



# DEPARTMENT OF EPILEPTOLOGY

## UNIVERSITY OF BONN MEDICAL CENTRE



## FOCUS ON: THE PATIENT.

## EFFECTIVE TREATMENT. SUSTAINABLE ASSISTANCE. TARGET-ORIENTED RESEARCH.



WITHOUT A DOUBT, BRAIN RESEARCH IS ONE OF THE LEADING SCIENCES OF THE 21ST CENTURY. HOW IS CONSCIOUSNESS, MEMORY OR PERCEPTION REALIZED IN THE BRAIN? WILL WE BE ABLE TO IMPROVE TREATMENT OR EVEN HEAL BRAIN DISEASES LIKE EPILEPSY? OVER THE PAST FEW DECADES, EPILEPSY RESEARCH HAS ALREADY MARKEDLY IMPROVED THE SITUATION OF MANY PATIENTS. AS A RESULT, IMPORTANT FINDINGS HAVE BEEN OBTAINED CONCERNING THE FUNCTION OF THE HUMAN BRAIN.

### A WARM WELCOME TO OUR DEPARTMENT

As Head of the Department of Epileptology, I am pleased to present this brochure to you. On the following pages, we will introduce our department and explain our scientific activities. We would like to leave you with a sense of our commitment to the patient and our fascination for epilepsy and brain research. You will read a bit about the overall clinical picture of epilepsy; a disease that strongly affects the life of the patients and awakens within us the desire to help. But we would also like to show you that epilepsy research provides unique insight as to the functionality of the human brain, which can also be significant for understanding other brain diseases. We owe much of our current knowledge on human brain function to the cooperation and open-mindedness of epilepsy patients.

### PROGRESS AND PREJUDICE

Even today, patients with epilepsy continue to be unjustly stereotyped and stigmatized because of unwarranted fears. In the overall population, it is unknown just how many people suffer from epilepsy and that the risk is relatively high. We want to show that epilepsy is a brain disease which can be examined more and more precisely and treated with ever increasing success, even in difficult cases.

### ROOM FOR COMMITTED GOALS

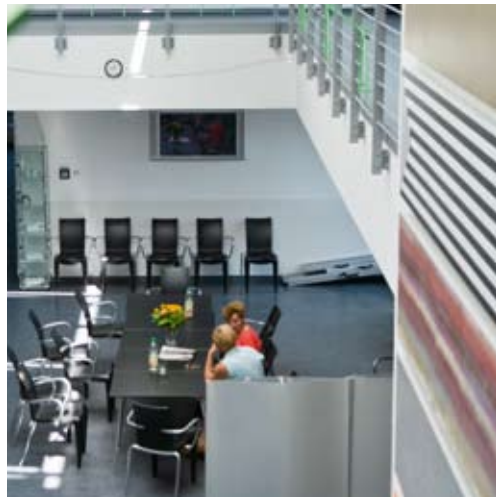
The Department of Epileptology moved into its new building back in 2000. The manner in which the architecture contributes towards the success of our work is multifaceted. We hope that this brochure reflects the functional as well as inspirational atmosphere of the facilities, in which we and our patients – day after day – face new challenges.

Learn more about our clinical and scientific work!  
We cordially invite you.

**CHRISTIAN E. ELGER**







# DEPARTMENT OF EPILEPTOLOGY IN BONN. ONE OF THE WORLD-WIDE LEADING INSTITUTIONS IN EPILEPSY TREATMENT AND RESEARCH.



IN 1979, THE STATE OF NORTH RHINE WESTPHALIA SUMMONED THE CITY OF BONN TO CREATE A UNIVERSITY RUN, SPECIALIZED CLINIC FOR THE TREATMENT AND RESEARCH OF EPILEPSY. AT THE SAME TIME, THE ONLY GERMAN PROFESSORSHIP FOR EPILEPTOLOGY EMERGED FROM HERE.

## CHALLENGES AT THE HIGHEST LEVEL

The duties of the Department of Epileptology are clearly defined: optimal diagnostics and treatment for patients with epilepsy and other seizure-like disturbances, and research on epilepsy and the functions of the human brain, such as memory and emotion. Patients benefit from our extensive commitment to education and the advanced training of students, medical personnel and established physicians – all of whom help guarantee the highest possible quality of treatment.

## IN FAVOUR OF THE PATIENT

The well-being of the individual patient is the central concept of the department. Seizure control and quality of life improvement are the primary goals. Even though many patients are not acutely ill or do not suffer pain during their in-hospital stay, exhausting or invasive diagnostic procedures are sometimes unavoidable. Waiting for results can be very wearing. Competent physicians, EEG assistants and our experienced health care personnel help patients get through these hours and days. Of course, parents are permitted to be with their children around the clock.

## COMPLEX COOPERATION

Our department offers patients clinical surroundings in which all aspects of their disease are intensively examined. Afterwards, the patient is then provided with an optimal treatment plan. This requires a complex interaction of multiple in-house work groups as well as close cooperation with other departments, such as Neurosurgery and Neuroradiology.

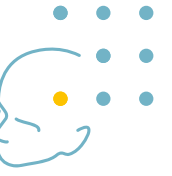
In daily ward rounds, the head physician's weekly round, and many other meetings, the patient's results are compiled, discussed and evaluated with regard to further diagnostic and therapeutic approaches. The course of action for every procedure is communicated to the patient in a comprehensible manner by healthcare personnel and physicians. Our staff is open to any and all patient questions - because ultimately the patient decides upon his course of treatment.







# EPILEPSY. FOR OUR PATIENTS, AN AFFLICTION THAT PROFOUNDLY AFFECTS THEIR LIVES. FOR US, A MEDICAL AND SCIENTIFIC CHALLENGE.



EPILEPSY IS A COMMON DISEASE. IN GERMANY, MORE THAN 600,000 PEOPLE ARE AFFECTED. EVERY YEAR, APPROXIMATELY 40,000 PEOPLE ARE NEWLY DIAGNOSED WITH EPILEPSY. EPILEPSY CAN OCCUR AT ANY AGE. IN MOST CASES, EPILEPSY CAN BE TREATED SUCCESSFULLY.



## LIVING WITH EPILEPSY

By far, most epilepsy patients are either unaffected or only marginally affected with regard to their everyday and professional abilities. In fact, it is the other way round; patients who were either born mentally disabled or became so as the result of an early childhood brain injury often suffer from epileptic seizures.

Several famous people also suffered from epilepsy including Julius Caesar, Alexander the Great, Napoleon Bonaparte, Sir Isaac Newton and the Russian author Fjodor Dostojewski.

## SEIZURES AND OTHER SYMPTOMS

Epileptic seizures can look very different. Especially frightening is the so-called grand mal seizure, which occurs with a tonization of the muscles, followed by muscular convulsions. Normally, this seizure lasts one or two minutes. Afterwards, the patient is often very tired. Short losses of consciousness, so-called absences, constitute another form of epilepsy. A patient experiencing absences might have the appearance of "having his/her head in the clouds". Depending on which brain region is affected by the seizure, uncontrollable movements can occur.

Patients with epilepsy suffer more often from depression, the treatment of which must be initiated. Furthermore, many patients suffer from memory impairment. Neuropsychologists in our department examine and research the most important psychological symptoms that accompany epilepsy.

## EFFECTIVE DRUGS

Approximately 2/3 of all people with epilepsy are successfully treated with anti-epileptic drugs (i.e. seizure freedom). About half of them must take this medication their entire lives. For 1/3 of all patients, seizure treatment is considerably more difficult. For them, the drugs are not sufficiently efficacious or they are not well tolerated because of side-effects. Approximately 20% of these difficult-to-treat epilepsy patients can be helped with an epilepsy surgical procedure.

Because of these statistics, it follows that much more research is needed in this area of epilepsy. This includes researching the origin of the seizure as well as improving treatment options. With the cooperation of leading pharmaceutical companies, our patients have the opportunity to participate in clinical studies and be treated with the newest available drugs. These studies are reviewed and approved by the Ethics Committee of the University of Bonn Medical Centre.







## EPILEPSY SURGERY. THE DEPARTMENT OF EPILEPTOLOGY, TOGETHER WITH THE DEPARTMENT OF NEUROSURGERY, COMPRISE ONE OF THE LARGEST EPILEPSY SURGERY CENTRES IN THE WORLD.



EPILEPSY SURGERY IS A WELL-ESTABLISHED, SAFE FORM OF THERAPY. THE FIRST STEP INVOLVES A VISIT TO OUR OUT-PATIENT CLINIC. EXPERIENCED SPECIALISTS TREAT ABOUT 80 PATIENTS PER WEEK FROM WITHIN GERMANY AND COUNTRIES THROUGHOUT THE WORLD. CHILDREN ARE CARED FOR IN A SPECIAL CLINIC. IT IS POSSIBLE THAT A STATIONARY, PRE-SURGICAL DIAGNOSTIC MIGHT BE RECOMMENDED.

### PRE-SURGICAL EPILEPSY EVALUATION

On an annual basis, approximately 150 patients undergo a pre-surgical evaluation here in Bonn. Prior to an epilepsy surgical procedure, the following questions must be answered:

- > Does an epilepsy definitely exist?
- > Would an epilepsy surgery procedure be a reasonable alternative to drug therapy?
- > Is there a single seizure focus in the brain?
- > Can this seizure focus be safely removed without subsequent neurological damage?

A mandatory prerequisite is the recording of an epileptic seizure with video equipment and simultaneous EEG monitoring. Depending on the seizure frequency, this can last several days. Our department has eight single-bed rooms which are available for digital video EEG recording.

In addition, structural brain lesions are detected by means of high resolution magnetic resonance imaging (3.0-Tesla MRI). For a few patients, subdural and depth electrodes must be implanted directly in the brain in order to find the seizure focus. The same electrodes will also be used in examinations that assess possible post-surgical effects.

### EPILEPSY SURGERY

In Bonn, almost 100 epilepsy surgery procedures are conducted annually. There are various strategies available. According to the indication, about 60–90% of the operated patients experience long-lasting, complete seizure freedom. Unfortunately, 5–10% of patients show no improvement. Meticulous testing shows that with a complication-free course, additional neurological impairments do not occur.







# TREATING AND RESEARCHING EPILEPSY: HAND-IN-HAND, STEP-BY-STEP. A UNIQUE BONN SYNTHESIS.

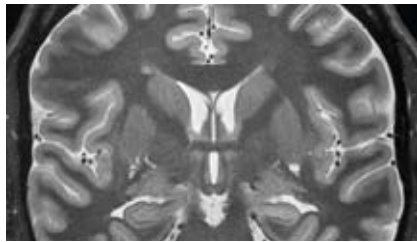


WITHIN THE FRAMEWORK OF EPILEPSY DIAGNOSTICS, UNIQUE OPPORTUNITIES ARISE WHICH ALLOW US TO EXAMINE THE HUMAN BRAIN IN ITS COMPLEXITY. OVER THE YEARS, MANY OF OUR PATIENTS HAVE VOLUNTEERED TO PARTICIPATE IN SCIENTIFIC STUDIES. THE FINDINGS OBTAINED IN THESE STUDIES HAVE CONTRIBUTED TOWARDS A BETTER UNDERSTANDING OF MANY BRAIN DISEASES.



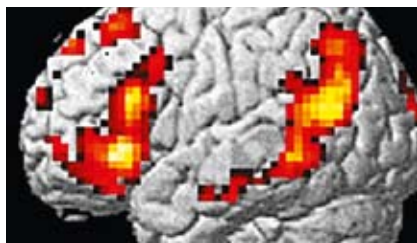
## AMAZING GREY CELLS

The human brain weighs just about 1,500 grams. One hundred billion nerve cells are hiding within it, which have over several hundred trillion contact points – so called synapses – that are connected. They communicate with each other via chemical and electrical means. This complexity far exceeds anything we could possibly imagine. Little-by-little, we are delving into the science of the brain and drawing out its secrets. How do these millions upon millions of nerve cells develop typical brain activities? How do perception, movement, memory and consciousness function? How do epilepsy seizures develop?



## ON THE HUNT FOR NEW SOLUTIONS

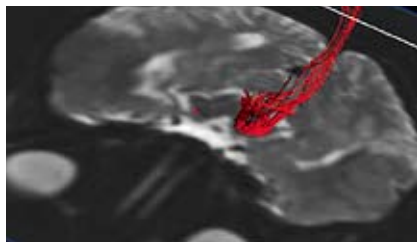
In our department, internationally renowned scientific work groups are busy studying the various problems involving epilepsy. Multiple groups analyze the structure and functionality course of the human brain using EEGs and MRIs. Neurophysicists search for methods of accurately predicting an epileptic seizure based on EEG data. Neurophysiologists analyze, among other things, the mechanisms of pharmacoresistance, i.e. the phenomenon that some drugs may lose their effectiveness over time. One increasingly important area of clinical research is inflammation of the brain. The Department of Epileptology is also renowned for the number of scientific articles which have been published in very highly ranked journals. In this respect, our department is one of the most successful in the world.



## WATCHING THE BRAIN WHILE THINKING

A functional MRI allows one to “watch” the brain while thinking: Where does speech “sit” in the brain? How do encoding, consolidating and retrieving of memory traces function?

Our Neuropsychology work group is researching the effects of epilepsy on mental capacity. What is the effect of the underlying brain disease? How does medical treatment or operative treatment effect memory and thinking? How do seizures affect one’s well-being and quality of life?



Brain Structure (MRI, upper panel)  
Brain Activation (fMRI on language, middle)  
Fibre tracks (DTI, lower panel)

# NUMBERS AND DATA, PUBLICATIONS AND SCIENTIFIC AWARDS

# THE DEPARTMENT OF EPILEPTOLOGY IN BONN PROVES ITS INTERNATIONAL RANKING TIME AND TIME AGAIN.



## PERSONNEL IN THE CLINIC:

DIRECTOR, SENIOR PHYSICIANS AND SPECIALISTS	11
ASSISTANT PHYSICIANS	9
PSYCHOLOGISTS	5
MEDICAL – TECHNICAL ASSISTANTS	15
NURSING STAFF	15
SECRETARIAT AND ORGANIZATION	2
TECHNICIANS	2

## SCIENTIFIC PERSONNEL:

SCIENTISTS:	
CLINICAL EPILEPTOLOGY	2
NEUROIMMUNOLOGY	1
NEUROPSYCHOLOGY	5
COGNITIVE NEUROSCIENCES / EEG	3
COGNITIVE NEUROSCIENCE / NEUROIMAGING	3
NEUROPHYSICS	2
EXPERIMENTAL EPILEPTOLOGY	4
Neurochemistry	6

### DOCTORIAL CANDIDATES:

NEUROPSYCHOLOGY	2
COGNITIVE NEUROSCIENCES	8
NEUROPHYSICS	9
EXPERIMENTAL EPILEPTOLOGY	4
NEUROCHEMISTRY	2

LABORATORY ASSISTANTS	5
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## NUMBER OF BEDS

BEDS IN DOUBLE ROOMS	16
MONITORING BEDS	8
CHILDREN'S BEDS	3

## TECHNICAL EQUIPMENT

DIGITAL VIDEO EEG MONITORING UNITS	11
ROUTINE EEG (with the possibility for digital video)	4
MOBILE LONG-TERM EEG RECORDER	5
ADDITIONAL RECORDING SYSTEMS	3

## NUMBER OF PRE-OPERATIVE EVALUATIONS

From the middle of the 1990s through 2000, the number of pre-surgical evaluations has increased from 100 to approximately 150 per year. Since then, we have conducted extensive pre-surgical epilepsy diagnostics for approximately 150 patients every year.

## INTERNATIONAL SCIENTIFIC AWARDS

OVER THE YEARS, RESEARCHERS HERE IN OUR DEPARTMENT HAVE BEEN PRESENTED WITH INTERNATIONAL SCIENTIFIC AWARDS IN THE AREA OF BRAIN AND EPILEPSY RESEARCH. AMONG THE MOST PRESTIGIOUS AWARDS ARE:

INTERNATIONALER ZÜLCH-PREIS FÜR HIRNFORSCHUNG DER MAX-PLANCK-GESELLSCHAFT UND DER GETRUD-REEMTSMA-STIFTUNG  
2005: C. E. Elger (together with S. Berkovic)

HANS-BERGER PREIS DER DEUTSCHEN GESELLSCHAFT FÜR KLINISCHE NEUROPHYSIOLOGIE UND FUNKTIONELLE BILDGEBUNG  
2009: C. E. Elger

INTERNATIONALER PREIS DER STIFTUNG MICHAEL  
1983: C. E. Elger; 1999: H. Beck

ALFRED-HAUPTMANN-PREIS  
2009: J. Wellmer; 2002: C. Bien; 2000: H. Beck; 1996: C. Helmstaedter; 1990: C. E. Elger

OTHER IMPORTANT RESEARCH PRIZES FOR YOUNG SCIENTISTS, INCLUDING:  
H. Beck, C. Bien, F. Mormann

## INTERNATIONAL PUBLICATIONS

The international reputation of our research groups as well as the fundamental importance of epileptology for brain research have been well documented in numerous publications, including world-wide leading science journals such as Science and Nature. Our scientists publish about 40 – 50 original (peer reviewed) articles per year. That means our clinic releases a scientific publication almost every week.

## FINANCING

A good 2/3 of the scientific positions were financed through external third party funding (Deutsche Forschungsgemeinschaft, Bundesministerium für Bildung und Forschung, and other third parties).



# SUPPORT THE DEPARTMENT OF EPILEPTOLOGY. PRIVATE FUNDING IS INDISPENSABLE FOR OUR CONTINUING SUCCESS AND DEVELOPMENT.



SCIENTIFIC WORK IN A UNIVERSITY HOSPITAL IS FINANCED ALMOST EXCLUSIVELY FROM THIRD PARTIES. FOR YEARS, THE DEPARTMENT OF EPILEPTOLOGY IN BONN HAS SUCCESSFULLY OBTAINED PUBLIC FUNDING (I.E. DFG, BMBF, EU), AND PRIVATE DONATIONS.

### YOUR HELP COUNTS!

We would also like to invite you to assist us in our work. Now more than ever, top-quality research is paid for with private means. Your help would benefit epilepsy and brain research exclusively. With donations, important instruments and new computers can be obtained. Positions for experienced personnel can also be temporarily financed until their new project has been approved by third parties. Meanwhile, it is hard to imagine how the scientific work of the hospital can be held at this high level without the support of individuals.

### VEREIN ZUR FÖRDERUNG DER EPILEPSIEFORSCHUNG E.V. (THE SOCIETY FOR THE SUPPORT OF EPILEPSY RESEARCH)

One way of supporting us is to donate to the Society for the Support of Epilepsy Research. This society was founded in November 1994 and is recognized as a charity. Your donation is tax deductible. There are many excellent occasions for making a donation: birthdays, anniversaries, company parties. Over the past years, bequests have become invaluable. We would be pleased to inform you of donating options.

Thank you for your continuing help and support!

**CHRISTIAN E. ELGER**

VEREIN ZUR FÖRDERUNG  
DER EPILEPSIEFORSCHUNG E.V.  
(THE SOCIETY FOR THE SUPPORT  
OF EPILEPSY RESEARCH)

DONATION ACCOUNT:  
COMMERZBANK

ACCOUNT NUMBER: 0237 7780 00  
BANK CODE NUMBER: 370 800 40  
SWIFT-BIC: DRES DE FF 370  
IBAN: DE37 3708 0040 0237 7780 00



