

# 60 Years of the Department of Neurology



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## Impressum

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# Foreword by Prof. Dr. Christian Leumann, Rector of the University of Bern



When the first professorship in neurology was established at the University of Bern in 1958 following a decision by the Government Council of the Canton of Bern, the discipline had a long history behind it, characterized by a wide range of research activities and priorities.

In the 19th century, neurology was still mainly a field of internal medicine and psychiatry: it evolved from neuropathology to nervous disease medicine to neurology and neurological medicine, into a specialist subject with a focus on acute neurology, neurorehabilitation, psychosomatic illness and neurovascular medicine. Such specialization went against the traditional concept of the universal scholar, but made sense in view of the rapidly developing subject areas and the increasing knowledge about medicine.

Today, in addition to its clinical activities, the Department of Neurology pursues integrated research with a translational approach. This is in line with an important fundamental idea of the University of Bern: usable knowledge that results from research should be leveraged for patient benefit. As a full university, the University of Bern also stands for interdisciplinary and intercultural knowledge. In this respect, it is gratifying that the Department of Neurology not only specializes at the highest level, but also uses the knowledge gained through interdisciplinary approaches and research collaborations, such as the interfaculty research effort «Decoding Sleep». Here, neurologists and psychologists contribute their knowledge to a holistic view of the patients. On behalf of the university management, I would like to congratulate you on your 60th anniversary and on your important research achievements. May many more follow!



# Foreword by Prof. Dr. Urs Peter Mosimann, Medical Directorate Insel Gruppe AG



It is a great pleasure and an honour for me to write a foreword for this anniversary report. The Department of Neurology at the Inselspital in Bern is celebrating its 60th anniversary – actually a young age for a discipline with such a long tradition.

Sixty years of development and innovation characterize the Department of Neurology in Bern. Now is a good time to take a moment to thank the driving personalities behind this anniversary celebration and to pay tribute to them for their achievements. It gives me great pleasure to invite you – dear readers – to take a tour through the history of neurology in Bern and to look ahead to the future challenges.

At the end of the 1950s, the first university neurological unit was established within the Department of Internal Medicine of the Inselspital. It was headed by Prof. Dr. med. Rolf Magun, who died unexpectedly in 1960. His successor, appointed in 1962, was Prof. Dr. med. Marco Mumenthaler. The Department of Neurology was founded in 1966. During the 28 years that followed, Prof. Mumenthaler exerted a decisive influence over the development of neurology in Bern. The «Mumenthaler School» shaped neurological diagnostics, as well as the research and training of an entire generation of neurologists.

In 1990, Prof. Dr. med. Christian W. Hess succeeded Prof. Mumenthaler. The neurological subspecialties developed rapidly as a result. The new imaging methods revolutionized neurological diagnostics and interventional therapy. Neurology became a therapy- and rehabilitation-oriented discipline. This development was characterized by numerous interdisciplinary collaborations in clinical medicine, education, and research. The interconnections between the neurology disciplines became increasingly important, leading to the founding of the University Neurocenter Bern in 2010.

In 2012, Prof. Dr. med. Claudio Bassetti took over the management of the Department of Neurology. Under his leadership, the department established links with networks all over Europe and the rest of the world. The sleep research programme has achieved considerable international visibility with recent publications in high-profile journals such as *Science*, *Nature* and *Nature Neuroscience*. Numerous competitive Swiss and European research grants have been awarded to the Department of Neurology. Research training and clinical research have become increasingly professionalized and translational research has continued to gain importance on the Inselspital site and has created new synergies – a development that continues unabated.

Neurology at the Inselspital can look back on a 60-year success story. This has been achieved through consistent leadership, interdisciplinary cooperation, clear visions, and the adoption of new technologies and treatments for patients. This was only possible thanks to the persistence of the staff, who worked tirelessly to further develop services, teaching, and research. Many thanks to them all.

On behalf of the management: congratulations on the anniversary! We look forward to further developments.

**How do you balance your personal life with your working life?**

*Through various activities, rest and being with my family.*

**What springs to mind when you think of the word «neurology»?**

*A doctor examines a patient very carefully and then thinks about it.*

**Which field of neurology do you find the most exciting? Why?**

*The differential diagnostics of the old school. To send someone to a neurologist in the Bern School and then receive a comprehensive neurological assessment that is known to be correct.*

**Why would you choose the Department of Neurology at the Inselspital Bern if you had a neurological problem?**

*Because it has the best reputation, which is based on experience, scientific substance and a great deal of skill on the part of everyone involved.*

**Which neurological expression sounds more beautiful to you in Italian or French than in German?**

*Solo il neurochirurgo può aiutare qui.*

**In which area of the work of the Department of Neurology at the Inselspital in Bern should more research be done?**

*It would be presumptuous to comment on this. I believe that as much research is being carried out there as is possible. There are practical limits due to the amount of resources needed and their scarcity.*



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#### Interview

Prof. Dr. Andreas Raabe has been working as the Chair and Director of the Department of Neurosurgery at the Inselspital Bern since August 2008 and is an important partner of the Department of Neurology.

**How do you balance your personal life with your working life?**

*The distinction between private and professional life is sometimes difficult and does not always make sense for me; there is often an overlap between friends and activities. In my life, sport has always been a very good balance against sometimes exhausting times.*

**What springs to mind when you think of the word «neurology»?**

*A gigantic area, which has successfully established itself within medicine as an independent specialist field, has evolved from its original subject area and developed into further sub-specialities. Something that still lies ahead for neuroradiology.*

**Which field of neurology do you find the most exciting? Why?**

*Actually, I'm interested in neuroscience in general. Probably the most exciting areas are the interfaces between neurology and related disciplines, in particular neurosurgery, neuroradiology, neuropaediatrics, and psychiatry. It is at these interdisciplinary frontiers that science and new clinical possibilities develop. The University Neurocenter Bern certainly represents this*

*interdisciplinary approach very well. Neurovascular and neuroinflammatory diseases, epilepsy and sleep research are clear focal points here.*

**Why would you choose the Department of Neurology at the Inselspital for neurological problems?**

*The Department of Neurology in Bern successfully combines two approaches in one department: on the one hand, the role model of the broadly trained neurologist who covers the entire field where necessary, e.g. in emergency care. On the other hand, they offer highly sub-specialized investigations and interdis-*

*ciplinary consultations, which provide the highest level of international expertise in the various areas of the field.*

**Which neurological expression sounds more beautiful to you in Italian or French than in German?**

*Without a doubt: the «folie à deux». A melodious, almost sympathetic term for a clinical situation that is also sometimes interesting in routine clinical practice. The German term, «gemeinsame psychotische Störung», on the other hand, is quite different.*

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**Interview**

Prof. Dr. Jan Gralla has been working since February 2014 as Chair and Director at the Department of Diagnostic and Interventional Neuroradiology at the Inselspital Bern and is an important partner of the Department of Neurology.



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# The Department of Neurology, Bern: yesterday, today, tomorrow

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Authors: Prof. Claudio L. Bassetti, Prof. Christian W. Hess,  
Prof. Hans-Peter Ludin

Long before the founding of the Swiss Neurological Society (SNG) in 1908 and before the emergence of neurological departments in university hospitals, researchers in Switzerland made significant contributions to clinical and experimental neuroscience. In Bern, these contributions included the experimental work of Albrecht von Haller (1708–1777), a Bernese all-round genius, Gabriel Gustav Valentin (1810–1883, pupil of Purkinje and the first Jewish professor at a German-speaking university) and Ernst Grünthal (1894–1972), born in Upper Silesia.

## The pioneers of neurology in Bern

Until the beginning of the 20th century, neurological patients in Switzerland were generally cared for by internists and psychiatrists who were also entrusted with teaching. In Bern these were mainly the psychiatrist Burckhardt and the internists Lichtheim, Sahli, and Quincke. Quincke came from Frankfurt and worked from 1873–1878 as a professor of internal medicine in Bern. He introduced the lumbar puncture in Kiel in 1891.

In 1863 **Gottlieb Burckhardt** (1836–1907) completed his habilitation at the University of Basel and became the first lecturer in neurology in Switzerland. From 1873–1882 he worked as a senior physician in the Bernese Waldau Hospital and gave lectures in psychiatry and neurology in Bern. During this time his monograph *Die physiologische Diagnostik der Nervenkrankheiten* [Physiological Diagnosis of Nervous Diseases] was published. He introduced lobotomies for psychiatric patients in 1888 and is regarded as the founder of psychosurgery.

**Ludwig Lichtheim** (1845–1928) was a prominent and influential character at the University of Bern and the Inselspital. He had studied medicine in Breslau, Zurich, and Berlin and achieved his habilitation in Breslau in 1876. In 1878 he was appointed full professor and director of internal medicine in Bern, where he also worked in the Department of Neurology for ten years, before moving to Königsberg in 1888. During his time in Bern he conducted research on oculomotor nerve palsy, apoplectic bulbar palsy and aphasia, among other conditions. In 1887 he became famous for the first description of funicular myelosis, otherwise known as «Lichtheim's disease».

Lichtheim was followed by the prominent and powerful Bernese physician **Hermann Sahli** (1856–1933), who was the medical director from 1888 to 1929. Sahli, who completed his advanced training in Bern and Leipzig and had also visited the neurological heavyweights William R. Gowers and John Hughlings Jackson in London and Jean-Martin Charcot in Paris, had an interest in neurology in addition to his broad interest in internal medicine, which was not neglected in his famous textbook *Klinische Untersuchungsmethoden* [Clinical examination methods] (1894). As an opponent of specialization, Sahli vehemently resisted the emerging trend toward the formation of independent neurological hospital units.

In 1902, **Paul Dubois** (1848–1918, Fig. 1), a native of Neuchâtel, was appointed *ad personam* as associate professor of «neuropathology» in Bern, which must be understood in a comprehensive (not pathological-anatomical) sense. Obviously Sahli would not have tolerated an associate professorship in «neurology». Dubois obtained his postdoctoral qualifications in 1876 in Bern for his work on «physical diagnostics» and read first in electrodiagnostics and electrotherapy and later also in psychoneuroses and psychotherapy. The latter became his main field at the beginning of the 20th century and

in 1904 he wrote a widely acclaimed monograph on the subject. Dubois was world-famous for his psychotherapeutic methodology. Today he is regarded as a pioneer of psychosomatics and psychotherapy and was also the second president of the SNG, which was founded in 1908.

Originally from Munich, **Fritz Lotmar** (1878–1964) gained his postdoctoral qualification in 1912 with a thesis on meningitis and worked on and off in Bern from 1920 as a clinical neurologist, lecturer, and researcher. Lotmar was scientifically very active and published numerous papers, including on acute myelitis and encephalitis, on extrapyramidal motor diseases and above all on aphasia. Because of Sahli's fundamental opposition, he had no prospect of academic advancement in Bern, and following the Nationalsozialistische Deutsche Arbeiterpartei (NSDAP)'s seizure of power in Germany, he had to leave Munich in 1934 because he was Jewish. Back in Bern he was in charge of the neurological consultations at the surgical clinic of the Inselspital until 1949 and ran his successful neurological practice until 1953.

**Georg Robert Isenschmid** (1882–1964) from Bern was appointed professor in 1930. He held a lectureship in «internal medicine», which shortly afterwards became

«internal medicine with particular emphasis on neurology». He gained his postdoctoral qualification in Bern in 1919 and ran a neurological practice until 1958. From 1930 until his retirement in 1952, he was a lecturer at the university where he led the course in neurological examination for medical students, which took place once or twice a week. He also inspired Sandro Bürgi to study neurology and introduced electroencephalography (EEG) to the Inselspital (see below).

**Rudolf Stähli** (1904–1994), who managed the Bethesda Epilepsy Clinic in Tschugg from 1938 to 1947 as external medical director, worked as a neurological consultant at the University Medical Clinic for many years until about 1965, i.e. during the time of Rolf Magun and Marco Mumenthaler. This remarkable situation speaks volumes for Stähli, but he was perceived as somewhat strange by some of those involved.

**Ernst Frauchiger** (1903–1975) completed his human medicine studies at the universities of Geneva, Paris, Rome, Vienna and Zurich. In 1933, he studied for his postdoctoral qualifications under the neurologist Otto Veraguth at the veterinary medical faculty of Zurich, then in 1934 at the veterinary medical faculty of Bern for com-

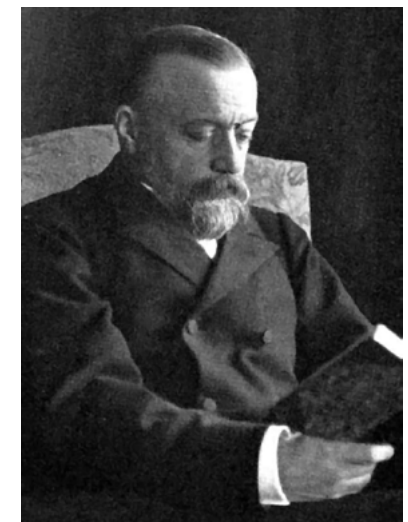


Fig. 1: Paul Dubois (1848–1918), the first associate professor (ad personam, 1902) of neurology in Bern

parative neurophysiology and animal psychology. He was appointed Full Professor of Comparative Neurology in Bern in 1944. He also ran a medical practice in his hometown of Langenthal in the Canton of Bern until 1947 and a neurological practice in Bern from 1948 to 1974.

**Sandro Bürgi** (1904–1974), was a Bernese lawyer and physician. He studied medicine in Zurich after studying law in Bern and Berlin. He was an assistant to Walter R. Hess at the Department of Physiology in Zurich. He completed his postdoctoral studies in Bern in 1947 on the topic of «Internal Medicine, in particular Neurology». As successor to Isenschmid from 1952–1958 he gave the only compulsory lecture on neurology, namely the «Neurological examination course for beginners». He was appointed honorary professor in 1958 and retired in 1971.

**Werner Bärtschi-Rochaix** (1911–1994) also ran a neurological practice in Bern and was one of the first physicians in Switzerland to use an EEG apparatus. For about two years he also did the EEGs at the Inselspital. The Swiss EEG Association (later the Swiss Society for Clinical Neurophysiology) was founded in his practice at Sulgeneggstrasse 8 in 1948. Bärtschi-Rochaix held consultations at the medical outpatient clinic of the Inselspital. His

postdoctoral work at the Medical Faculty of Bern with his later famous work on «cervical migraine» was approved in 1949. In 1956 he accepted an invitation to join the medical faculty in Alexandria, Egypt, but returned to his practice in Bern in the same year for political reasons. He was strongly committed to the neurological training of practicing physicians in Bern and to the Swiss multiple sclerosis (MS) Society.

#### First neurological facilities at the Inselspital

The first neurological laboratory at the Inselspital was an **EEG laboratory** set up by Robert Georg Isenschmid shortly before his retirement in 1952. Isenschmid's assistant physician, René Monteil (1920–2011) from Solothurn, was commissioned to assemble the components of the EEG apparatus manufactured by the Grass company, put it into operation and immediately begin its clinical application. He was introduced to the basic principles of EEG diagnostics by Rudolf M. Hess (1913–2007) in the EEG ward of the Kantonsspital Zurich, but was unable to decide whether to continue his training as a neurologist. That is why Isenschmid, who had learned about EEG diagnostics from Marcel Monnier (1907–1996) in Geneva, volunteered once or twice a week to obtain the EEGs, until in 1953 Werner Bärtschi-Rochaix took over

the supervision of the EEG laboratory. In 1956 he was replaced for a short time by the psychiatrist Theodor Spoerri (1924–1973), who had completed his postdoctoral studies in 1955. In 1957 Marc Eichenberger (1923–2018) took over the evaluation of the EEGs, which he had learned from W. A. Cobb at the National Hospital for Neurology and Neurosurgery, Queen Square, London.

In November 1957, the **Polio Center** was opened on the site of the former Insel plant nursery, where the children's hospital is now located. There, the poliomyelitis patients affected by the last epidemics of 1952 and 1954 were treated for long-term respiratory and other severe impairments. **Paul Walther** (1921–2015) was the chief physician. In 1971, this non-university department of the Insel had to make way for the new children's hospital and moved to **«Rehabilitation II»** in the newly erected Bettenhochhaus (BHH). There, neurosurgical and increasingly also neurological patients were treated. In 1987 Walther was succeeded as chief physician by neurologist and psychiatrist **Ellen Markus**. She teamed up with the head neuropsychologist, Klemens Gutbrod and focused the department on modern neurorehabilitation.

### **The Foundation of the Department of Neurology – Rolf Magun (1958–1962)**

In their decision of 10 June 1958, the Governing Council of the Canton of Bern established the first chair of neurology and a neurological department at the Inselspital. At that time, Bern lagged significantly behind the cities of Basel and Zurich. However, this was not ascribable to Bernese caution, but to the will of the great Hermann Sahli, who decreed that all internal medicine subjects – including neurology – would have to stay under one umbrella. It was his pupil, Walter Hadorn, who, in view of the exponential increase in medical knowledge, realized that this attitude could no longer be upheld.

PD Dr. Rolf Magun (1916–1962) was elected head physician of the Department of Neurology, and at the same time was promoted to (the first full-time Bernese) associate professor. Magun came from the famous Hamburg School of Max Nonne and Heinrich Pette and had been head of a neurological clinic in Hanover since 1955. At this time, the monthly income was CHF 1,764.

The newly founded Department of Neurology was located on the first floor of building 12 on the Insel premises, in the former Schüpbach Department, which had

moved to the newly built Anna-Seiler-Haus in 1955 (Fig. 2). Even for those times, the infrastructure of the 19th century house was very modest. The Department of Neurology had a total of 15 beds available for inpatients: 12 in two six-bed rooms and three in a smaller room for seriously ill patients. In 1958, the Inselspital had 1,011 beds, of which 360 were for medical patients (including the neurology, polio and rheumatology departments), 319 for surgical patients (including urology) and 176 for dermatology patients (Fig. 3). There was running water in the rooms; the toilets and bathrooms were outside the wards, and there were no showers. A third six-bed room was converted into an outpatient clinic. Later, half-height partition walls were installed which provided privacy but hardly any sound-proofing. The EEG unit, founded in 1952, remained in building 14C and was run by Dr. Marc Eichenberger, at that time assistant physician at the Medical Clinic. The electromyography (EMG) equipment was in the nurses' room.

Magun started with an assistant doctor, four nurses, a nurse's assistant, a cleaner, a laboratory assistant, and a secretary (according to the registered letter of appeal of the Education Directorate of the Canton of Berne dated 21/6/1958). Soon two more assistant doctors were add-

ed to the staff and, in spring 1960, Marc Eichenberger (see above) was appointed senior physician. The following curious circumstance is worth noting: Although Magun was head of the Department of Neurology of the Medical Clinic, Rudolf Stähli (see above) remained the neurological consultant of this clinic.

On 5 July 1960, at the age of 44, Magun died completely unexpectedly. The next morning Walter Hadorn appeared in front of the students at the big medical lecture and said that Magun was not able to give the lecture. The auditorium was frozen for a moment. Subsequently, Eichenberger headed the department on an interim basis. However, the expansion of the staff was stopped.

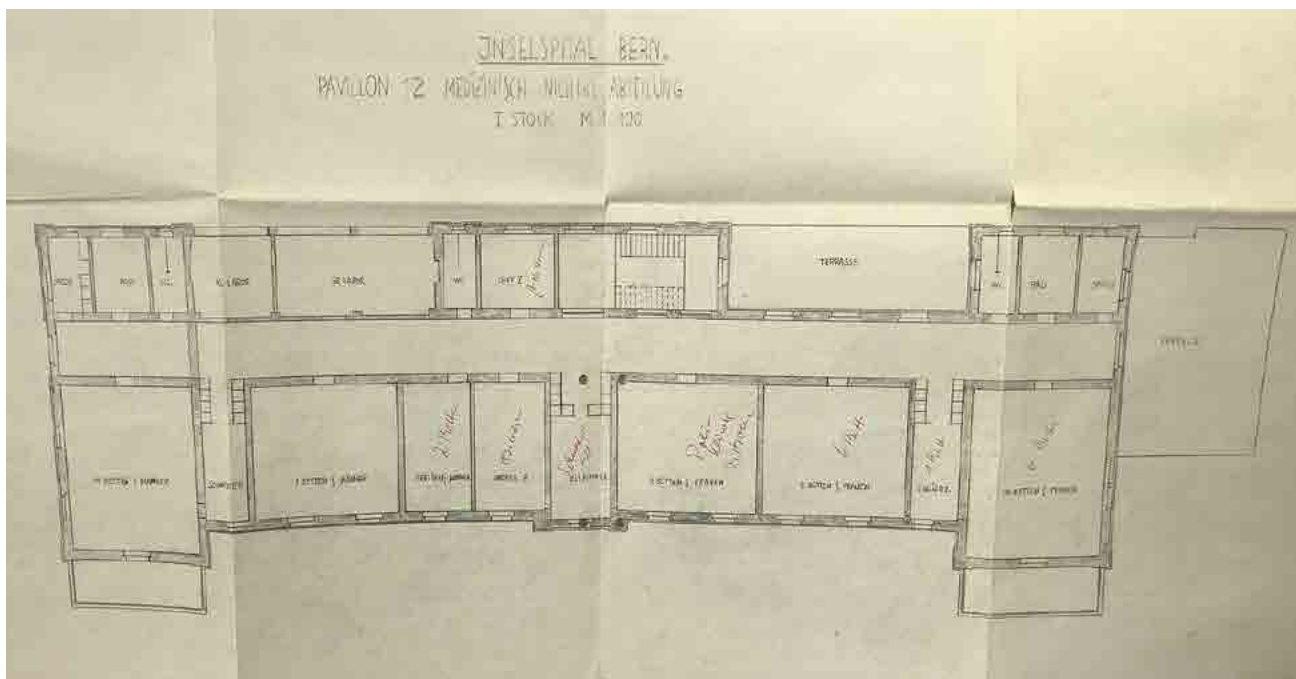


Fig. 2: Plans of the first neurological ward at the Inselspital (on the first floor of building 12)

	Betten	Patienten	Pflegtage	Durchschnittlich Belegung %	Krankentage
Medizinische Klinik	135	1'529	38'841	78,82	25,40
→ Poliostation	26	92	7'268	76,50	79,00
→ Neurologische Abt.	15	34	528	57,70	15,53
Chirurgische Klinik	176	2'487	56'225	87,52	22,61
Dermatologische Klinik	114	678	23'844	57,30	35,17
Augenklinik	66	859	16'415	68,14	19,11
HNO-Klinik	49	1'201	12'091	84,88	12,56
Orthopäd. & Unfallklinik	24	215	7'766	88,65	36,12
Medizinische Abt. ASH	93	1'145	28'742	84,67	25,16
Chirurgische Abt. ASH	96	1'234	28'352	80,91	22,97
Med. Abt. Lory-Haus	75	483	25'706	93,80	53,92
Urologische Abteilung	39	518	12'201	85,71	23,55
Urolog. Abt. Annex	8	104	2'650	90,75	25,48
Strahlenabteilung	25	256	7'324	80,26	28,61
Rheumastation	16	124	5'462	93,53	44,05
Ernst-Otz-Heim	54	68	18'119	91,93	266,45
<b>Total</b>	<b>1'011</b>	<b>11'027</b>	<b>291'534</b>	<b>81,31</b>	<b>26,71</b>
Ohne Otz-Heim					25,22
Ohne Otz-Heim & Lory					23,93

Fig 3: Hospital statistics of the Inselspital 1958

### Growing independence – Marco Mumenthaler (1962–1990)

There were numerous applicants for the post of successor to Magun, including some who were already renowned. The authorities had the foresight to wait for the return of the young Marco Mumenthaler, who was in the USA at that time and who was preceded by an excellent reputation. On 1 April 1962, Mumenthaler took up the position in Bern as Professor of Neurology and Head of the Department of Neurology. His facility credit amounted to CHF 10,000.

When he took up his post, the Department of Neurology, still under the University Department of Internal Medicine, had a total of five doctors (including the Physician-in-Chief).

Mumenthaler continued to expand the clinic energetically. He deliberately increased the number of staff and endeavoured to cooperate with other departments. Hans Spiess, who completed his postdoctoral qualifications in 1971, became the first senior physician – alongside Marc Eichenberger. Later they were joined by Vinicio Medici, Philippe Grandjean and Joseph (later Gino) Gschwend.

**Hans-Peter Ludin** (born 1936, Fig. 4), who had worked in the department on and off since 1961, took over the management of clinical neurophysiology in 1970, completed his postdoctoral studies in 1972 and was promoted to associate professor in 1977. From 1983 to 1989 he headed the joint neurological-neurosurgical outpatient clinic, which had been established by Prof. Mumenthaler and Prof. Markwalder (Chairman of the Department of Neurosurgery) in 1964. Ludin was very interested in Parkinson's disease and founded the Swiss Parkinson's Association in 1985.

From 1972 to 1990, the EEG unit was headed by **Kazimierz Karbowski** (1925–2012). He had completed his advanced training in electroencephalography and epileptology with François Martin in Geneva and came to Bern in 1968 from the Epilepsie-Klinik Bethesda Tschugg. In 1970 he had been the first to obtain his postdoctoral qualifications in the Mumenthaler era.

The space problems in the Inselspital did not improve for a long time. The situation became even worse when, in the early 1960s, the south-western third of building 12 had to give way to the new «*Bettenhochhaus*». This meant that the only lift was lost and carrying patients up and downstairs became part of the daily medical routine.



Fig. 4: Prof. Hans-Peter Ludin



Fig. 5: Transport of neurological patients in Haus 12 in the 1960s. Dr. Philippe Grandjean and Sister Anni Lüthi can be seen in the foreground.

One year after the retirement of Walter Hadorn, Director of the University Department of Internal Medicine, in 1965, the neurological department was granted autonomy and elevated to an independent university department. At the same time, the neurological associate professorship was transformed into a tenured professorship (at that time, the medical faculty in Bern had 30 members). Within this framework, the governing council decided to increase the number of neurological beds in the cerebrovascular unit from 26 to 40. However, in the end Marco Mumenthaler had to make do with a modest increase from five beds to 31 (which remained the case until 1996).

In the summer of 1966, Marco Mumenthaler took over from the ophthalmologist Hans Goldmann the important office of President of the Medical Council at the Inselspital (medical directors and chief physicians). He held this position until autumn 1974. Marco Mumenthaler got on very well with the then Administrative Director Dr. François Kohler, whom he met weekly between six and seven o'clock in the morning. This enabled him to strengthen the influence of the physicians-in-chief at the Inselspital.

It was not until he moved to the newly built «*Bettenhochhaus*» in 1970 that the space limitations affecting the

department became a thing of the past. The Department of Neurology was able to move into two floors, B and M, in the new «*Bettenhochhaus*», so that a ward with 31 beds and the neurological-neurosurgical an outpatient clinic as well as an EEG and EMG unit were all located in the same building.

Marco Mumenthaler was mainly active in Bern in research on diseases of the peripheral nerves and muscles, an interest shared with the doctors **Albert Bischoff** (associate professor from 1972) and **Claus Meier** (associate professor from 1987), who came from Zurich. The neuromorphological research laboratory was established for this purpose. The **electron microscope**, which the Prince of Liechtenstein, Franz Joseph II, donated to Albert Bischoff in 1972, played an important role here. Shortly afterwards, electron microscopy was enhanced by means of a freeze-etching system for the depiction of membranes. Since the 1980s, animal experimental research has also been conducted. In addition to the state-funded scientific assistant (Franz Omlin 1977–1981 and Marc Dumas 1983–1991) and the scientific laboratory assistant Therese Lauterburg, research personnel were employed and paid by the Swiss National Fund.

After a phase of rapid growth, despite very successful

clinic management and rising patient numbers, the clinic was again forced to accept a reduction in staffing costs in the 1980s, owing to cost-cutting measures.

Marco Mumenthaler was particularly involved in teaching. His further training courses were very popular with practicing doctors in the region because of their clarity and practical relevance. He conducted regular neurological consultations in the various hospitals throughout the canton and the bordering areas, as for a long time there were no practicing neurologists outside the city of Bern. These events usually took place at six in the morning or after eight o'clock in the evening. With his books, especially the paperback *Neurologie*, which became a must for all medical students in German-speaking countries, he made Bern an international flagship for neurology. He resigned in 1990. His career culminated with his becoming the Rector of the University of Bern (1989–1991).

### Expansion of the department – Christian Hess (1990–2011)

The transfer of the leadership of the department to Christian W. Hess in autumn 1990 coincided with the beginning of the new era in neurological subjects. The start of magnetic resonance imaging, the first therapeutic successes

in neuroimmunology and functional neurosurgery and, finally, the groundbreaking developments in interventional neuroradiology opened up new possibilities. Neurology, which was predominantly a diagnostic field and somewhat ridiculed for being «contemplative», developed into a therapeutic discipline that also played an increasingly important role in emergency medicine. The networking of the neuro-subjects became a decisive factor in its success. In the course of the rapid development of cerebral angiography and the pioneering work of Andreas Grüntzig (who carried out the first successful balloon dilatation of the heart in 1977), it was predictable that stroke would also become a domain of the neuro-subjects. This called for structural adjustments.

In sharp contrast to this mood of optimism, however, the faculty management and those responsible for the Inselspital saw no need to strengthen neurology and neurosurgery. The employment negotiations for the internal candidate Christian W. Hess in spring 1990 were accordingly difficult. In addition, Peter Saladin, who had been the administrative director of the Inselspital since July 1990, was looking for positions that could be switched to cardiology. With a view to the impending replacement of Hans Peter Gurtner, Head of Cardiology, Saladin's

priority was to establish an interventional cardiology department.

Three important factors contributed backing for the Department of Neurology in 1990. In November of that year, Christian W. Hess received a request for election negotiations from Zurich, but this resulted in a rejection in the autumn of 1991, after the most important demands regarding personnel in both the Department of Neurology and the Department of Neurosurgery had been met. In addition, Zurich was even less sympathetic to the planned development of clinical neurosurgery than Bern. Second, three senior management positions in neurology had become vacant in Bern, following the departure of Hans-Peter Ludin (Head of the outpatient clinic) who retired on 1 January 1989, the retirement of Kazimierz Karbowski (Head of EEG) at the end of March 1990 and the departure of Claus Meier (Head of Neuromorphology) who was appointed Chief Physician at Neurorehabilitation Walenstadtberg at the beginning of May 1990. These new vacancies facilitated structural adjustments.

Hess immediately set up a **clinical sleep laboratory** with the resources of the exceptionally well-endowed EEG department. This had already been identified by the In-

selspital administration as an area for cost-savings. The sleep laboratory enabled the methodical and research-oriented optimization of the polysomnography technique introduced by Christian W. Hess in 1984. The third favourable factor for the development of the neuro-subjects was that after the appointment of the neurosurgeon Hans-Jürgen Reulen to Munich at the end of 1990 and the retirement of the neuroradiologist Peter Huber in 1992, the new appointments could be geared toward candidates with a neurovascular focus. Consequently, Gerhard Schroth, an experienced interventional neuro-radiologist, and Rolf Seiler, a vascular neurosurgeon, were chosen. The latter had also mastered epilepsy surgery as developed by Gazi Yaşargil.

However, further opportunities for the development of the neuro-subjects were lost: after the retirement of Giorgio E. Pilleri, Director of the Bern University Brain Anatomy Institute in 1990, the Institute was regrettably abandoned. The position of neuropathologist had already been transferred from neurology to pathology in March 1989 in connection with the appointment of a new professor of pathology. The post unfortunately remained vacant until 1997, when a very capable neuropathologist, Joachim Weis, was finally appointed. However, he was

denied adequate academic promotion, so he accepted a post in Aachen in 2004.

After 1990, the Inselspital underwent two decades of major structural changes. The so-called «Insel 90» structure was followed by departmentalization and finally by the formation of centres in 1999. Participation at management level was indispensable so that those responsible for the neuro-subjects could help shape these organizational upheavals and seize the opportunities for positive development. As director of the Department of Medicine (1992–1996) as it was called and later of the Department of Head Organs and Neurology (1999–2006) and the associated appointment to the hospital management, Christian W. Hess was able to help set the right course.

For the development of the **neurovascular field**, it was lucky that Hans-Jürgen Reulen's predecessor, the Norwegian neurosurgeon Helge Nornes, had already brought the brilliant engineer and physiologist Rune Aaslid to Bern in 1981. Aaslid developed transcranial Doppler sonography here. **Heinrich Mattle** (born 1952) returned from his two-year research stay at Harvard Medical School in Boston in the summer of 1990 with expertise in cerebral haemodynamics and magnetic resonance imaging. He

was the ideal executive to realize the cerebrovascular focus that culminated in the establishment of an **interdisciplinary neurovascular laboratory** in 1995 and a stroke team in 1999. In 1994, the **EEG department** was expanded to include an EEG telemetry unit on the acute wards to facilitate surgical treatment of epilepsy.

Three further milestones were reached in 1996: first, the **neuromorphological laboratory** in Sahli-Haus 1 on the Insel site was enlarged. Second, the neuropsychological rehabilitation unit was integrated. Later, under the direction of René Müri, this enabled development into a very active research department. Among other things, the therapeutic applications of transcranial magnetic stimulation, which was introduced by Christian W. Hess, were further advanced. Thirdly, the **interdisciplinary sleep centre** was established in 1996 together with the pneumology department. Claudio Bassetti, who specialized in cerebrovascular neurology and sleep medicine, returned from his research stay in the USA in 1996 and appointed Matthias Gugger as the first interdisciplinary specialist in sleep medicine in Switzerland. The renowned clinical **neurophysiological unit** that had been established by Hans-Peter Ludin offering special consultations for patients with extrapyramidal motor dis-

orders (Parkinson's disease) was further developed (in succession by Christian W. Hess, Kai Rösler, Jean-Marc Burgunder, Mathias Sturzenegger and Johannes Mathis). In 2003, this led to the founding of the **Competence Center for Movement Disorders** led by Alain Kaelin, which was established together with the Department of Neurosurgery. Deep brain stimulation for the treatment of Parkinson's disease and dystonia has now developed into another interdisciplinary field. Finally, the gentle application of this invasive therapy, together with psychiatry, to treat severe obsessive-compulsive disorders and tics opened the door to modern psychosurgery. In 2003, the long-awaited **interdisciplinary neuromonitoring ward** was put into operation.

The Department of Neurology also played a leading role in the restructuring of the university psychiatry facilities and, in 1998, in the election of the research-oriented psychiatrist Werner Strik as successor to Wolfgang Bökler. The neuro-subjects finally saw their vision of comprehensive, integrated neurological research within their reach. Despite continually facing structural, administrative, and political hurdles, this goal was consistently pursued, e.g. with the establishment of a joint **memory/dementia service**. In December 2005, the **interfaculty Clinical**

**Neuroscience Bern (CNB)** was founded with the support of the Faculty of Medicine – including neuropsychologists from the Faculty of Philosophy and Humanities. In a way, this area was the successor of the Neurobiology Bern network, which used to connect those working in the field of veterinary medicine.

In December 2009, Werner Strik (psychiatry), Gerhard Schroth (neuroradiology), Christian W. Hess (neurology) and Andreas Raabe (neurosurgery) decided in a memorable meeting at Schlössli Waldau to found a **University Neurocenter** in Bern. This plan was gradually implemented over the years that followed.

The growth of the Department of Neurology has not been able to keep pace with the increasing numbers of patients. In the medical field, the new legal regulations concerning working hours necessitated an increase in staffing levels. At the time the management changed in autumn 1990, the state-paid endowment to the service covered 22 doctors and 15.6 qualified nurses. At the beginning of 2012 there were 49 doctors and 67 nurses. The downside of this growth was the lack of space, which increasingly limited the development of the department. In 2011, the neurology services were spread across the



Fig. 6: Management of the clinic 2007 (in the 1st row from the left: Johannes Mathis, Heinrich Mattle, Christian W. Hess, Matthias Sturzenegger, Babette Stuber [Head of Nursing Services], Kai Rösler)



Fig. 7: Birth of the University Neurocenter in 2009  
(from the left: Werner Strik, Gerhard Schroth, Christian W. Hess, Andreas Raabe)

entire Insel site in ten different locations. Even so, it was not possible to provide all staff with an adequate working space. The number of research personnel had increased too. In 1990, there had only been one state-funded researcher and one laboratory assistant. A few years later there were dozens of academics, laboratory assistants, and study nurses, most of whom were funded by third parties. In addition to better patient care, the aim has always been to enable young staff members to do research and develop academically. During the Hess era, 19 neurologists were able to complete their postdoctoral studies and 16 of them became professors, many of whom later became leaders, and three of whom were awarded a PhD.

#### The Department of Neurology today – Claudio Bassetti (from 2012)

Claudio Bassetti (born 1958) headed the neurocentre of the Italian-speaking part of Switzerland from 2009 to 2012, the Neurological University Clinic from 2007 to 2008 ad interim and the outpatient clinic in Zurich from 2002–2009. His employment negotiations were easier than those faced by his predecessor: Firstly, the popularity of the neurosubjects in Bern had been growing for years and, secondly, he had been directly appointed. Thus, the establish-

ment of an independent **Stroke Unit** (Marcel Arnold), the **expansion** of the **Sleep-Wake-Epilepsy Center** (SWEZ) (Kaspar Schindler), the establishment of an **Experimental Neurology Center** (ZEN) (Antoine Adamantidis) for sleep research in vitro and on rodents, as well as founding of new translational research steps on neuroimmunology (Andrew Chan) and neurodegeneration (Smita Saxena) became possible. Further commitments could be negotiated in the context of a later call.

The development of the Department of Neurology from 2012–2018 took place in the context of major changes and challenges facing hospitals, health care and society. The focus on the neurological sector became a real feat of strength against the background of the ambitious construction projects (implementation of the Inselspital Master Plan), the delayed but ultimately successful merger of the Inselspital with the Stadtspital Tiefenau and the rural hospitals of Aarberg, Münsingen, Belp and Spital Riggisberg, and the change in the hospital's management structures and facilities.\* In addition, there was increasing financial pressure, further subspecialization of the neurosciences, more neurologists working in practices and non-university hospitals, and the changing expectations of the public (especially the younger generations).

\* In the last 7 years, Joseph Rohrer and Uwe E. Jocham have been the chairmen of the board of directors, Urs Birchler and Holger Baumann the hospital directors. Today Uwe E. Jocham is the hospital director, Urs Peter Mosimann the medical director and Martin Fiedler the medical director.

The aim of the management was the continued pursuit of clinical excellence and interdisciplinarity (e.g. in the University Neurocenter), further subspecialization, and the development of translational research as well as modern management practices.

In the following pages, eight areas are described, which have strengthened the position of the Department of Neurology as the leading neurological clinic in Switzerland. Over the decades it has achieved top performances and an international reputation.

#### *Area 1: Clinical care*

The traditional breadth and excellence of clinical care is being maintained. The Acute Neurological Inpatient Department (Head: Urs Fischer) and the emergency ward (Head: Simon Jung) will continue to be overseen by general neurologists. Further activities include the training of hospital specialists, the revision of clinical aids (e.g. neurostatus sheets, reporting, Monday reports, rotations of senior clinical physicians) and the creation of a **professorship for acute neurology and stroke** (Urs Fischer). The holistic treatment of patients has been strengthened by the integration of **psychosomatic medicine** (Head: Nick Egloff) and the development of neuropsychosomatic

medicine. In the latter area, Switzerland and Bern were among the first in Europe (Head: Selma Aybek).

Recognizing the importance of clinical patient care, the facilities for **neurological emergencies** have been improved. In addition, neurorehabilitation was expanded at two sites – including early rehabilitation services in the Anna-Seiler-Haus and in the Spital Riggisberg (Head: René Müri). At the same time, nursing care is developing and specialist expertise in the individual areas is being increased.

The need for resources and skills for the care of patients with complex diseases is increasingly recognized. In the field of **highly specialized** neuromedicine, our department – also thanks to excellent cooperation with the University Neurocenter and with other departments of the Inselspital (e.g. emergency medicine and cardiology) – is the Swiss leader in all areas and specialities related to **stroke** (Head: Marcel Arnold), deep brain stimulation for **movement disorders** (Head: Paul Krack) and **epilepsy surgery** (Head: Kaspar Schindler).

Subspecialization has also been expanded in other areas of neurology, including **neuroimmunology** (Head:

Andrew Chan, professorship for ambulant neurology and neuroimmunology since 2019), **vertigo** (Head: Roger Kalla), and **headaches** (Head: Christoph Schankin).

Interdisciplinarity is very important in everyday life and also in the outpatient unit of the University Neurocenter (Head: Andrew Chan), in emergencies (Head: Simon Jung) and in the Stroke Center (Head: Marcel Arnold). Dual posts such as those of Olivier Scheidegger (Head of Neuromuscular Center, Neurology-Neuroradiology), Werner Z'Graggen (Head of **Neuro-Intensive Care Unit**, Neurology-Neurosurgery) and Roger Kalla (Co-Head of Vertiginous Center, Neurology-HNO) help to promote cooperation between the disciplines. In the field of **sleep medicine**, traditional collaborations with epileptology, pneumology, psychiatry, paediatrics, and psychology were further expanded through the establishment of the Bern Network for Epilepsy Sleep and Consciousness, or BENESCO for short, regionally and nationally.

The number of senior staff was increased in line with the growth of the department, including the election of three physicians-in-chief (Matthias Sturzenegger 2014–2018 wards; Andrew Chan from 2017 for the ANZ [Ambulantes Neurozentrum], Paul Krack from 2018, [Center for

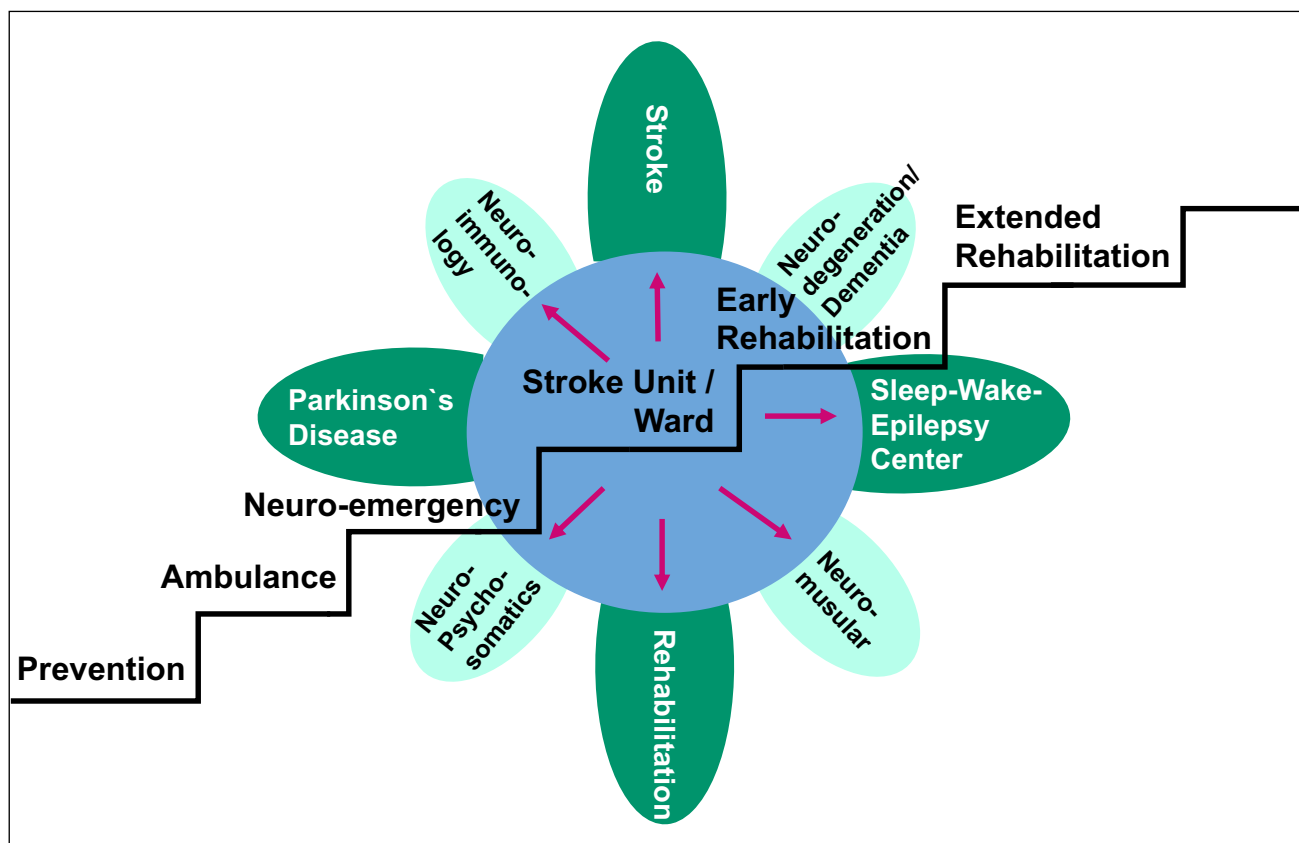


Fig. 8: Graduated care model of the Department of Neurology, Inselspital, Bern

Movement Disorders] and a deputy chief physician [Marcel Arnold, from 2017, Stroke Center].

#### *Area 2: Teaching (further education and training)*

The Department of Neurology in Bern is not only very popular with **medical students** from all over Switzerland, but also with students from many European countries who choose our department for their specialist training.

A clear separation of **neurological training** into the first three introductory years (outpatients/emergency, wards, neurophysiology) and the last two consolidation years (fellowships) has been established, a model recently adopted by the Swiss Neurological Society. For the first time in Switzerland, eight structured fellowships (for stroke, movement disorders, neuroimmunology, epilepsy, sleep, neuromuscular medicine, general acute neurology and neurorehabilitation) were introduced. For a period of six to twelve months as a rule, the assistants can work in a sub-discipline, deepening their knowledge and taking on increasing responsibility. The **fellowships** can also serve to consolidate scientific knowledge. These special programmes have attracted fellows from all over Switzerland and abroad to Bern.

The **training programme** was reorganized and centrally coordinated and currently includes 24 components.

#### *Area 3: Research*

The traditional strengths in **clinical** and, in particular, **neurophysiological** research were increased by the expansion of basic research in the newly established Center for Experimental Neurology (ZEN) (Head: Antoine Adamantidis) and of **clinical studies** in the new Neuro Clinical Trial Unit (NCTU) (2014, in collaboration with CTU Bern, Head: Urs Fischer). Cutting-edge research in several thematic areas (sleep/epilepsy, neuroimmunology, neurodegeneration, stroke), and clinical, neurophysiological and animal studies are carried out in Bern.

The establishment of three **extraordinary** professorships (Antoine Adamantidis for systems physiology, Urs Fischer for acute neurology, Andrew Chan for outpatient neurology and neuroimmunology), a professorship funded by the **Swiss National Science Foundation (SNSF)\*** (Selma Aybek for neuropsychosomatic disorders) and a total of **21 academic promotions** (11 postdoctoral qualifications – of which three are from women – and 10 professorships) testify to the strong commitment to research.\*\*

Since 2012, our research has been supported by more than 40 **SNSF grants**. The two European Research Council Grants (Antoine Adamantidis and Smita Saxena, 2017, EUR 4 million) and the **Interdepartmental Research Co-operation** (IFK) «Decoding Sleep» (Claudio Bassetti, Fred Mast, 2018, CHF 6 million) are also worth mentioning because they are highly competitive.

The department currently publishes more than 100 original papers per year, including in top journals such as *Science* (Boyce et al.), *Nature* (Latorre et al., 2018) and the *New England Journal of Medicine* (Schüpbach 2014, Saver 2015).

The annual budget for teaching and research, which the department receives from the university via the teaching and research department of the Inselspital (Director: Matthias Gugger), has more than doubled since 2012 and is now more than CHF 5 million. The way employment is structured at our centre, where 50% of the working time is used for research and 50% for the daily routine of the clinic, is very popular with the assistants and is also possible within the framework of a fellowship. In collaboration with Clinical Neuroscience Bern (CNB) and the

Graduate School for Health Sciences (GHS), a new PhD programme in Health Sciences has also been established, enabling young clinicians to receive clinical training in parallel with a PhD programme.

#### *Area 4: Personnel*

The number of staff has almost doubled in the past seven years. The reasons for this are the increased size of the department and the legislation on the working hours of assistant doctors and senior physicians. Also, the new ideas of the younger generation about the work-life balance, have led to a greater demand for part-time employment. These factors make the recruitment of new staff a constant challenge. The department is well-known for the good cooperation between its doctors and **nursing staff** and between all its personnel in general. The regular appraisals and team meetings, the introduction of so-called huddle boards, and the organization of team events promote team spirit.

A highlight was the 2018 **Christmas party**, which was attended by more than 340 people who danced until the early hours.

\* In 2018, 29 SNSF projects were running in the Department of Neurology (in 16 of them the researchers were responsible applicants, in 8 projects they worked alongside other applicants, in 5 as project partners).

\*\* Currently there are five research groups (headed by Antoine Adamantidis, Andrew Chan, Smita Saxena, Claudio Bassetti, and Markus Schmidt) and more than 40 staff.

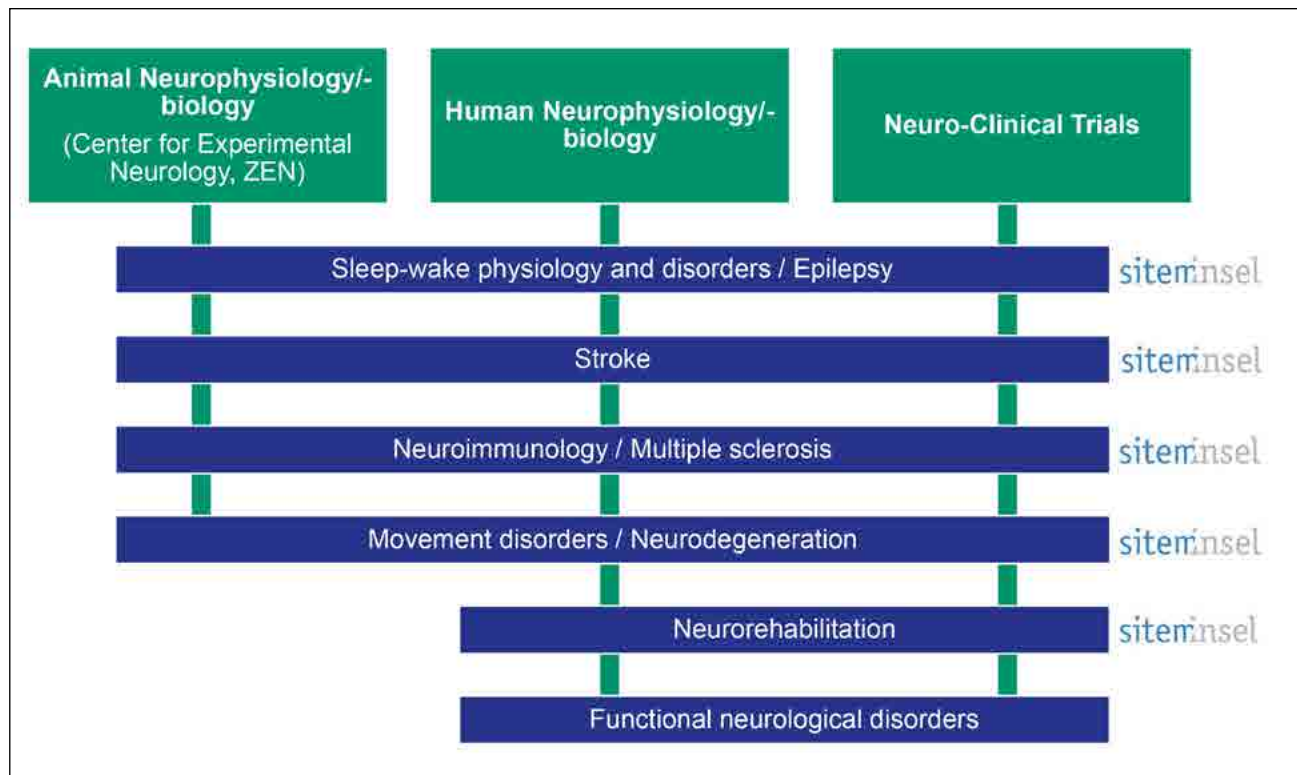


Fig. 9: Current research approaches and focal points

#### Area 5: Infrastructure

As in the past, the department has had to contend with a general lack of space over the past seven years. Nevertheless, thanks to very innovative project management and implementation, the following important relocations as well as expansion and construction work have been carried out at five locations (Bettenhochhaus, Anna-Seiler-Haus, Lory-Haus, Sahli-Haus and Spital Riggisberg):

- Relocation/expansion of the Neuromuscular Center (2013)
- Establishment/expansion of the Center for Experimental Neurology (ZEN, 2013–)
- Relocation/extension of the ward with construction of a Stroke Unit (2013–2014)
- Relocation/expansion of the Outpatient Neurocenter (Ambulantes Neurozentrum [ANZ], 2015)
- Relocation/expansion of the Sleep-Wake-Epilepsy Center (SWEZ, 2015)
- Expansion of neurorehabilitation/construction of early rehabilitation facilities in the Anna-Seiler-Haus (2017–2018)
- Development of neurorehabilitation in Spital Riggisberg (2017–2018)
- Takeover/expansion of psychosomatic medicine and development of neuropsychosomatic services (2017–)

- Expansion and joint location of the Center for Movement Disorders (with the help of Parkinson's Switzerland, Paul Krack, 2018)

#### *Area 6: Management and communication*

The growth of the department and the new financial framework conditions are placing great demands on the management and leading to changes in the organization and structure.

The expansion and professionalization of the administrative and financial management of the department was shaped and strongly supported by the two **department managers** Christa Leutert (2012–2017) and Mechthild Himmelrich (2017–2019) together with Remo Briker, the department manager since 2018.

Systems analyses in the outpatient neurocentre (2016) and in the ward (2016–2017) led to important improvements in the areas of organization, processes, and communication.

**Communication** within and across the rapidly changing and growing department and with other departments was judged to be very important and has been strength-

ened through various channels (including a new website, monthly newsletter, and social media postings).

Claudio Bassetti has served as Chairman of the University Neurocenter Bern since 2012, Head of Clinical Neuroscience Bern (CNB, 2012–2016), Co-Director of the Board of Trustees of the Clinical Trials Unit (CTU, since 2014), Member of the Board of the Swiss Academy of Medical Sciences (SAMS, since 2013), as Vice-Dean of Research at the University of Bern (since 2016) and as President-elect of the European Academy of Neurology (EAN, since 2018). He will ensure the representation of the Bernese neurological disciplines locally, nationally, and internationally and thus promote their development.

#### *Area 7: Cooperation*

The cooperation within the **University Neurocenter Bern** at the **Inselspital** – among others with the departments of emergency medicine, cardiology, pneumology, general and family medicine as well as rheumatology – and with the colleagues in **practices** is excellent and enables optimal interdisciplinary care of the patients.

**Clinical** alliances have been expanded in recent years with external partners such as the cantonal hospitals of

Fribourg, Neuchâtel and Lucerne, the Hirslandenlinik St. Anna Lucerne, the Neurocentro della Svizzera Italiana, and the rehabilitation clinics of Tschugg, Montana and Zihlschlacht. Further alliances have been forged with the Institute of Psychology at the University of Bern (University Psychiatric Services [UPD]), the hospitals of Frutigen Meiringen and Interlaken AG (Spitäler fmi AG), the Privatklinik Meiringen, the Hôpital du Jura, the Spitalzentrum Biel AG, the Klinik Barmelweid and the Solothurner Spitäler AG (Bürgerspital Solothurn).

Academically, we work together to conduct research. We collaborate not only with many departments and institutes of the University of Bern, but also with most of the university clinics in Switzerland, to conduct research and support joint rotations and further training courses for assistant physicians.

#### *Area 8: Finances*

The clinic's operating income (revenue) increased from CHF 42 million in 2012 to more than CHF 94 million in 2018. Thanks to this positive financial development, the department has been able to contribute a substantial income surplus of more than CHF 20 million to the Insel Gruppe over the past seven years. The increasing eco-

conomic pressure on the Insel Gruppe, which was aimed at improving the financial situation, led to a slowdown in personnel growth in 2018. In addition, revenues have grown faster than operating costs in recent years.

### The future and the strategic goals 2020–2030

The **aging** of the population and the increasing scarcity of **resources** (personnel, infrastructure, finances), as well as **advances in biotechnology**, will play a decisive role in shaping and determining the quality of health care and especially neurology in the future.

The values and strategic focus of our department in the years to come have been defined through multidisciplinary discussions and assessments.

#### *Our values*

1. Humanity
2. Integrity
3. Cost-effectiveness
4. Competence
5. Appreciation

#### *Our strategic goals*

1. Focus should be on **the patient**, taking into account the psychosocial factors and individual expectations. Advances in medicine will strengthen the possibilities for personalized and precise diagnosis and therapy. Empathy and respect should guide us.
2. Multidisciplinary and **highly specialized** clusters will be expanded and cooperation between clinicians and researchers will be promoted.
3. New **technologies** will revolutionize diagnostics (including telemonitoring and analysis of big data) and treatments (including so-called closed-loop systems). The opening of the **NeuroTec Center** in the sitem-insel AG building on the Insel site will help us to prepare for this development.
4. More professional management in combination with **new management and infrastructure models** should guarantee the sustainable profitability of the department while ensuring that it continues to be a rewarding and motivating workplace.

Our successful history allows us to look to the future with optimism. We would like to thank our patients, our current and former staff, the Inselspital, the Insel Gruppe and the University of Bern for their loyalty and cooperation over the past 60 years.

## References

1. Gross, D. Contribution of Gottlieb Burckhardt (1836–1907) to psychosurgery from the medical history and ethical viewpoint. *Gesnerus* 55, 221–48 (1998).
2. Sahli, H. Ueber den neurologischen Unterricht an den schweizerische Universitäten. *Correspondenzblatt für Schweizer Aerzte* 21, 195–205 (1912).
3. Schnyder, L. Le Professuer Paul Dubois. *Swiss Arch Neurol and Psychiatry* 4, 5–12 (1918).
4. Müller, C. Paul Dubois (1848–1918). Ein vergessener Pionier der Psychotherapy. (Schwab, Basel, 2001).
5. Klein, D. Obituary. Ernst Frauchiger (1903–1975). *J Neurol Sci* 26, 113–114 (1975).
6. Mumenthaler, M. Medizingeschichtliches zur Entwicklung der Neurologie in der Schweiz. *Schweiz Arch Neurol Psychiat* 38, 15–30 (1987).
7. Leu, F. Das Inselspital. Geschichte des Universitätspitals Bern 1954–2004 (Weber AG, Wabern-Bern, 2006).
8. Mumenthaler, M. & Ludin, H.P. 50 Jahre Neurologie in Bern. *Praxis* 97, 829–834 (2008).
9. Hess, C.W. Geschichte der Neurologie in Bern. *Swiss Arch Neurol and Psychiatry* 176–182, 176–189 (2008).
10. Bassetti, C. & Valko, P.O. History of the Swiss Neurological Society in the context of the national and international development of neurology. *Swiss Arch Neurol and Psychiatry* 160, 52–65 (2009).
11. Hess, C.W. & Bassetti, C. In Memoriam: Professor Marco Mumenthaler. *Clinical and Translational Neuroscience* 1, 1–4 (2017).
12. Bassetti, C.L., Hess, C.W., Steck, A. & Ludin, H.P. A 110-year history of the Swiss Neurological Society (SNG) through the biosketches of its first 42 presidents. *Clinical and Translational Neuroscience* 2, DOI: 10.1177/2514183X18788797 (2018).
13. Bassetti, C.L., Galimanis, A. & Du Pasquier, R. The new Swiss postgraduate training (residency program) in neurology: Making Swiss neurologists more competitive. *Clinical and Translational Neuroscience* 2, DOI: 10.1177/2514183X18792760 (2018).

## Department Managers 1958 to the present day

Prof. Dr. med. Rolf Magun



Chairman of Department 1958 to 1962

Prof. Dr. med. Marco Mumenthaler



Chairman of Department 1962 to 1990

Prof. Dr. med. Christian W. Hess



Chairman of Department 1990 to 2011

Prof. Dr. med. Claudio Bassetti



Chairman of Department und Physician-in-Chief since 2012

**What led you to apply to the Department of Neurology?**

*As an elective year student, the exciting work on the acute neurological ward with its inspiring teachers was the decisive factor for me.*

**How do you balance your personal life with your working life?**

*I go on excursions to enjoy nature with my family.*

**What springs to mind when you hear the word «neurology»?**

*This is a diverse field of expertise with exciting pathologies and rapid developments in diagnosis and treatments.*

**Which field of neurology do you find the most exciting? Why?**

*I like the broad spectrum of neurology.*

**What has been the highlight of your work in the Department of Neurology?**

*There have been many highlights during my time here. What particularly fascinates me is working in a team to make a diagnosis from individual symptoms or findings and to improve the situation for the patient with targeted measures.*

**Why would you choose the Department of Neurology at the Inselspital Bern for a neurological problem?**

*A competent and patient-oriented team is at work here, which promotes good cooperation between the subdisciplines.*



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#### Interview

Dr. Lara Chilver-Stainer has been working as a hospital specialist on the acute neurological ward since 2017 and in neurology since 2006 in various capacities.

# The Department of Neurology today

We offer our patients an attractive range of services. On the following pages we present a selection of our services to our referring physicians and the interested public. Full details are available on our website: [www.neurologie.insel.ch](http://www.neurologie.insel.ch)

# About Us

Over the past 60 years, the Department of Neurology has developed into a leading service, research and teaching provider.

## Everything from a single source

The Department of Neurology offers an integrated range of medical services and holds a leading position in research and teaching. Our specialist teams diagnose and treat people with diseases of the central and peripheral nervous, neuromuscular transmission, and muscle systems. Integrated care is part of our day-to-day business. We look after our patients throughout the entire treatment chain from admission in an emergency to sustainable rehabilitation.

## Integrated specialist knowledge for holistic care

Patients can count on us to provide diligent, integrated care. Our teams have outstanding, specialist expertise in all areas of neurology. We take a holistic approach to patients and integrate medical, psychological, and psychosocial aspects of their care.

## High-quality primary care and internationally leading highly specialized medicine

We offer high-quality treatment, both basic neurological care and highly specialized medicine. The Department of Neurology is renowned nationally and internationally for its highly specialized medicine. Examples include:

- the certified Stroke Center
- the Center for Movement Disorders (in particular, deep brain stimulation)
- the Sleep-Wake-Epilepsy Center, which opened in 2015 (in particular, presurgical evaluation).

## Leaders thanks to cooperation between disciplines

The Department of Neurology in Bern is the largest neurological clinic in Switzerland. Its competence is strengthened by the close interdepartmental cooperation within the University Neurocenter, a strategic cornerstone of the Insel Gruppe and the Faculty of Medicine of the University of Bern.



### International leaders in teaching and research

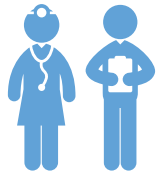
With our groundbreaking research and teaching, we support the high-quality treatment of our patients. The Department of Neurology offers an excellent platform for experimental work in neurophysiology and neurobiology. It focuses on translational, clinical, and technological research. It is the largest training center in Switzerland for doctors working to gain the title «Consultant in Neurology».



Staff of the Neurology Department Bern 2018

## Key figures

Compared to the previous year, patient numbers and research projects increased slightly in 2018, which had a positive effect on revenues. This steady growth is very encouraging and shows us that we are on the right track.



**575**

575 employees



**94 000 000**

million CHF total revenue



**29**

ongoing SNSF projects



**186**

publications



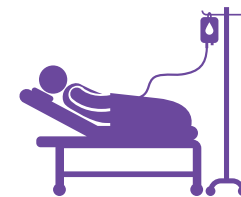
**32 000**

outpatient consultations



**132**

beds



**3 300**

inpatients

**What made you decide to work at the Department of Neurology in Bern?**

*My goal is to specialize in neuroimmunology, and Prof. Andrew Chan's team in Bern has a good reputation.*

**How do you balance your personal life with your working life?**

*Sometimes it is difficult to find a good balance between work and leisure time. Fulfilling hobbies, good organization, and support at home are extremely helpful.*

**What springs to mind when you hear the word «neurology»?**

*Complexity. The neurologist and writer Oliver Sacks has compared the brain very aptly with an orchestra: «The brain is more than an assemblage of autonomous modules ... their total integration creating something like a vastly complicated orchestra with thousands of instruments, an orchestra that conducts itself, with an ever-changing score and repertoire.»*

**Which area of neurology do you find the most exciting? Why?**

*Neuroimmunology particularly fascinates me: a field that is constantly evolving with new hypotheses and new therapies.*

**What has been the highlight of your work at the Department of Neurology?**

*The cooperation, the closeness, and the good atmosphere in the large team are particularly impressive.*

**Why would you choose the Department of Neurology at the Inselspital Bern if you had a neurological problem?**

*I have one hundred percent confidence in the competence and humanity of my colleagues.*



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#### Interview

Dr. Lara Diem has been working as an assistant physician in the Department of Neurology since January 2018. She previously worked at the Cantonal Hospital of Aarau.

# University Outpatient Neurocenter (ANZ), Neurological Policlinic – focus on headache consultations

**The ANZ offers interdisciplinary diagnosis and therapy across the entire neurological spectrum.**

**The headache consultations are one of the highly specialized services of the ANZ.**

The ANZ integrates all relevant areas. The following departments and institutes are united under the umbrella of the ANZ:

- Department of Neurology
- Department of Neurosurgery
- Department of Neuropediatrics of the University Children's Hospital Bern
- University Psychiatric Services Bern (UPD)
- Department of Diagnostic and Interventional Neuroradiology

There is a lively exchange between the specialists in the interests of joint patient care. Other departments are involved to help with specific issues, e.g. pain therapy, infectious diseases, or haematology.

Today we offer 14 different interdisciplinary consultation types. This portfolio of consultations covers the entire spectrum of neurology. The specialized consultations also deal with differential issues and rare diseases at the university level. Thanks to this method of working, internal and external referrals can be made to general neuro-

logical consultations, where they are then processed in a differentiated manner. Further specialized services are offered for patients with vertigo, under the interdisciplinary vertigo and dizziness centre, and for cognitive problems. Outpatient services also include neuroimmunology (e.g. for MS), the Sleep-Wake-Epilepsy Center and the Center for Movement Disorders.

We also deal with expert questions. From 2019, Dr. med. Christoph Schankin will take over the management of the headache consultations at the Inselspital. As a recognized expert on headache disorders and migraine-associated visual disorders, he has broad clinical experience and has written numerous scientific papers in this field.

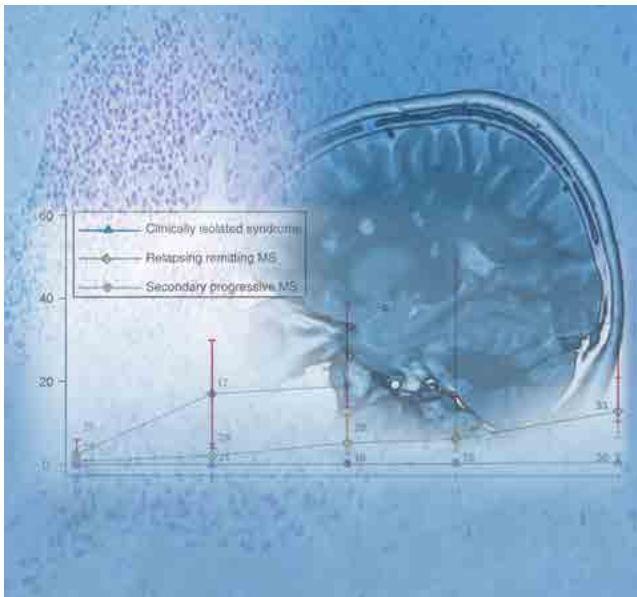
In the headache consultations we offer comprehensive interdisciplinary support in cooperation with our partners, especially those from the pain centre. In addition to migraine, its severe chronic form, and drug-overuse headache, we assess the entire spectrum of more than 200 headache disorders, including cluster headache, rare primary headache, and secondary headache.



Special emphasis is placed on intracranial hypo- and hypertension as well as migraine-associated visual disturbances, particularly persistent migraine aura and visual snow syndrome. In close cooperation with our resident colleagues, we offer treatment with the most up-to-date pharmaceutical, non-pharmaceutical, and invasive procedures.

# Neuroimmunological focus – outpatient consultation and outpatient therapy unit FANI

**A clinical focus of the Day Clinic Fast Track Ambulant Neurological Infusion Therapies (FANI) and the Outpatient Neurocenter (ANZ) is the care of patients with multiple sclerosis (MS). Diagnosis and treatment of the entire spectrum of autoimmune diseases complete the services on offer.**



The aim is to provide comprehensive care for our patients at all stages of the disease, from the initial manifestation or diagnosis, through phases of pronounced disease activity (acute therapy and differential immunotherapy), as well as dealing with specific issues. These include affective and cognitive comorbidity, pregnancy, the conversion

of immunotherapy in risk constellations, and MS in adolescence, which is treated in collaboration with specialists in neuropaediatrics.

In addition to the core team of neuroimmunologists, other departments are involved in interdisciplinary assessments: e.g. from neurosurgery (interdisciplinary treatment for spasticity, e.g. intrathecal pump therapy), ophthalmology, rheumatology, the University Psychiatric Services (affective comorbidity) and the competence centre for psychosomatic medicine. There is also close cooperation with other departments to ensure the best possible patient care, for example in the field of haematology/plasmapheresis and neuroradiology.

At the FANI Day Clinic, complex, potentially high-risk forms of treatment for immune-mediated or other neurological diseases (e.g. infusion therapies with monoclonal antibodies and enzyme replacement therapies), which require monitoring, can be carried out under the continuous supervision of experienced nursing staff and the medical team. The range of services also includes diag-

nostic procedures that are difficult to perform outside the hospital, such as lumbar punctures.

The clinical and scientific focus is on the multidimensional phenotyping of various diseases with the aim of isolating the characteristics of the course of the disease for risk profiling or determining the response to specific therapies. Together with the study unit, we are involved in phase II and phase III clinical trials. The experimental neuroimmunological laboratory supports these efforts with neurobiological plausibility checks.

# Center for Movement Disorders

**The Center for Movement Disorders (ZfB) offers a comprehensive range of services from clarification to therapeutic support.**

Our interdisciplinary consultations cover the entire spectrum of movement disorders and neurodegenerative diseases. They allow clarification of the situation and sustained treatment of patients with Parkinson's disease, dystonia, tremor disease, tic disorders, Huntington's chorea and other rare movement disorders. The continuous integration of new scientific findings together with individualized treatment and personal consultation are the hallmarks of our work.

## The treatment of Parkinson's disease at all stages is a clinical focus.

There is close cooperation with physiotherapists, occupational therapists, and speech therapists. The *Berner Therapienetzwerk Parkinson* was set up in 2016 to optimize cooperation between these areas, medical care, and outpatient care.

Treatment of movement disorders with a metabolic, psychiatric, or functional cause requires cooperation between several disciplines: in our interdisciplinary consultations we work closely with colleagues specialized in metabolic disorders, neuropsychosomatic medicine and neuropaediatrics as well as the University Psychiatric Services (UPD). We also cooperate with the Department of Human Genetics on issues related to hereditary movement disorders.

The ZfB can call on its many years of experience in the field of invasive treatment of movement disorders. For more than 20 years, it has been offering deep brain stimulation for Parkinson's, dystonia and tremor diseases in close cooperation with the Department of Neurosurgery. A team of specialized doctors, nurses, and neuropsychologists ensures the best possible care from pre-operative planning to follow-up rehabilitation and outpatient aftercare. In close collaboration with the UPD (Prof. Dr. med. Sebastian Walther) deep brain stimulation has recently been offered for the treatment of rare, not yet definitely established indications (including depression, Tourette syndrome, and obsessive-compulsive disorder) and as part of a multicentre, international study on Huntington's disease.



In one of the largest outpatient botulinum toxin clinics in Switzerland, injections are offered for indications such as dystonia, hemifacial spasm, and spasticity. For patients with pronounced spasticity, an interdisciplinary consultation also offers the possibility of individually optimized therapy.

# Sleep-Wake-Epilepsy Center (SWEZ)

**Our interdisciplinary team cares for patients with disorders of sleep, alertness or consciousness as well as people affected by epilepsy. Research and teaching are the central pillars of our activities.**



At the University Sleep-Wake-Epilepsy Center (SWEZ), disorders of sleep, alertness and consciousness are diagnosed, treated, and studied. The knowledge gained is passed on through teaching. Experts in neurology, epileptology, pneumology, psychiatry, neurosurgery, psychosomatics, psychology, chronobiology, pharmacy, engineering, and physics work closely together. In this way, we are able to achieve precise and personalized diagnoses and develop efficient treatments. Thanks to the close cooperation between clinical and experimental researchers, we can gain new insights and quickly put them into practice. This important transformation is

catalyzed, in particular, by the newly founded NeuroTec Center of the sitem-insel AG.

The SWEZ offers a range of specialized and high-quality interdisciplinary consultations. During neuropneumological consultations, one neurologist and one pneumologist work closely together. They decide how best to care for patients with sleep-related breathing disorders, difficulty falling asleep and sleeping through, restless legs syndrome, narcolepsy, and other causes of daytime sleepiness or fatigue.

During neuropsychiatric consultations, a three-person team, consisting of a specialist in psychiatry, neurology, and chronobiology diagnoses, advises, and treats patients with disorders of intratry and maintaining sleep.

In epilepsy consultations, we work with patients with seizure-like disorders or who are suspected of having epilepsy. For patients who have been diagnosed with epilepsy, we offer the entire spectrum of possible treatments, which range from pharmacological therapy to highly specialized surgical interventions, and the necessary diagnostic clarifications.

Non-pharmacological therapies such as cognitive behavioural therapy are also important. During the epilepsy consultation, we also assess a person's fitness to drive and can provide special counseling on, for example, the subject of epilepsy and pregnancy.

Physicians can refer patients with suspected sleep-wake consciousness disorders or epilepsy directly to the relevant specialists or for additional examinations. Our SWEZ secretaries act as a contact point for referring physicians.

# Neuromuscular Center

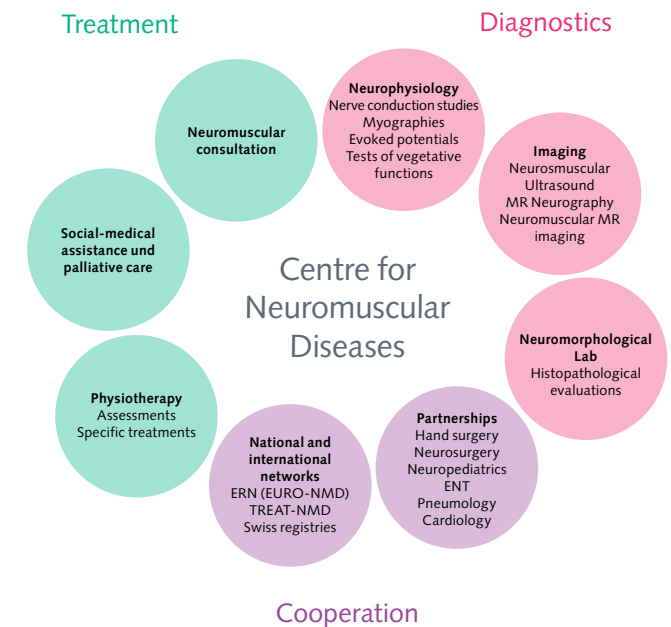
The Neuromuscular Center offers integrated care for patients with neuromuscular diseases in interdisciplinary, cross-clinic collaboration. Neurophysiological and imaging techniques are also used.

Neuromuscular diseases include diseases of the peripheral nerves, the neuromuscular end-plate, and the musculature itself. These include frequent diseases such as compression neuropathy or very rare diseases such as hereditary muscular dystrophies. The Neuromuscular Center has facilities for the assessment of neuromuscular diseases using specific equipment and multimodal methods. Long-term care of the affected patients and their relatives in a sociomedical and palliative context is also provided.

In addition to a clinical evaluation, neurophysiological techniques such as neuro- and myography, evoked potentials and vegetative function tests are used where necessary and appropriate. Imaging using nerve sonography, magnetic resonance neurography and magnetic resonance examinations specific for myopathy complete the diagnostic tools. The examinations are coordinated and evaluated by our specialized team. Where required, histopathological investigations are carried out and evaluated in our neuromorphological laboratory. If necessary, we initiate genetic investigations including segregation analyses. We assess pathogenicity in cooperation with the Department of Human Genetics.

Patients are cared for on an interdisciplinary basis by appropriately specialized physiotherapists and nursing staff. We support patients and their relatives in all areas relevant to everyday life, from the provision of medical aids, to contact with authorities and social services, to the preparation of medical and nursing emergency plans. For example, patients suffering from inflammatory neuromuscular diseases can be treated on a long-term basis with infusion therapies in cooperation with the neurological outpatient clinic.

We are part of an international network: we cooperate closely with research institutions – such as the Institut de Myologie in Paris – as well as with partners whose focus is on the care of patients (e.g. with the European network of excellence – TREAT-NMD Alliance and European Reference Network for neuromuscular diseases – EURO-NMD). In this way, we promote highly specialized care.



# Stroke Center – outpatients and inpatients

**The certified Bern Stroke Center is the largest of its kind in Switzerland and covers the entire treatment chain from the acute phase to rehabilitation and outpatient aftercare and secondary prevention.**



The first thrombolysis in Switzerland was carried out at the Inselspital in 1992. In 2013, the Bern Stroke Center was the first university center to be certified in the field of highly specialized medicine. Since 2015, 12 beds for stroke patients have been available in a specialized Stroke Unit. Currently, more than 350 acute revascularizations are carried out per year, about 250 of them endovascular. In total, we treat 1,750 patients with acute strokes each year. This makes our Stroke Center the largest in Switzerland.

Our interdisciplinary team consists of specialists in the fields of neurology, neuroradiology, neurosurgery, anaesthesia, intensive care medicine, cardiology, vascular surgery, and neuropsychology. The team is complemented by internists, rehabilitation staff, medical-technical assistants, nursing staff and specialists in the therapeutic disciplines.

Neuroradiology plays a central role in imaging diagnostics and acute catheter interventions to remove clots. Neurosurgeons have a particularly important role in the treatment of complications. The Stroke Center cooperates closely with the intensive care unit and the neuro-monitoring unit (IMC). Close cooperation with the Sleep-Wake-Epilepsy Center (SWEZ) is pivotal. Bern's Stroke Center is one of the world's leading institutions in neurovascular research.

At the Stroke Center, investigations are carried out to identify the causes of stroke. Of great importance is the care provided by specialized nursing staff and the early initiation of targeted therapies by a specialized team of physiotherapists, occupational therapists, and speech therapists.

In the neurovascular consultations and in the neurovascular laboratory, more than 3,000 outpatient consultations are carried out annually. All modern diagnostic imaging techniques (ultrasound as well as CT, MRI, and angiography) are available. One focus is individual, holistic counseling on prevention. For complex questions, internal and external physicians can refer their patients for case discussion at the weekly meetings of the interdisciplinary neurovascular board (conference of specialists).



The Bern Stroke Center is the largest of its kind in Switzerland and covers the entire treatment chain from acute phase to rehabilitation. The Stroke Center investigates the causes of a stroke and monitors vital signs.



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#### Interview

Dr. Daniela Wiest worked as an assistant physician in neurology. Currently she works as a neurologist in Biel and is president of the Swiss Neurological Society (SNG).

**How do you balance your personal life with your working life?**

*I find the balance to my working day during walks in the woods with my dogs, sailing and cycling.*

**What springs to mind when you hear the word «neurology»?**

*Neurology is as exciting as a detective story.*

**Which area of neurology do you find most exciting? Why?**

*What I find most exciting is the examination of balance and movement coordination. It is fascinating how finely tuned and with what great precision our movement sequences function. With simple methods these can be studied clinically, analyzed, and positively influenced with a few aids.*

**Why would you choose the Neurological Clinic at the Inselspital Bern for a neurological problem?**

*The outstanding features of the cooperation with the colleagues of the Department of Neurology of the Inselspital are the competent and uncomplicated services for patient transfer.*

**Which neurological expression sounds more beautiful to you in Italian or French than in German?**

*«Courbature» sounds much nicer than «aching muscles».*

**In which area of the Department of Neurology should more research be done?**

*Clarification algorithms and artificial intelligence are among the megatrends of the future. In neurology, too, these developments must be increasingly incorporated into the processes and taken into account.*

## Acute care ward

**In the acute ward, patients receive professional care around the clock.**

On the acute neurological ward, we care for more than 1,400 patients every year. We treat the entire spectrum of diseases of the nervous system, i.e. of the brain, spinal cord, and peripheral nerves. We also treat patients with diseases affecting the musculature and the connection between nerves and muscles.

Neurological diseases can, for example, affect strength and movement (motor skills, coordination), sensation and feeling (sensitivity), or higher brain performance (cognition).

**Dizziness and headaches are also important symptoms that require neurological assessment and treatment.**

Examples of common neurological diseases include stroke (cerebral and spinal circulatory disorders), multiple sclerosis (MS), epilepsy, movement disorders (e.g. Parkinson's disease) and dementia (e.g. Alzheimer's disease).

In addition to a broad range of basic neurological services, we also offer highly specialized therapies, such as treatments for stroke, epilepsy surgery, deep brain stimulation for Parkinson's patients, and treatments for complex inflammatory diseases of the central and peripheral nervous system.

More than half of the patients who are hospitalized are admitted via the emergency ward. Our day clinic is also located in the ward. The capacity is 47 beds (including 12 beds in the Stroke Center); 6 therapy slots are available in the day clinic.



# Emergencies and neurology consultations

**There is always an open ear and open door for patients, referring physicians and colleagues from other disciplines: this is what distinguishes the emergency and consultation team of the Department of Neurology.**



The neurological emergency and consultation team cares for more than 8,000 patients annually, around 6,000 are seen by the emergency service and around 2,000 in the regular consultation service for inpatients and patients from other specialist disciplines at the Inselspital.

**With nine assistant physicians and five senior physicians working in shifts, availability of qualified staff is guaranteed around the clock, seven days a week for all urgent questions about the entire range of neurological disorders.**

We are open for patients within the Inselspital, for patients transferred from other hospitals and practices, as well as for direct referrals by rescue services and persons seeking help directly from the emergency department.

Thanks to our interdisciplinary and interprofessional approach, the team is able to offer in a one-stop shop the whole range of diagnostic steps and acute treatment measures for the benefit of patients.

A broad neurological background and experience in the management of acute neurological diseases, such as stroke, enable our medical team to meet the daily challenges of emergency operations and to offer our patients the best possible care.

# Neurological-Neurosurgical Monitoring Station – Neuro-IMC

**At the Neurological-Neurosurgical Monitoring Station – Neuro-IMC (Neuro-Intermediate-Care Unit) we monitor patients who are in a neurologically unstable state.**

The university departments of intensive medicine, neurology, and neurosurgery cooperate closely in the running of the monitoring station.

Here we care for patients whose clinical picture requires complex treatment and care.

We perform close clinical and instrument-based monitoring of the patient's neurological condition as well as of the circulatory and respiratory systems.

Patients whose condition can change rapidly are cared for here. These are mainly patients suffering from stroke, cerebral or subarachnoid haemorrhage, epilepsy, craniocerebral trauma, meningitis, encephalitis, or brain tumors, and patients who have undergone brain surgery or endovascular catheterization.

There are 14 beds available and the Neuro-IMC currently treats around 1,900 patients annually.



# Neurorehabilitation in Bern and Riggisberg

The university neurorehabilitation service enables continuous inpatient and outpatient rehabilitation. With the opening of the Spital Riggisberg site in 2016 and the establishment of neurological-neurosurgical early rehabilitation in the spring of 2017, a growing number of patients are taking advantage of this continuity of care.

The neurorehabilitation facility offers a wide range of services for targeted rehabilitation after acute brain damage, such as from craniocerebral trauma, stroke, or cerebral haemorrhage. Severely affected patients are treated in the Anna-Seiler-Haus. Rehabilitation can also be continued in Spital Riggisberg as the treatment progresses.

An interdisciplinary team of closely cooperating staff from the fields of rehabilitation care, neuropsychology, speech therapy, and social services, as well as physicians and

therapists trained in physiotherapy and occupational therapy, ensures optimal treatment.

Since the opening of the neurological-neurosurgical early rehabilitation facility in January 2017, it has been possible to transfer patients directly from the intensive care unit or the **Neuro-IMC** (Neurological-neurosurgical Monitoring Unit). These patients are sometimes confused and agitated and medical problems are often still at the forefront. Intensive support from nursing staff and doc-

tors is necessary. We have developed special treatment concepts to take into account the problems of these patients.

The Riggisberg site was opened in September 2016. Patients who have already made progress in rehabilitation or whose problems are less pronounced can undergo the specific, graduated rehabilitation treatment there. The picturesque landscape of the Gantrisch Nature Park supports patients in their recovery.

Interdisciplinary rehabilitation is also offered to outpatients in the Anna-Seiler-Haus. The goal of these advanced therapies is a return to everyday life and, if appropriate, a return to work.

In order to involve relatives in the rehabilitation process, regular exchanges take place. This includes the possibility for relatives to attend the therapy sessions. Information evenings for relatives take place every six weeks. They offer the opportunity to obtain additional information about the essential aspects of neurorehabilitation.



# Neuropsychology

**Injuries or diseases of the brain can lead to cognitive and emotional impairments, including memory, attention, or drive. The field of neuropsychology includes the diagnosis and treatment of these emotional and cognitive brain dysfunctions.**

A staff of 19 currently work in Bern and Spital Riggisberg. They diagnose and treat a large number of both outpatients and inpatients. The referrals are made internally by other hospitals, or by doctors in private practice.

The neuropsychological evaluation involves a comprehensive assessment of cognitive functions, which includes standardized examination procedures and interviews with relatives, in addition to careful questioning of the patient. We answer questions about the type and extent of functional disorders, as well as the neuropsychological therapies needed for social or occupational reintegration. Finally, we can also discuss the course of the disease and its treatment.

The therapy is individualized and oriented to everyday life.

As part of their neuropsychological therapy, we discuss with patients how to cope with the disease and adapt to changed living conditions. In addition, we provide psychotherapeutic consultations with patients and their families.



**What prompted you to apply to the Department of Neurology at the Inselspital Bern?**

*I was 20 years old at the time and looking for a new challenge. I had completed a 3-year apprenticeship as a commercial clerk and worked in a technical company.*

**What springs to mind when you hear the word «neurology»?**

*The brain certainly occurs to me. I also think of the nervous system, stroke and diseases such as multiple sclerosis, epilepsy and Parkinson's disease.*

**Which field of neurology do you find the most exciting? Why?**

*There are many exciting areas, e.g. MS consultations. It is also touching to witness the positive progress and recovery of the patients.*

**What has been the highlight of your work in the Department of Neurology?**

*One highlight was participating in awake patients deep brain stimulation surgery.*

**Why would you choose the Department of Neurology at the Inselspital Bern if you had a neurological problem?**

*In the case of a neurological problem, I would choose the Department of Neurology at the Inselspital Bern because very competent and experienced doctors work there, because they offer the optimal medication and the necessary equipment, and because the patient always comes first; and also because a connection between the patient and the specialist staff is quickly established.*

**How do you balance your personal life with your working life?**

*I am able to balance my working life with my family. Last year we travelled to Israel, Finland and Italy. Jerusalem fascinated me personally. I also exercise three times a week, which gives me energy and strength.*



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**Interview**

Ernestina Cardinale has been working at the Neurological Policlinic since 1 January 1989. This year she is celebrating her 30-year jubilee as group leader in the medical secretariat.

# Psychosomatics, neuropsychosomatics – consultations for functional neurological disorders (FNS)

**As a cooperative project between the departments of neurology and psychosomatics, the Inselspital has been running specialized consultations for patients with functional neurological disorders (FNS) since 2017. This service is a worldwide innovation and caters to a large demand.**

FNS commonly prompt patients to seek a consultation with a neurologist. The patients experience symptoms such as paralysis, seizure disorders, movement disorders, or abnormal sensations that cannot be explained by classical neurological structural disorders.

Although functional neurological disorders have been well described since Charcot and Freud, they attracted relatively little academic attention in the 20th century. Since the 1990s, however, advances in neuroscience have led to a growing interest in this frequent and complex form of neurological complaint.

Since 2017, the Inselspital has been running specialized neurology consultations for patients with FNS, a service that is unique in Switzerland. It is led by specialized neurologists who have had extra training in psychosomatic medicine. Both a high-quality diagnostic process and individualized, multimodal therapeutic care are provided. This interdisciplinary treatment is carried out in collaboration with the competence area of psychosomatic medicine, which has a long tradition of excellence in the interdisci-

plinary management of complex medical cases in Switzerland.

In cooperation with other partners of the University of Bern, various research projects are underway to further the understanding and treatment of neurofunctional disorders. A programme financed by the Swiss National Science Foundation explicitly supports research on systematic treatment for patients with neurofunctional disorders. The aim is to continuously and sustainably optimize the service competence in the field of neurofunctional disorders.



# Occupational therapy, physiotherapy and speech therapy

The three therapeutic areas of occupational therapy, physiotherapy, and speech therapy allow patients to be appropriately supported through all phases of neurorehabilitation. Interprofessionality\* characterizes the daily work with patients and their relatives.



The range of therapies offered at the Department of Neurology has been steadily expanded in recent years so that patients can be systematically examined and treated during all phases of a neurological disease.

The goal of occupational therapy is to enable people to carry out meaningful and useful activities in their daily lives. The best possible communicative independence in everyday life, be it in conversations or in written exchanges, is developed in speech therapy. In physiotherapy, the focus is on restrictions of sensorimotor functions, cardio-pulmonary issues, and swallowing or the prevention of secondary problems.

Physiotherapy begins when the patient is in the Intermediate Care Unit. All three professional groups are represented at the Stroke Unit and on the acute ward. All therapists evaluate the limitations of the sensorimotor, perceptive/cognitive, and linguistic functions and, together with the patients and their relatives, assess their effects on the patients' daily lives. In the case of cognitive impairments, neuropsychologists are also involved.

Based on an assessment by an interprofessional team – consisting of doctors and specialists from the therapeutic disciplines, social services, and nursing – further treatment is discussed and planned. The initial therapeutic steps are initiated while outpatient therapies are organized. If patients need inpatient rehabilitation, the therapy is continued seamlessly in the Anna-Seiler-Haus or in Spital Riggisberg thanks to efficient communication channels.

A full programme of individual and group therapies enables intensive training in all the skills required in everyday life.

Depending on the course of treatment, rehabilitation may continue in Spital Riggisberg after neurorehabilitation in the Anna-Seiler-Haus. When the patients leave or are discharged home, their rehabilitation is continued at our interdisciplinary outpatient department in the Anna-Seiler-Haus. All the interventions are coordinated on an interdisciplinary basis and supervised by neurologists. When the patients return to work, we cooperate with external bodies such as disability insurance (IV). In addition, physiotherapists and speech therapists provide interdisciplinary care and support patients with neuromuscular diseases and movement disorders. Physiotherapists are also involved in the ambitious twelve-week outpatient preventive programme for patients after a stroke.

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*\*Interprofessionality: a detailed description of the objectives and advantages of cooperation between the medical professions can be found on the website of the Swiss Academy of Medical Sciences (SAMS) › [www.samw.ch](http://www.samw.ch) › projects › interprofessionality.*



The range of therapies offered has been steadily expanding in recent years. The focus here is on people and their daily tasks.  
Photo: Occupational therapy aims to enable people to carry out meaningful and useful activities in their daily lives.

**What made you decide to work at the Department of Neurology in Bern?**

*For me, the most important thing was the opportunity to earn money.*

**How do you balance your personal life with your working life?**

*By spending a lot of time outdoors hiking, cycling, and travelling.*

**What springs to mind when you hear the word «neurology»?**

*I can think of two terms «exciting» and «demanding». The field demands a lot from those who work here, and there are also many exciting moments and insights.*

**Which area of neurology do you find most exciting? Why?**

*The care of chronically ill people, because I can support these patients during their stay in hospital and contribute a great deal to their knowledge of the disease, as well as helping them to deal with it.*

**What has been the highlight of your work in the Department of Neurology?**

*I was fascinated and challenged by the specialized training in nursing and my dissertation on telemetry and epilepsy.*

**Why would you choose the Department of Neurology at the Inselspital Bern if you had a neurological problem?**

*Because here I would find very well-trained doctors, many of whom I know personally, and because specialists are available to deal with complications.*



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#### Interview

Susanna Rohrbach worked for 32 years in the Department of Neurology as an expert in nursing care. She retired at the end of 2018 and is now enjoying her well-deserved retirement.

## Nursing care

**Diverse and changing complaints and limitations shape patients' expectations of care.**

**This also includes fears and uncertainties about the future and the progression of their illness.**



Since neurological diseases can mean drastic lifestyle changes, patients and their relatives are put under severe strain and often find themselves in a state of crisis. A direct consequence of this is that any delay, change or disappointment can be overwhelming. Nursing care offers

help with the activities of everyday life; it takes measures to alleviate pain, and helps to release blockages in patients with sensory, speech, and movement disorders.

It is equally important to ensure that existing impairments do not lead to new damage. Empathy with the patients and careful communication are indispensable prerequisites for the continuous assessment, planning and fulfilment of nursing needs.

This requires a continuous and detailed exchange of information with doctors, therapists, social services, and other professional groups.

### **Nursing care is the interface between patients, doctors, and relatives.**

The nursing staff is committed to supporting the patients and their relatives individually, competently, safely, continuously, and in a spirit of cooperation, in the experience of their illness and in dealing with the illness. The nursing staff can acquire specific specialist knowledge within the field of neurology, e.g. in acute neurology. The FANI Day

Clinic, the Stroke Unit, acute and early rehabilitation, psychosomatics, the outpatient neurocentre as well as the Center for Movement Disorders and various special consultations are available to provide training and further education.

The daily routine in the Department of Neurology places many demands on nursing staff: at the Stroke Unit, stroke patients receive specialized acute treatment combined with early rehabilitation. Experienced nursing staff with a high level of expertise play a central role in the specialized treatment of stroke patients in the multi-professional team.

Nursing care during early neurological rehabilitation pursues the overriding goal of enabling people, some of whom are severely affected, to return to their social and, if appropriate, to their professional lives.

**What made you decide to apply to the Department of Neurology in Bern?**

*I find the Inselspital, as a university hospital, very impressive and interesting. Neurology is also a complex and exciting field. That was the reason for my application.*

**How do you balance your personal life with your working life?**

*My social environment and sportactivities are very important to me. Thanks to the regular working hours, I am able to balance work and leisure time.*

**What springs to mind when you hear the word «neurology»?**

*Neurology is a complex and interesting field of medicine.*

**Which field of neurology do you find the most exciting? Why?**

*Since I work in the neurology ward or in the Stroke Unit in the secretary's office, this is the area I have the most insight into. I really like the job. You are actively involved in what is happening and work together with the nursing staff and the doctors.*

**What has been the highlight of your work in the Department of Neurology?**

*The cordiality and openness with which I was accepted into the team on the neurological ward when I took up my position.*

**Why would you choose the Department of Neurology at the Inselspital for a neurological problem?**

*Because the Inselspital, as a university hospital, offers the best medical treatment possibilities in all areas.*



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**Interview**

Since October 2017 Fabienne Bieri has been working as a medical secretary for the neurological ward and the Stroke Unit.

# Teaching and training

Teaching has a high priority and a long tradition, both in further education and in advanced training at the Department of Neurology



Comprehensive clinical knowledge transfer has been of great importance since the Department of Neurology was founded. We invest a great deal of energy and a considerable proportion of our resources in the education of university students, in the continuing education of our assistant physicians on their way to becoming specialists, and in internal and external training events for primary care providers, specialists in neurology, and other disciplines.

The Department of Neurology is known for its wide range of activities. Traditionally, numerous specialists from the field of neurology take part. However, many events are also aimed at specialists from other disciplines, such as people from other neurological fields, general internal medicine, and family medicine. The events also provide laypersons and patients with insight into neurological disease patterns.

General neurological training events such as **Neurology for practicing physicians** or **Neurological emergencies** are firmly established seminars. Interdisciplinary advanced training courses such as the Workshop Bernese Parkinson Therapy Network, the Sleep-Wake Days, the Brain and Heart Symposium, the Stroke Symposium and events for laypersons and patients, such as the MS Patient Symposium, attract wide interest.

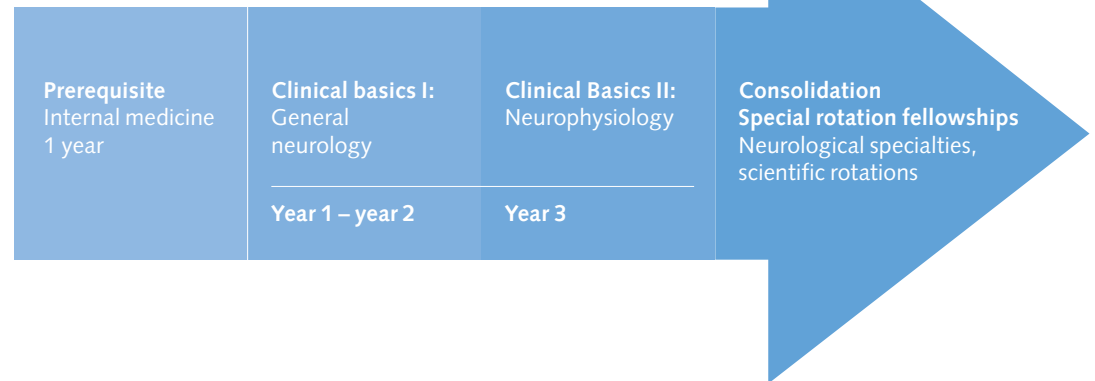
### «Neuro-logical» brain training at the Inselspital

The Department of Neurology at the Inselspital is the largest neurological training center in Switzerland. It can look back on a long tradition of high-quality, broad clinical training for assistant physicians on their way to becoming specialists. Teaching and continuing education have always been a cornerstone of the values and orientation of the clinic. Today, there are more than 60 young doctors in neurological training every year. Their fields are diverse and enriching for the team and for everyday life, whether it is the most aspirational specialist qualification in neurology, an optional year on the way to becoming an internist or a psychiatrist or an academic career following the MD-PhD model (MD-PhD: Doctorate of Medicine and of Philosophy). Over the years, numerous different training and further education pathways have emerged. After two years of general neurological training, in-depth further training in electrophysiology as well as fellowships are part of the specialist training.

Currently, 16 different clinical and scientific fellowships are offered for assistant physicians and specialists (e.g. in general neurology, neurovascular medicine, sleep, movement disorders, neuroimmunology, dizziness and headaches, and in-depth electrophysiological training). In addition, there are various possibilities for cooperation and interdisciplinary rotations (e.g. in intensive care medicine, neuroradiology, and internal medicine). We offer professional and individualized planning and design of the curriculum. This enables the participants to develop

to their full potential. Thanks to the high priority it gives to continuing education, this year the Department of Neurology received an award from the Swiss Institute for Postgraduate and Further Education in Medicine (SIWF) for its commitment in this area.

The promotion of young talent is a challenge both in a university academic setting and for the retention of general neurological. With innovative recruitment initiatives, targeted promotion of part-time-friendly working models and encouragement to combine scientific research and clinical commitment during advanced training, we ensure that junior staff are appropriately supported.



### Training programme Neurology Bern

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#### Structured «Morgenfortbildung» Neurology

Our specialized teams have designed a two-year training programme with comprehensive neurological learning goals for our assistant physicians.

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#### Fellowships in Neurology

Specialized in-depth training in various subdisciplines rounds off the individualized curriculum of our assistant doctors.

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#### Master of Advanced Studies in Sleep, Consciousness and Related Disorders (in English)

This is an internationally recognized course, which is coordinated by the University of Bern USI.

The university's continuing education programme teaches current scientific and clinical knowledge as a basis for understanding sleep physiology and the diagnosis and treatment of patients with sleep and consciousness disorders.

# Research at the Department of Neurology

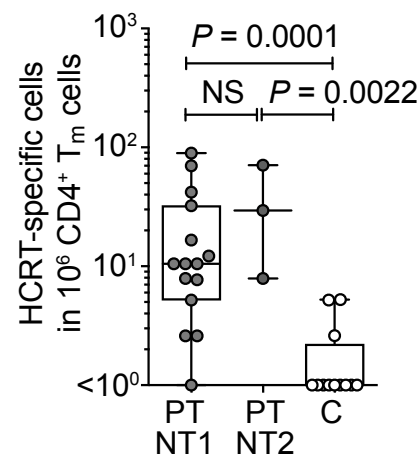
Modern clinical and translational research will be the basis for the innovation and future development of medicine. In the year 2018, our clinic was ranked second out of a total of 38 university hospitals for the quality of its research and teaching, according to information that is collected and evaluated by the Dean's office of the Faculty of Medicine. Through multidisciplinary collaboration, we combine clinical practice with basic research, supported in 2018 by 29 ongoing SNSF projects. Here we summarize some recently published papers that give a brief insight into our research.

Prof. Dr. med. Claudio Bassetti  
Chair of Department and Head

## The importance of immune response in patients with narcolepsy

Prof. Claudio Bassetti's group is interested in clinical research and basic research on neuronal circuits that are important for sleep-wake regulation. The aim is to better understand the role of sleep in neurological diseases such as narcolepsy. Narcolepsy is a rare condition – 0.05 percent of the population is affected – and is characterized by a disturbance of the sleep-wake cycle. Patients with narcolepsy can experience extreme fatigue and can fall asleep unintentionally at any time. In the vast majority of cases it is not possible to clearly determine the cause of the disease or to attribute it to another disease. However, narcolepsy has been shown to be due to the loss of a small number of neurons in a part of the brain called the lateral hypothalamus.

Studies suggest that the loss of these neurons (so-called hypocretin neurons [HCRT]) could be the result of an autoimmune response: white blood cells, which normally provide protection against external pathogens, erroneously attack the body. This autoimmune response could be a reaction to environmental factors that occurs in genetically predisposed individuals. However, the connection between the disease and an erroneous immune response has yet to be demonstrated.



Prof. Bassetti and his colleagues studied this phenomenon in blood collected from both healthy individuals and narcoleptic patients. They measured the number of white blood cells (T cells) of a certain type to find out whether the HCRT neurons might be attacked. The researchers were able to show that these T cells attack proteins expressed in HCRT neurons in patients with narcolepsy. How these neurons are then destroyed will require further investigation.

These results could have a significant influence on the treatment of narcolepsy and could open up new possibilities for earlier and more reliable diagnoses. Furthermore, new therapies could be developed to modulate the immune system.

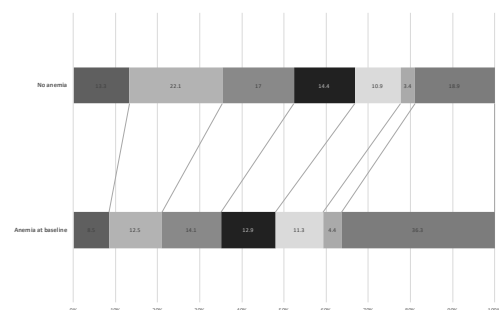
This work was published in the renowned British journal *Nature*. For further information see: Latorre, D. et al. T cells in patients with narcolepsy target self-antigens of hypocretin neurons. *Nature* 562, 63–68 (2018) doi:10.1038/s41586-018-0540-1

### What influence does anaemia have on the development of a stroke?

A stroke is caused by a deficiency in the blood supply to the brain, usually due to a sudden vascular occlusion. In the acute phase, the treatment of the vascular occlusion by means of medication (thrombolysis) or mechanical catheter procedures (thrombectomy) is effective in ensuring immediate survival and helps to improve the long-term prognosis.

About 20 percent of stroke patients are already suffering from a deficiency of red blood cells – anaemia – when the stroke occurs. Several studies have shown that pre-existing anaemia can adversely affect the recovery of stroke patients. It was not known whether a decrease in red blood cells, which is frequently observed during the first few days of treatment, could also have a negative influence through excessive dilution of the blood. If necessary, the regime for infusion treatment should be reconsidered and adapted.

To investigate the influence of anaemia and the decrease in red blood cells during stroke treatment, Prof. Dr. Simon Jung's research group, with the help of Dr. Sebastian Bellwald, analyzed the medical data of 1,158 patients who had suffered a stroke between January 2011 and June 2015. Twenty-three percent of these patients were already anaemic when they were admitted to hospital. In addition, 47 percent of thrombolysis-treated patients and 29 percent of thrombectomy-treated patients developed anaemia between the day they were admitted to



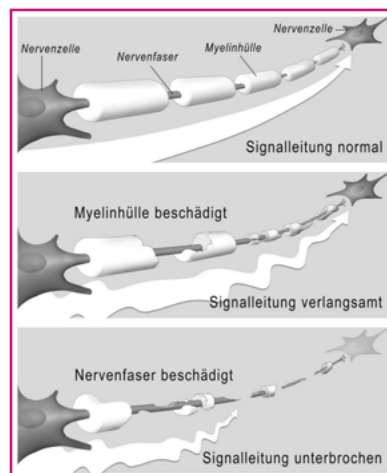
the hospital and the fifth day of their stay. The analyses showed that a pre-existing low level of red blood cells or a significant decrease in their number during the hospital stay correlated with a poorer outcome for the patient,

regardless of the type of treatment. While 19 percent of non-anaemic patients had died three months after their stroke, the percentage of anaemic patients who died was 36 percent. In addition, a correlation between the number of red blood cells and the severity of the stroke could be demonstrated: every decrease in red blood cell concentration was linked to an increase in lost brain tissue. Accordingly, the amount of infusion used to dilute the blood may have a considerable influence on the fate of the patients. The research group is planning a further study to investigate this relationship in more detail.

This work was published in the American journal *PLoS One*. For further information see: Bellwald S., et al. Association of anemia and hemoglobin decrease during acute stroke treatment with infarct growth and clinical outcome. *PLoS One*. 2018 Sep 26; 13(9).

### Progression of multiple sclerosis (MS) after discontinuation of treatment with fingolimod

MS is a chronic autoimmune disease of the central nervous system (CNS). In the course of the disease, recurrent inflammation in the CNS first damages the protective sheaths of the nerves and later the nerve cells themselves. This impairs the ability of the nervous system to transmit information between the brain and the rest of the body. The symptoms (impaired thinking, visual and speech disorders, paralysis, muscle stiffness, etc.) vary depending on the area of the brain affected. Several forms can be distinguished, the most common of which is relapsing-remitting MS. In patients with this form, remission phases with stable symptoms are interrupted by relapses during which they experience an acute loss of neurological function. These relapses occur spontaneously.



Several pharmacological treatments that act on the immune response are available. One of the approved drugs is fingolimod (trade name Gilenya). It prevents the immune cells from leaving the places where they are normally found – for example the lymph nodes – and from traveling in the bloodstream to the brain or spinal cord.

Earlier studies in mice showed that an abrupt cessation of fingolimod intake can trigger a severe relapse. However, the frequency and characteristics of such relapses are not yet well defined in patients with MS. The neuro-immunological research group in Bern (Prof. Andrew Chan, Dr. Robert Hoepner, Dr. Anke Salmen, and Dr. Nicole Kamber) and the neurological department of the University of Athens (Prof. Dr. Maria Eleftheria Evangelopoulos) combined their own data with published data from other centres in order to deepen their understanding. In this way, their cohort of patients could be expanded and it was possible to improve the statistical basis of the data. People who had finished treatment

with fingolimod were examined. The research group was able to show that 11.7 percent of MS patients experienced a significant relapse in disease activity after stopping fingolimod. The most common symptoms were muscle weakness, sensory disturbances, and fatigue. In addition, the relapses were more severe than average in the sense that MS patients had several symptoms at the same time. In line with this finding, an average of 13 new active lesions were detected in cerebral MRI. The significance of this work lies in the description of the frequency and the severity of this phenomenon.

This work was published in the American journal *CNS Neuroscience & Therapeutics*. For further information see: Evangelopoulos M. E., et al. Frequency and clinical characteristics of multiple sclerosis rebounds after withdrawal of fingolimod. *CNS Neurosci. Ther.* 2018 Oct; 24(10): 984–986.

Prof. Dr. Antoine Adamtidis  
Senior Physician, Head of ZEN Inselspital, University Hospital of Bern

### How are sleep and wakefulness controlled?

Sleep is an essential biological phenomenon that originated early in evolution and has been preserved across species. The importance of sleep in the consolidation of new memory content, the renewal of energy reserves, and the brain's ability to make new connections has already been demonstrated. However, the mechanisms used by the brain to regulate sleep-wake states are unclear.

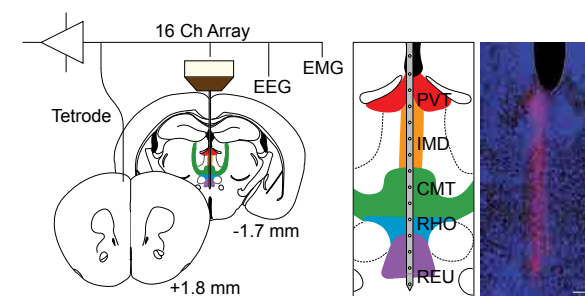
The research goal of Prof. Antoine Adamantidis's group is to better understand the neural basis of sleep-wake states.

The team is investigating the interactions between areas of the brain that promote sleep and those that promote wakefulness. Previous studies have shown that the anterior hypothalamus is important for the sleep phase, while the posterior hypothalamus, the basal forebrain, and the

brainstem have a role in promoting wakefulness. The sleep stages, which reflect different neuronal activity, are recorded by a sleep electroencephalogram (EEG): Deep sleep (known as non-rapid eye movement [NREM sleep] and paradoxical sleep (rapid eye movement [REM sleep]).

For an article published in early 2018, Prof. Adamantidis's team studied mice to find out how nerve cells in the thalamus control the onset of wakefulness or the depth of deep sleep. The researchers used new, very specific technologies that enable the stimulation or inhibition of nerve cell activities. They found that the thalamus plays a dual role in this control. The tonic activation of these nerve cells during sleep caused awakening, while their phasic activation promoted deep sleep. This special circuit could therefore integrate both wake and sleep signals into interdependent processes. The results obtained with this animal model may help to find new approaches to the treatment of sleep disorders.

This work was published in the renowned British journal *Nature Neuroscience*. For further information see: Gent T.C., et al. Thalamic dual control of sleep and wakefulness. *Nature Neuroscience*. 2018 July; 21(7): 974–984.



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Prof. Dr. Dr. Kaspar Schindler  
Senior Physician, University Hospital of Bern

### Development of a computer algorithm capable of detecting and classifying epileptic seizures

Epilepsy is a chronic neurological disorder. During an epileptic seizure, cerebral nerve cells suddenly produce abnormal electrical discharge patterns in certain areas of the brain and transmit uncontrollable commands to the body. A major challenge is to detect seizures reliably.

In cooperation with scientists from the Institute for Integrated Systems at ETH Zurich (Alessio Burrello, Dr. Abbas Rahimi, and Prof. Luca Benini), Prof. Kaspar Schindler's group has developed an algorithm that characterizes intracranial electroencephalography signals (iEEG) by means of so-called local binary groups and then processes them further using hyperdimensional computing. This method offers the possibility to learn from one or just a few examples (one-shot learning). The researchers analyzed the data of 16 patients with epilepsy for a total of 99 iEEG seizure recordings and showed that for the majority of these persons (10 out of 16) the algorithm quickly developed. After one or two seizures it had learned to detect seizures reliably (i.e. 100 percent of new seizures) and

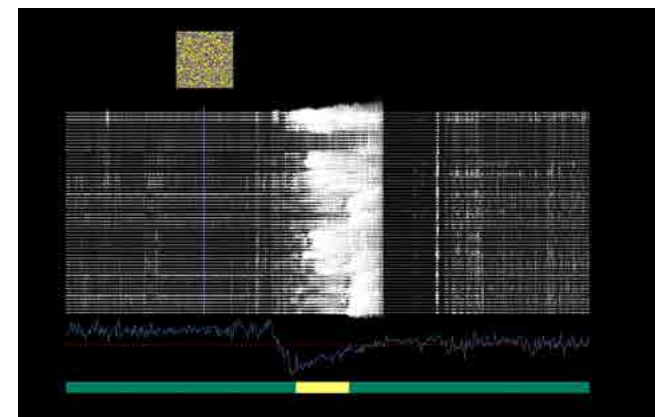
then detected them correctly. For the other six patients, the algorithm needed more seizures (3 to 6) for training, but the probability of detection remained at 100 percent.

### The algorithm also outperformed other seizure detection methods and provides a simple interface for analyzing even longer iEEG recordings.

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This paper was published as a conference article at the conference **BioCAS 2018** and was selected as one of the three best papers presented.

Further information: Alessio Burrello, Kaspar Schindler, Luca Benini, Abbas Rahimi, One-shot Learning for iEEG Seizure Detection Using End-to-end Binary Operations: Local Binary Patterns with Hyperdimensional Computing, in proceedings of the IEEE Biomedical Circuits and Systems Conference (BioCAS), Cleveland, OH, October 17-19, 2018, Online: [www.research-collection.ethz.ch/handle/20.500.11850/305686](http://www.research-collection.ethz.ch/handle/20.500.11850/305686)



The algorithm also outperformed other seizure detection methods and provides a simple interface for analyzing even longer iEEG recordings.

Prof. Dr. René Müri  
Head of Medical Department, Inselspital, University Hospital of Bern

### Role of non-verbal communication in patients with speech impairment after a stroke

Aphasia is an impairment of the central nervous system. It leads to speech not being understood or produced due to damage to certain brain regions. Aphasia is typically observed in patients who have suffered a stroke. Usually some aspects of communication (speaking, understanding, reading and writing) are impaired, while others remain accessible for limited information exchange.

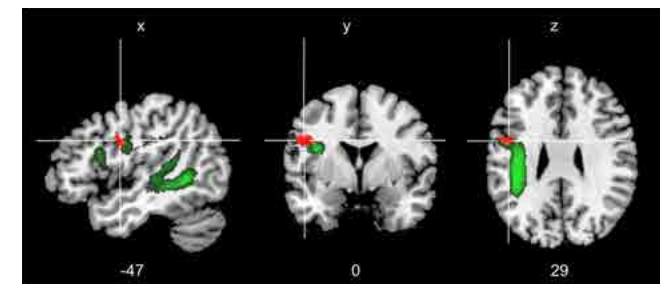
Language-accompanying (co-speech) gestures are non-verbal communicative movements of the hands and arms. They accompany speaking and are important for the communication of information. At the same time, they support the language by facilitating word recognition. Such co-speech gestures help stroke patients to express themselves more clearly but the role these gestures play in stroke patients with speech impairment is not yet fully understood.

Prof. René Müri led a study co-financed by the Swiss National Science Foundation on how aphasic patients perceive and produce gestures. The study also investigated the question of whether certain brain lesions can predict the frequency of co-speech gestures.

To answer these questions, healthy participants and patients with aphasia were asked to participate in a short conversation. In the course of the conversation, the eye movements and movement production of the participants were recorded. The study initially showed that aphasic patients were more likely to adopt the gestures of the examiner than healthy participants. Meaningful gestures (gestures illustrating what was said) were recorded more frequently than abstract ones. In addition, aphasic patients produced more meaningful gestures than healthy participants. The production of these gestures was even higher in severely aphasic patients. Damage to a specific brain region (the arcuate fasciculus) correlates with the increased production of gestures.

The results suggest that patients with aphasia can benefit from the information provided by co-speech gestures to compensate for reduced speech capacity.

This work was published in the journal *Frontiers in Human Neurosciences*. For further information see: Preisig B. C., et al. Multimodal communication in aphasia: perception and production of co-speech gestures during face-to-face conversation. *Front Hum Neurosci*. 2018 Jun; 12: 200



Voxel-based lesion-symptom mapping. Orange voxels represent brain damage locations that were significant predictors of an increased frequency of meaningful gestures. The left arcuate fasciculus is shown in green.

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Prof. Dr. med. Urs Fischer, Senior Consultant Inselspital,  
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Prof. Dr. med. Marcel Arnold, Chief Physician, Inselspital,  
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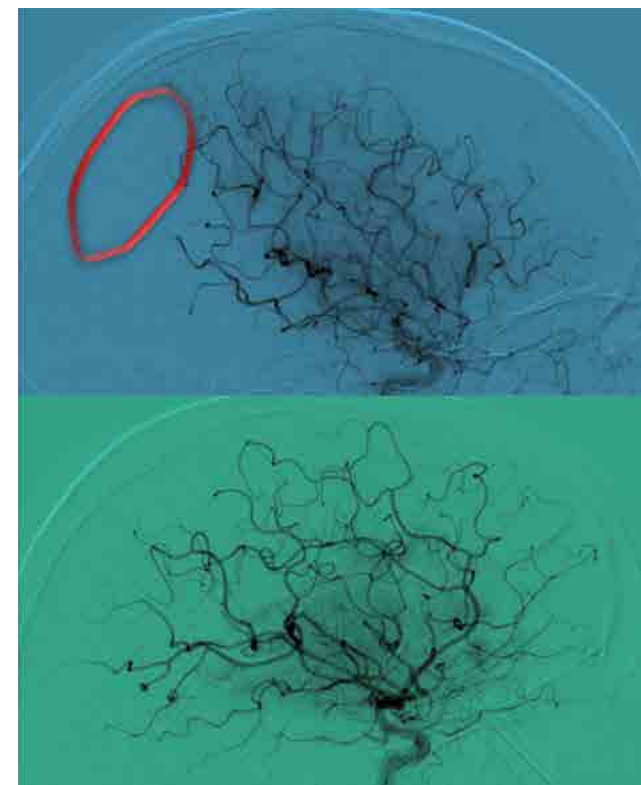
### **Influence of cerebral blood flow on the healing process after acute stroke treatment**

Cerebral infarction is the most important cause of premature disability in adult life in industrialized countries and the most common life-threatening neurological disease. A significant proportion of strokes are caused by the occlusion of a large artery in the head. Since 2015, several major international studies have shown that the timely treatment of large vascular occlusions with catheter techniques via the inguinal artery can protect a large proportion of patients from disability.

The Stroke Center Bern is clinically and scientifically one of the pioneering centres worldwide in the treatment of stroke with catheter techniques. In this procedure, material is introduced into the head via the inguinal artery, the aorta and suitable cervical vessels to treat the occlusion. The blood clot is pulled out of the clogged arteries using a mobile stent, which restores the blood flow.

When the blood clot is mobilized, it can disintegrate and clog the small arteries behind it. Depending on the location, one can try to treat these smaller occlusions in the same way, but the general rule is that the smaller the vessels, the more technically demanding and risky the procedure is.

In a recently published study, neurologists (Prof. Urs Fischer, Prof. Marcel Arnold and his team) and neuroradiologists (Dr. Johannes Kaesmacher, Prof. Jan Gralla and his team) were able to show that patients who, by definition, had been successfully reperfused, but to varying degrees, had different clinical outcomes. In a metaanalysis, the teams compared the influence of successful, but not total, reperfusion according to the threshold value, with the clinical course of patients in whom complete reperfusion was achieved. Patients with complete reperfusion were significantly less dependent on outside help after three months. The authors therefore recommend achieving complete reperfusion whenever possible. The results also provide a scientific justification for the treatment of small blood clots formed during the procedure so that the blood circulation can be further improved.



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This work was published in the journal *JNNP*. For further information see: Kaesmacher J., et al. Systematic review and metaanalysis on outcome differences among patients with TIC12b versus TIC13 reperfusion: success revisited. *JNNP* 2018 Sep; 89(9): 910–917.

# Cooperation partners of the Department of Neurology

We cooperate intensively with the referring and post-treating physicians. Our goal is to provide a full range of neurological services, from basic care to highly specialized medicine. We are also active partners in national and international multidisciplinary research projects.

Our clinic collaborates with all the hospitals in the Canton of Bern to ensure basic neurological care. Within the field of specialized and highly specialized neuromedicine, we also cooperate with many hospitals outside the canton, in addition to providing care within the canton. Telera-diology is used in the majority of cases. We have contractual agreements with the Hôpital Neuchâtelois (HNE), the Freiburger Spital (HFR), the Hôpital du Valais, the Spitalzentrum Biel, the Solothurner Spitäler AG, the Spitäler fmi AG in Frutigen and Interlaken, the Luzerner Kantonsspital and the Neurocentro in Lugano.

Cooperation with the neurologists and neurosurgeons who are members of the **Berner Neurologen und Neurochirur-gen Verein** [Bern Neurologists' and Neurosurgeons' Association] (BNNV), is particularly important and enriching.

## Our research groups are linked to important networks both nationally and internationally:

- The Bern Network for Epilepsy, Sleep and Consciousness (BENESCO) comprises scientists from the University of Bern, the University of Fribourg, the Neurocenter of Southern Switzerland (Lugano) and the Barmelweid Clinic. These researchers specialize in various aspects of sleep medicine, epilepsy, and consciousness.

- The interfaculty research cooperation, Decoding Sleep: From Neurons to Health and Mind, consists of 13 research groups and is mainly funded by the University of Bern.
- Research groups in the fields of stroke, MS, and neurorehabilitation have been collaborating in and leading national and international research projects for many years.



**What made you decide to work at the Department of Neurology in Bern?**

*I completed my training as a qualified nursing specialist at the Stroke Unit. This internship awakened my interest in neurology. I was very interested in the diversity of neurological disorders. Patients often come to us with non-specific symptoms. A diagnosis is then made and, if necessary, treatment is started.*

**What springs to mind when you hear the word «neurology»?**

*I spontaneously think of the words «nerves» and «brain».*

**How do you balance your personal life with your working life?**

*I enjoy my free time with my friends and family. I am still looking for a specific sport that will help me to achieve a good work-life balance.*

**Which field of neurology do you find the most exciting? Why?**

*Each area has its own exciting aspects, and at the Stroke Unit I found the medical technology and the rapidly changing situations very exciting. Currently on the ward, I find it fascinating that patients often come with non-specific symptoms that have psychological*

*causes. We also have patients with various secondary diagnoses, which also have to be taken into account. This makes the cases even more complex.*

**What has been the highlight of your work in the Department of Neurology?**

*For me, the highlight is to see the progress of the patients toward recovery: the improvement of their pain symptoms and then the moment when they can go home.*

**Why would you choose the Department of Neurology at the Inselspital Bern if you had a neurological problem?**

*I would recommend treatment here because there are specialists with experience in diagnosis and treatment. Various therapists help patients to regain functions that might previously have been thought to be lost. Important examinations can be carried out in-house, and care is also evidence-based and performed with all one's heart.*



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**Interview**

Luna Cavallari has been working in the Department of Neurology at the Stroke Unit since October 2018. She recently completed her training as a qualified nurse.



# The future

**Innovations in highly specialized technologies and the strengthening of interdisciplinary cooperation are important driving forces for future development.**

## Innovative technology

Continuing advances in electronics, microtechnology, and data processing lead to ever smaller, less invasive and more efficient diagnostic and therapeutic procedures in the treatment of neurological disorders. In the future, portable or even implantable devices will make it possible to measure neurophysiological signals over periods of weeks, months, or even years. But «big data» is not automatically «better data». The amounts of data obtained in this way require new, powerful evaluation methods. The raw data must be translated into everyday clinical practice. Experienced neurologists will need to interpret and weigh the results.

Technological innovations have a profound impact on the way we work. Experts from all disciplines, and increasingly also from outside medicine, will work together more closely in the future. Specialists in information technology, natural sciences, and medicine will cooperate much more closely than is the case today. Interdisciplinarity places heavy demands on specialists. In order to ensure the exchange of information and efficient cooperation, new training and further education curricula will become necessary.

Adjustments to medical studies in general, and to neurological training, in particular, will follow. Communication with patients will be of the utmost importance and traditional medical consultation will continue to gain in importance in the future.

The new technologies will have to be explained and understood. In order to ensure that patients can take responsibility for their own decisions and participate optimally in their treatment, the findings from new technologies must be communicated in an understandable way.

Big &  
Better Data

Neuro-  
technology

Inter-  
disciplinarity

### Interdisciplinary problem-solving

Originally, neurology was predominantly a diagnostic discipline, but it has since developed into an active therapeutic discipline. In the future, the neuro-subjects will increasingly require cooperation between specialized disciplines within neurology and far beyond, for example with specialists in oncology and geriatric medicine. The University Neurocenter and the Stroke Center, which are already operating well, are good examples of this development. The work at the Neurooncological Center has also started successfully.

In addition to their clinical focus, interdisciplinary treatment centres are also very important for clinical translational research. For example, they play an important role in the diagnosis and treatment of very rare diseases, known as orphan diseases.

**In the future, neurology will also focus on the rehabilitation of patients with specific neurological diseases.**

New treatment methods used in neurorehabilitation, such as robotics and non-invasive brain stimulation, create the necessary conditions for offering specific neurological

rehabilitation. The focus can be redirected to the rehabilitation of the neurological disease and no longer only needs to treat non-specific deficits.

Specialized training in neurology will have to include this rapid interdisciplinary development. For this reason, we will need to develop subspecialties in addition to solid basic training in neurology in order to do justice to the increasing specialization and development of the individual disciplines.

Communi-  
cation

Specialization

# Your contacts

We are happy to accept patient referrals from 08.00–17.00 (and to treat emergencies around the clock).  
At [www.neuro-bern.ch](http://www.neuro-bern.ch) doctors can also refer their patients online or using our electronic form.

## Emergencies (doctors' contact) (incl. stroke)

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## General Inquiries

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## Outpatients Neurology, Patient Registration

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## Psychosomatic Medicine

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