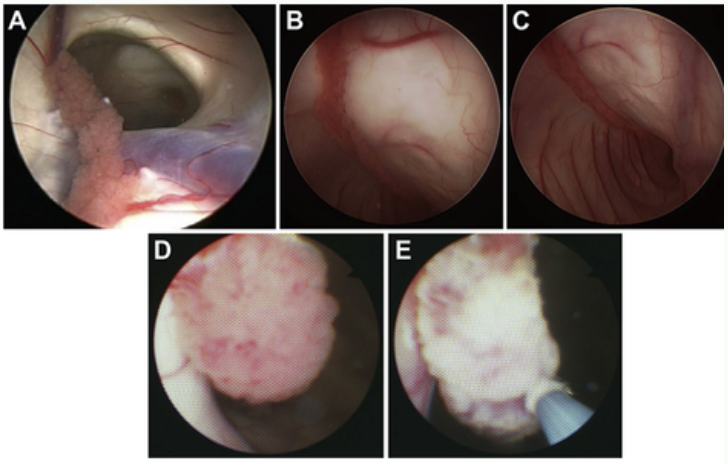
WRITTEN BY:
ESTHER GOEDE

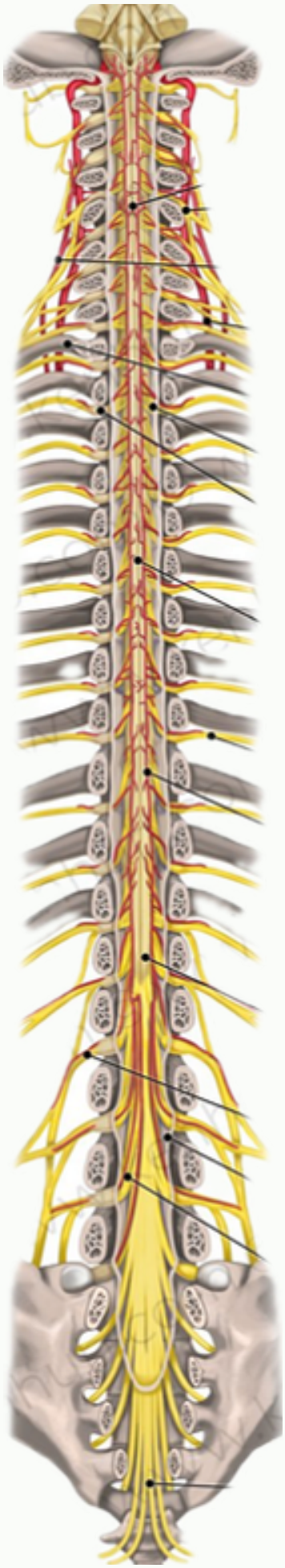
ETV + Choroid Plexus Cauterization (ETV-CPC)

For children under the age of one, also named the Warf procedure according to its founder in Uganda, American pediatric neurosurgeon Benjamin Warf. He wanted to be able to treat the infant population as well without as many risks and complications. He found that the issues were induced by the underdeveloped CSF absorption pathways. His theory was that the cauterization of the choroid plexus (CPC) would diminish the negative effects of this insufficient absorption in infants with hydrocephalus by reducing the overall CSF production. During this procedure, the only difference is the presence of a monopolar coagulator in the working channel of the endoscope. The choroid plexus from the foramen of Monro to the temporal horn is cauterized and the septum pellucidum fenestrated. In the contralateral lateral ventricle, the cauterization is completed and the choroid plexus in the third and fourth ventricles remain intact. The only additional risk is the venous hemorrhage from the choroid and damage to the thalamus that lies next to it.

These two procedures used to be done after a displaced or defect shunt, however, a replacement of the shunt beforehand would prevent a second surgery to be necessary.

A recent review has published an elaborate analysis of the usage of these procedures, compared with the shunt.[5] Here it is evident that they all provide their own benefits and risks. Etiology, family preferences, infection risks and surgical expertise are all factors important to consider in choosing the right treatment for the patient. Minimally invasive techniques should be furtherly investigated to provide better care for children with hydrocephaly.





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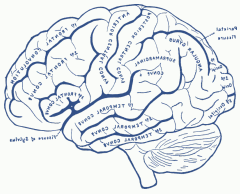
MEET THE BOARD: OLE DE BRUIN

Every month, we will highlight another member of our board, so you get to know us better. This month you can read about Dandy's Commissioner of Creative IT: Ole de Bruin!

Getting to know Ole



How old are you and how old do you feel?
I'm 24 years old, and usually feel my age, but around kids or younger patients, I can't help feeling a bit like one of them again.

Which faculty are you in, and what year are you in? And what do you like most about your faculty?
I study Medicine at the LUMC in Leiden and am currently in the last year of medical school. If everything goes according to plan, I'll graduate in October 2026. What I like most about my faculty is the mix of learning cutting-edge medical knowledge, and actually seeing it make a difference with patients.

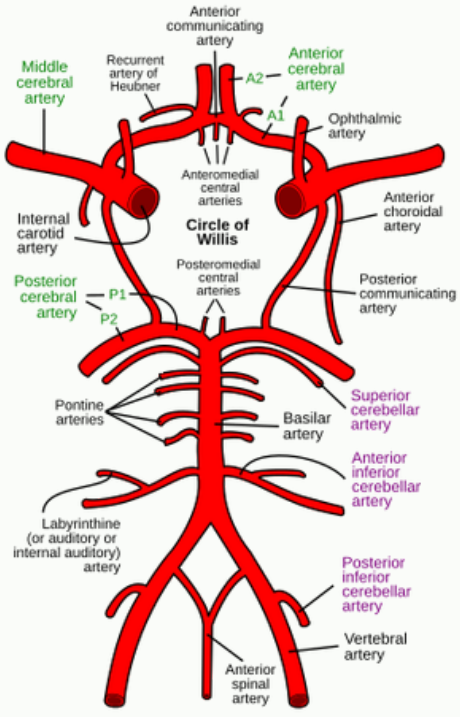
Where are you from, and where do you currently live?
I'm originally from Haarlem, but I currently live in Amsterdam.

What's your favourite brain structure and why? The cingulate gyrus, it connects emotion and rational decision-making within the limbic system. It is the origin of the fact that we, as humans, are rarely as rational as we think we are.

You have a long surgery coming up. Which genre of music do you listen to?
Probably 90s hip hop or techno, something that is relaxed for an easy surgery, and something rhythmic and repetitive for ultimate focus.

Neurosurgical questions

If you could share one neurosurgical fact to everyone in the Netherlands, what would it be?
That no brain is the same. For example, only approximately 34% of people have a classic 'textbook' Circle of Willis (an important vascular structure inside the brain). And all the many folds and grooves are unique to each person, too.



What sparked your interest in neurosurgery?
The brain has always fascinated me. Neurosurgery feels like operating on the very thing that makes us human, our ability to move and talk, our thoughts, personality, and consciousness. There's something both awe-inspiring and humbling about it.

Joining the Dandy Netherlands Board

What do you enjoy the most about being the Commissioner of Creative IT of Dandy?
What I enjoy most about being Commissioner of Creative IT at Dandy is maintaining and improving the website, making it user-friendly, and helping students access information easily. And of course connecting with like-minded people who love the specialty is a big part of the fun.

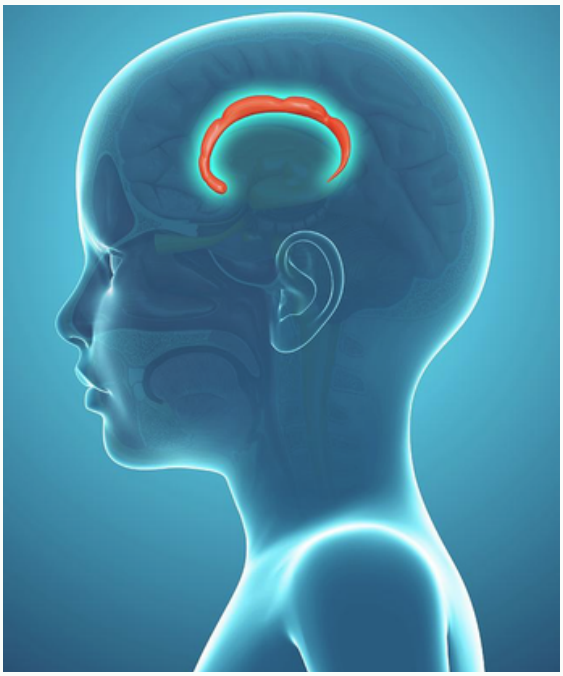
What made you sign up for the Dandy Board?
I wanted to combine my interest in neurosurgery with my hobby of coding, which is why I thought the role of Commissioner of Creative IT would be a perfect fit for me.

Personal Preferences

If you were a superhero, what would your power be?
The ability to pause time. Mostly so I could think things through properly before making decisions.

What's your ultimate guilty pleasure when you're cramming for exams?
Sour autodrop. I used to eat 4 whole packets a week during exam weeks.

What's your favourite season?
Summer



Rapid Fire Round

Sweet or savory?
Savory, although sour candy might be the exception.

Books or movies?
Books

Cats or dogs?
Dogs, definitely

What word or phrase do you use slightly too often?
Probably ''fair enough''

Excited to meet the rest of the board?
Subscribe to the newsletter and tune in for upcoming editions!

WOORDZOEKER

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ANEURYSMA · AVM · CRANIOTOMIE · DAVF · DECOMPRESSIE

DURA · GLIOOM · HERNIATIE · HYDROCEPHALUS

INTRACRANIEEL · MENINGEOOM · NEUROCHIRURGIE

NEUROPROTECTIE · STENOSE · STEREOTACTISCH

TRAUMATISCH · WERVELFRACTUUR

RECAP: LECTURE ON PEDIATRIC SPINA BIFIDA SURGERY BY DR. DENNIS BUIS

On the 18th of March, our fifth lecture of this academic year took place at the VU Medical Center in Amsterdam with a special focus for spina bifida surgery, and pediatric neurosurgery in general. We had the pleasure of hosting dr. D. Buis, who guided us through fetal surgical approaches in spina bifida: from its historical development, pathophysiology and clinical presentation to current surgical strategies, landmark studies and where the field is heading towards next. Key insights were given in the step-by-step procedure, highlighting surgical difficulties and dr D. Buis' own preferences for surgical techniques.

At present, the field is rapidly advancing towards fetoscopic repair of spina bifida, due to new insights, and recent landmark studies. In 2011, the landmark phase III RCT MOMS trial was published, demonstrating that prenatal repair of spina bifida (myelomeningocele) is superior to postnatal intervention. Fetal surgery reduced the need for shunting and resulted in improved motor and mental outcomes at 30 months.

The atmosphere was lively and engaging, with lots of opportunities for discussion and in-depth questions in the field. In addition, dr. Buis gave some interesting insights into his own career, including his experiences abroad in Japan and the USA. He stressed upon the fact that an international experience is always worth it. All in all, a very informative and engaging evening! Many thanks to dr. D. Buis for sharing his experience and expertise with us!

WRITTEN BY:
ERIC CHEUNG

STAY TUNED FOR THE 2025-2026 DANDY PROGRAMME

UPCOMING EVENT

VASCULAR NEUROSURGERY: ANEURYSM CLIPPING

On April 14, 2026, Prof. Dr. S. Abdulrauf (George Washington University) will give an online lecture on vascular neurosurgery, focusing on aneurysm clipping. The session will cover surgical techniques and decision-making in cerebrovascular pathology

WHEN? APRIL 14TH 2026, 19:00
WHO? PROF. DR. S. ABDELRAUF
WHERE? ONLINE (REGISTRATION LINK ON OUR INSTAGRAM)

NEXT ISSUE:

- A DEEP-DIVE INTO THE HISTORY OF NEUROSURGERY
- NEW BRAINTEASER
- RECAP OF PAST EVENTS
- FUTURE EVENTS
- QUIZ ANSWERS AND MORE FROM THE NEW BOARD!

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Dandy Netherlands Neurosurgical Club

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