

# Department of Medicine



Director:  
Professor Thomas Münzel, MD



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MAINZ

Our expertise for your health



## Annual Report 2009



# Annual Report 2009

Department  
of Medicine





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PREVENT<sup>+</sup>  
Die Gutenberg-Herz-Studie



STIFTUNG  
MAINZER HERZ



## Foreword

### Dear Ladies and Gentlemen,

with this booklet, I would like to provide an overview of the activities of the Department of Medicine 2 at the University Medical Center Mainz in 2009.

Year after year, our efforts have been aimed at achieving a constant improvement in our performance in both patient care and research. This trend continued and was reinforced in 2009, as we participated in the successful application for an Integrated Research and Treatment Center. In the framework of a Germany-wide Excellence Initiative of the Federal Ministry of Education and Research aimed at supporting the establishment of innovative concepts in patient care and research, the University Medical Center Mainz and our Clinic were selected to establish a „Center for Thrombosis and Hemostasis (CTH)“. This new Center will allow the creation of new structures for patient care, research and teaching, and it will surely represent an ideal platform for further development in the next 10 years.

Our biggest research project, the **Gutenberg Heart Study**, has now included more than 10,000 volunteers, and the first results regarding the causes of myocardial

infarction have already been published. Moreover, data collected in our Chest Pain Unit were accepted for publication in the New England Journal of Medicine – the world's leading medical journal.

In terms of budget, like in previous years, our 2009 balance remained strongly positive. The data show that we treated an increasing number of patients yielding more case-mix points, and that this trend is gaining further momentum.

Our **Thrombosis Service** was also very successful. It now follows nearly 300 patients on anticoagulant therapy. It is particularly gratifying to see that, through this new service, patients who had troubles with their medications can now be effectively treated.

In the next pages you will also find some portraits of team members who have rendered outstanding services to our clinic through excellence in patient care and science. This year, the spotlight is set on **Philip Wenzel, MD** and **Philipp Wild, MD** and on **Margot Neuser** from our **graphics department**. There is also another group of individuals that deserve special

mention for their efforts in trying to match the increasing complexity of technological advances and modern patient care. In this issue, you will find portraits of the **IT department** along with one of our new **Intermediate Care Unit**.

Finally, there are several institutions and persons that need acknowledgement. We want to thank our **Foundations** (the Margarete-Waitz-Foundation and the Foundation Heart of Mainz) for supporting our research staff at home and abroad; as well, we would like to thank the population of Mainz for transforming our prevention campaign into a success, and all colleagues in private practices and hospitals for referring their patients to us.

**Professor Thomas Münzel, MD**  
Director of the clinic





## Directors and Professors



**Director**

**Professor**  
**Thomas Münzel, MD**  
 Internal medicine, Cardiology

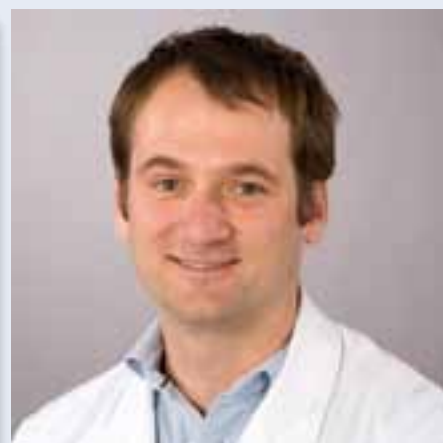
**Professor**  
 for Internal medicine  
 focus on cardiology



**Vice-Director**

**Professor**  
**Stefan Blankenberg, MD**  
 Internal medicine, Cardiology

**Professor**  
 for Internal medicine



**Clinical Manager**

**Felix Post, MD**  
 Internal medicine, Cardiology,  
 Intensive care



**Professor**  
**Andreas Daiber, PhD**

**Professor of**  
 Molecular Cardiology



**Professor**  
**Christine Espinola-Klein, MD**  
 Internal medicine, Cardiology, Angiology

**Professor**  
 for Internal medicine  
 focus on cardiology

## Senior consultants



**Stephan von Bardeleben, MD**  
Internal medicine,  
Cardiology, EMAH



**Professor Sabine Genth-Zotz, MD**  
Internal medicine,  
Cardiology, Intensive care



**Tommaso Gori, MD PhD**  
Internal medicine,  
Cardiology



**Professor Ewald Himmrich, MD**  
Internal medicine,  
Cardiology



**Ulrich Hink PD, MD**  
Internal medicine,  
Cardiology



**Klaus Kettering, MD**  
Internal medicine,  
Cardiology



**Arne Klett**  
Internal medicine



**Margit Niethammer, MD**  
Internal medicine,  
Cardiology



**Savvas Savvidis, MD**  
Internal medicine,  
Cardiology



**Professor Helmut Schinzel, MD PhD**  
Internal medicine, Angiology



**Ascan Warnholtz PD, MD**  
Internal medicine,  
Cardiology



**Philipp Wild, MD**  
Internal medicine,  
Cardiology

## Consultants



**Nico Abegunewardene, MD**  
Medical imaging



**Felix Gramley PD, MD**  
Electrophysiology



**Ludmila Himmrich, MD**  
Echocardiography



**Joachim Kaes, MD**  
Intensive Care Unit



**Dirk Mertens, MD**  
Pulmonary hypertension



**Hanke Mollnau, MD**  
Electrophysiology



**Barbara Nalenz, MD**  
Ultrasound



**Sebastian Sonnenschein, MD**  
Electrophysiology



**Cathrin Theis, MD**  
Electrophysiology



**Markus Vosseler, MD**  
Walk-in clinic,  
clinical coordination



**Philip Wenzel, MD**  
Pre-clinical research

## Physicians



**Maryam Ayati, MD**



**Andreas Bender, MD**



**Amelie Biedenkopf, MD**



**Jan Moritz Brandt**



**Frank Breuckmann, MD**



**Christiane Buhr, MD**



**Johanna Buse, MD**



**Meike Coldewey**



**Ewa Czyz**



**Christoph Dommke, MD**



**Jörn Dopheide, MD**



**Frauke Dumstorff, MD**



## Physicians



**Sebastian Göbel, MD**



**Stephanie Herkenhoff**



**Alexander Jabs, MD**



**Annika Jagodzinski, MD**



**Thomas Jansen, MD**



**Susanne Karbach, MD**



**Till Keller, MD**



**Maike Knorr, MD**



**Dudu Kutlu**



**Denise Kämpfner, MD**



**Edith Lubos, MD**



**Philipp Nikolai, MD**

## Physicians



**Mir-Abolfazl Ostad, MD**



**Karin Pfirrmann**



**Jürgen Prochaska, MD**



**Karsten Ritter**



**Ingo Sagoschen, MD**



**Kai-Helge Schmidt, MD**



**Frank Schmidt, MD**



**Renate Schnabel, MD  
MSc.**



**Eberhard Schulz, MD**



**Selvije Seta, MD**



**Christoph Sinning, MD**



**Kathrin Stelzer, MD**

## Physicians



**Nicole Toussaint, MD**



**Stergios Tzikas, MD**



**Gerhard Weißer**



**Marc Werner**



**Brigitta Wimmer, MD**



**Heide Zellerhoff**

Not in pictures:

Nadia Al Fergani, MD

Corina Huth, MD

Judith Schenke, MD

## Nurse coordination



**Gabriele Maas**  
Nurse Director  
4A, 4B, 4C and Poliklinik,  
Case Management



**Vera Jaresova**  
Nurse Vice-director  
Stations 4A, 4B and 4C



**Bianca Steinheimer**  
Nurse Vice-director  
Stations 4A, 4B and 4C



**Mike Böbel**  
Nurse Director Emergency  
Department



**Anne-Kathrin Breu**  
Nurse Vice-director  
emergency department



**Heike Eich**  
Nurse Vice-director  
Intensive Care Unit



**Annette Möhlenhoff**  
Nurse Vice-director  
Intensive Care Unit



**Silvio Kittlaß**  
Nurse Director  
catheterization laboratory



**Angela Frese**  
Nurse Vice-director  
catheterization laboratory

**We sadly  
announce  
the loss of**

**Petra Hertel**

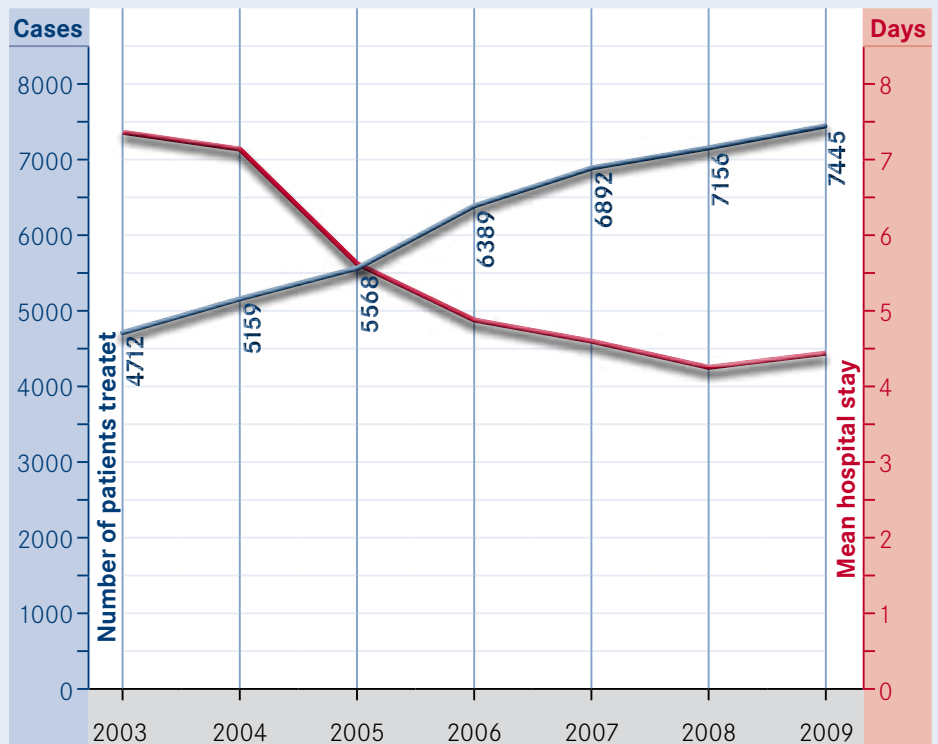
**Rainer Kirchner**

**Dirk Nebeling**

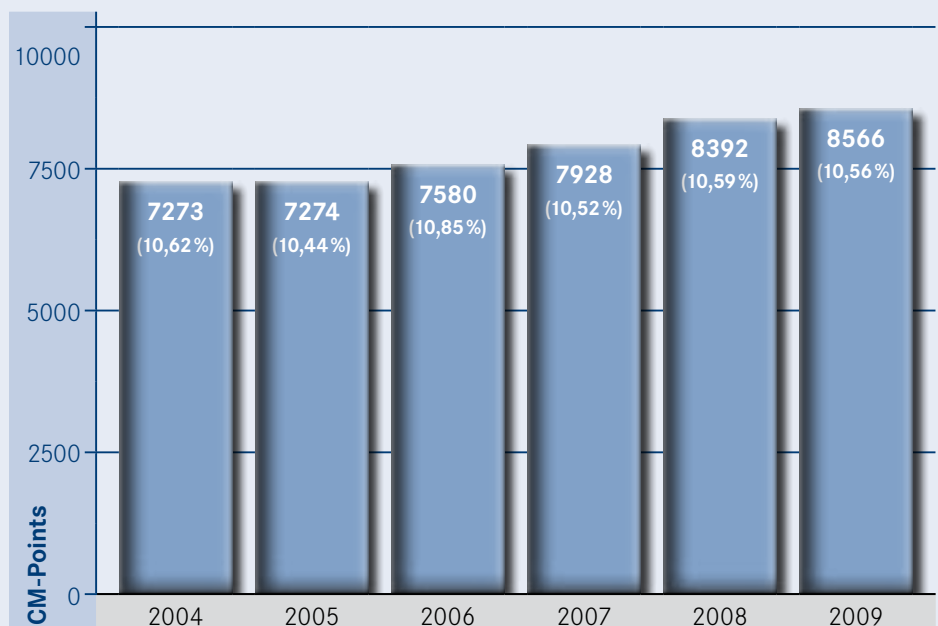


# Department of Medicine 2 in numbers

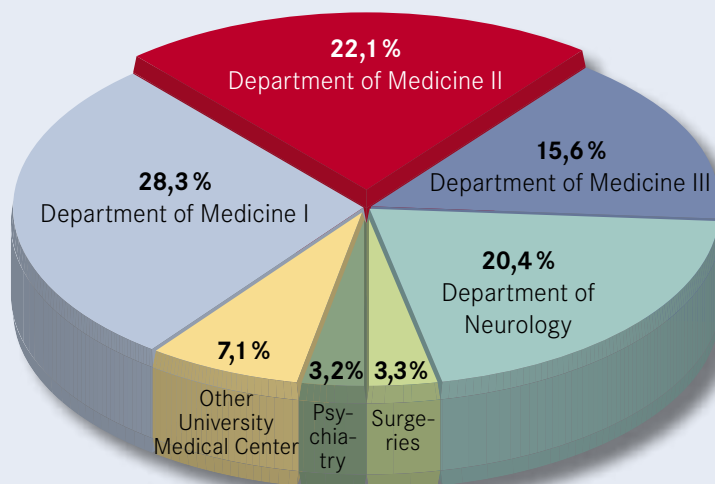
— The steady increase in the **number of patients treated** continued to gain momentum in 2009. As of today, almost 7500 patients are admitted to the Department of Medicine 2 per year. This could only be achieved by optimizing the procedures for the admission and discharge of patients. Compared to previous years, the **mean hospital stay** has however remained constant.



— Along with the above increase in the number of patients admitted to hospital, we have reached a new record in terms of **cumulative case mix**, an index that takes in consideration the number of patients and the complexity of the interventions performed. This year we reached a total of 8500 points, which corresponds to about 10% of the overall score of the University Medical Center Mainz. Due to the introduction of complex heart valve interventions such as percutaneous implantation of aortic valve or mitral valve clipping, a further increase is expected for next year.



**Transfers from Emergency Department 2009**  
Total number n = 4422



# News in Cardiology

Part 1

## Emergency Department

With a total of nearly 11,000 patients in 2009, the Medical and Neurological Emergency Department was more and more active, and the trend is still rising.

Originally, the organization of the Emergency Care Department was shared across the three Internal Medicine clinics, and the staff was provided by all three Clinics. The Department of Medicine 2 had the control over the organization of the admission of patients. Starting in 2010, the Emergency Medicine Department at the University Medical Center of Mainz will get a fully new structure. The organizational responsibility and the personnel will lie entirely on the Department of Medicine 2 under the leadership of the Senior Consultant Arne Klett. Needless to say, the experience and competence of the other medical clinics and of the Department of Neurology will remain essential to the good functioning of this multidisciplinary department.

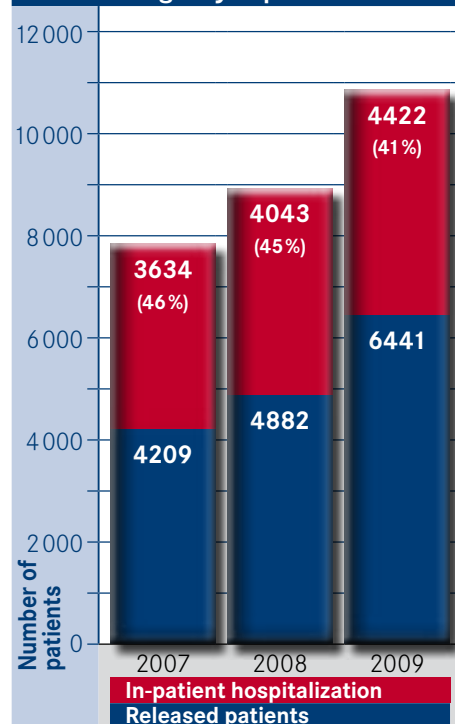
In addition to a highly trained staff, state-of-the-art technical equipment is an essential component of high-quality, fast and successful emergency care. In 2009, the technical requirements for the medical

work of the patient care were further improved, and the emergency ward was equipped with three fully monitored beds and a modern central monitoring station.

2009 also witnessed a special emergency: the swine flu pandemic. The sudden burst in the number of patients with suspected flu was a particular challenge all over the world, and particularly at University Centers. Our response was however quick and effective, as we promptly developed specific guidelines and dedicated both facilities and personnel to this emergency.

Overall, the above structural changes in 2009 also lead to a closer integration with the other Departments of the University Medical Center Mainz. We developed excellent cooperation schemes with all medical and surgical departments in order to ensure that all patients receive time-effective and competent care in specialized clinics.

**Total number of patients treated in the emergency department**





## Daily routine – Important questions and answers on the Emergency Department

### Interview with Arne Klett, MD

#### Mr. Klett, how does one reach the Emergency Department?

— The internal medicine emergency department is located on the ground floor of building 605, in close proximity to the medical clinics with their facilities (Chest Pain Unit, Stroke Unit, specialty outpatient clinics) and to the Department of Neurology.

#### Is the Emergency Department staffed 24 hours a day?

— Yes. The emergency room is open around the clock on all days for medical and neurological emergencies of any severity.

For the emergency room, ten doctors work in three shifts. At least two doctors are present in the Emergency Department / Chest Pain Unit per shift. In addition, an experienced specialist is always present on weekdays from 7 a.m. – 6 p.m. In cases of higher volume of patients, we organized a flexible system that allows increasing the number of doctors on call. In case of parti-

cular emergencies, additional manpower can be recruited from the different clinics.

The most modern technical equipment, including two new ultrasound machines for the examination of the heart, abdomen, vessels and transesophageal echocardiography, a central monitoring system with up to four surveillance sites and a modern biphasic defibrillator are also always on standby for emergency care.

In addition, the diagnostic facilities of the immediately adjacent the Chest Pain Unit are shared.

The care of patients occurs in three separate areas that allow three different levels of approach to the patient (from walk-in clinic to resuscitation). Finally, six rooms are available for in-patient emergency care.

#### What diseases are treated in the Emergency Department?

— An internal medicine emergency care service treats all patients with acute medical or neurological disorders.

The most common diseases include cardiovascular emergencies such as acute cardiac arrhythmias, heart failure, acute stroke, but also acute hemorrhage and lung infections. The most common diseases also include atrial fibrillation, diabetic shock and acute intoxication (poisoning). For many common diseases such as hypertensive emergencies and acute stroke there are guidelines and flowcharts that lead diagnosis and treatment; these guidelines are continuously updated with the improvements in medicine and they need to be strictly respected.

In addition, many patients who suffer from chronic diseases and unfortunately have to return periodically to the hospital are treated in the inpatient or outpatient clinics. These patients come, for instance, with problems caused by chemotherapy or transplantation. In cooperation with the specialist, we do all possible to treat and prevent a worsening of the situation.

The Emergency Department is there to provide care for patients with new, acute,



symptoms. Patients with preexisting conditions that have not worsened in the last days should rather refer to their family doctor.

### What does a typical medical emergency look like?

— Most patients come to the Emergency Department via ambulances equipped with trained personnel and a physician. As soon as the patient arrives, the ambulance staff discusses the case with our physicians. We receive information on the suspected diagnosis and on the medications given in the ambulance.

At the same time, the vital parameters (blood pressure, heart rate, temperature and oxygen saturation) are taken, and an ECG is derived. In addition, blood is taken to control several parameters that help orient further diagnosis.

Immediately thereafter, the doctor asks the patients what his/her symptoms are and collects his/her medical history. A physical examination follows.

When appropriate, instrumental examinations such as ultrasound or X-ray are then ordered by the doctor. The first therapeutic

measures, for instance the infusion of pain killers, are often initiated in the first minutes.

If the investigations and treatment in our Emergency Department have shown that a patient can be discharged home, a short letter is prepared to inform the patient and the family physician on the diagnosis, therapy and on all exams that were performed in the Emergency Department.

For patients that do not come with an ambulance, the process is similar: first, the symptoms and medical history are collected; then the patient is admitted to an examination room where a physical exam is carried out. The waiting time is based on medical priority, i.e. life-threatening diseases that require immediate treatment are always treated first.

Very often, specialist visits are required to diagnose a disease and decide the best therapy. These are usually conducted by senior physicians of other departments. A close cooperation between all the nurses and doctors is necessary for a comprehensive treatment of those patients who have several diseases. In most cases, a diagnosis and initial therapy can be made and the patient can return home. For other patients

with more serious diseases, a short hospitalization, or even admission to intensive medical care, are necessary.

### Does patients have an advantage if they come to the Emergency Department in a fasting state?

— The diagnosis of many diseases requires an investigation that is carried out under general anesthesia or after sedation (for instance a gastroscopy or a cardiac catheterization). As well, some patients may need urgent surgery that also require general anesthesia (such as surgical removal of the appendix in patients with acute abdominal pain). To carry out these investigations or operations, it is necessary that the patient remains on an empty stomach for at least 2 to 4 hours.

Some studies (such as ultrasound of the abdomen) are more difficult and less informative if the patient has eaten. Therefore, we are always very cautious, before we administer meals as this may limit our capacity to diagnose and treat a disease.

The intake of fluid (preferably only water) is allowed in most cases, and water is



usually offered to all patients immediately after admission.

#### **How can patients help optimize the process?**

— It is extremely important to have details on the patient's medical history: patients who carry all their medical documents to the Emergency Department, for instance previous discharge letters or their medical plans, help us (and themselves) greatly.

#### **What are the organizational challenges that must be overcome?**

— The number of patients presenting in the emergency room varies tremendously from day to day, and only a limited number of beds is available in the emergency room. These beds need to be spared for patients who really need acute care. Therefore, in busy days, patients with milder symptoms may have to sit on a chair and wait, when necessary for several hours.

In addition, when more than one emergency occurs at the same time, and several patients need to be treated acutely in parallel, there may be a delay in the treatment of a patient. As I said above, our priority is based on the urgency of

the disease, so that patients with less severe diseases sometimes unfortunately experience delays.

Overall, the organization of the Emergency Department is extremely flexible as it needs to adapt to different loads of patients and different types of emergencies. This flexibility acts like a “buffer” to ensure that all incoming patients can be treated.

Regular challenges are major events in the region, such as the Carnival parade as spectators come from all around the region. Despite the massive volume of patients, we could face this peak and provide competent care to all in 2009, an effort that was carried out in close cooperation with all other Departments at the University Medical Center and with the emergency services.

#### **What special qualities are needed to work in the emergency room?**

— The variety of diseases and the challenge of being the first station that receives the patient (and therefore the responsibility to decide whether or not he/she needs hospitalization) make the Emergency Department an exciting workplace. The staff needs to have a

true team spirit, resistance (including physical resistance) and ability to concentrate even under heavy workload. The cooperation with other departments is also very important. Communication skills have a very high priority. Worries and anxieties of the patients are always in the foreground and deserve full attention.





## Chest Pain Unit (CPU)

A few years ago, the Chest Pain Unit that we established in Mainz was seen as an “exotic” idea that was critically observed and sometimes ridiculed. Time has proved us right and, thanks to our example, Chest Pain Units have definitely improved in terms of reputation, number and quality in the last years throughout Germany.

A Germany-wide network of Chest Pain Units certified under guidelines developed in Mainz, has now been organized. This network includes now almost 100 CPUs and some regions of Germany are already fully covered in a capillary way. The reason behind this political decision is that scientific data – including those collected in our pilot project – clearly show that patients, who have a heart attack have a better chance to survive if they are treated in a Chest Pain Unit rather than in a general Emergency Department.

We are now collecting the data that are necessary to compare the activity of the German Chest Pain Units in a nationwide CPU register; in a further step, we will then combine the German data and we will compare them to the international ones. Medicine, like business, is now on a global scale.

In Mainz, the activities of the CPU are now well consolidated. The constant increase in the number of patients treated (about 2300 in 2009) has impressively demonstrated that the concept of Chest Pain Unit works well and helps us provide competent and rapid care.

## Chest Pain Unit: help for patients with chest pain

**Interview with Professor Thomas Münzel, MD, Director of the Department of Medicine 2, University Medical Center of the Johannes Gutenberg University Mainz**

**Heart attack – every minute counts! Nearly everyone knows that when it comes to a heart attack, waiting means risking health and life. But the reality is that many patients still wait too much time before they call the emergency service. Is it out of fear or embarrassment (“an ambulance and emergency doctor in the neighborhood – what will the neighbors say”)? Is it in the hope that the pain will eventually go away? Is it out of uncertainty: “maybe it’s not a heart attack”?**

**For those “procrastinators”, a new possibility to access early life-saving medical care has been developed: the CPU (Chest Pain Unit). At the beginning of 2008, this was a novel idea; today, our model has now been exported in several other German cities.**

**The Clinic directed by Professor Thomas Münzel was one of the first ones in Germany to develop this idea in 2005. Now, Professor Münzel is head of the Task Force that is responsible for controlling that the adequate standards of quality are respected in the CPUs nationwide.**

**Professor Münzel, what is a CPU?**

— The Chest Pain Unit is a department that provides care for patients with acute chest pain. The sudden onset of typical chest pain lasting for longer than five to ten minutes can be a sign of an acute heart attack and of many other dangerous disea-

ses. In the case of a heart attack (but also in other conditions that present with chest pain) a loss of time may have the worst consequences for the patient: a diagnosis must be made as early as possible!

Typical chest pain (angina pectoris) due to a heart attack is localized behind the sternum, may radiate to the left arm or neck, may be felt as a burning sensation or a weight on the chest.

**Many patients have so-called “atypical” symptoms, for instance shortness of breath. How do you handle it?**

— It is essential that patients understand this concept: a CPU is responsible for all patients with suspected myocardial infarction, whatever their symptoms. It needs to be clear that sometimes the symptoms of a heart attack are subtle and less easy to detect. It is very important that people understand this concept, so that they know how important it is that they seek early medical care.

In Mainz, we are very happy that the first division football club, the 1. FSV Mainz 05, supports the awareness campaigns of our CPU.

The theme of the campaign last year was “Women’s hearts are different – even in the case of a heart attack”. With this motto, we tried to explain that women and older patients often do not present with the classic pain behind the sternum, but rather with atypical symptoms such as shortness of breath, sweating and abdominal pain.

**Despite all the awareness campaigns about how vital it is to react immediately in cases of suspected acute myocardial infarction (“myocardial infarction: every minute counts”), the current statistics remain unsatisfactory: the German Heart Foundation has estimated that the time between the onset of symptoms and the call to the emergency service is two and a half to three hours. How do CPUs help to reverse this fatal trend?**

— There are different reasons – but no justification – as to why people wait before

they seek medical help even when they experience the most severe pain. Some feel that the problem is serious but simply refuse to accept it. We also witness that many patients are afraid to give false alarms and fear that they would have to justify themselves. Or else, they do not want the neighbors to see the ambulance come and pick them up. These patients may now simply come to the CPU to undergo medical check-up.

In any case, patients should not drive alone to the hospital: in case of a heart attack, there is always a risk of losing consciousness: driving can be extremely dangerous for the patient and for the others. It is much better to ask a relative or to call a taxi. That said, transportation in the ambulance is always safer also because patients with a heart attack may experience life-threatening collapses or arrhythmias, which can only be stopped with a defibrillator.

**When you suspect a heart attack, call the ambulance without hesitation.**

**It is always true: acting quickly saves lives!**

### **How are patients treated in the CPU? What investigations and what treatments are administered?**

— CPUs are organized to provide early treatment for patients with acute myocardial infarction. When the patient reaches the CPU, an ECG is immediately written and blood is taken.

If the diagnosis of a heart attack is clear, then the patient is transferred within minutes to the catheterization laboratory.

The cardiac catheterization laboratory of the Department of Medicine 2 is available around the clock, and a cardiologist experienced in cardiac catheterization is always on-call. This physician performs, when appropriate a cardiac catheterization to open an occluded coronary artery, removing the cause of the heart attack.

For luckier patients in whom ECG and blood levels are normal, a heart ultrasound is done to detect diseases that are not visible on the ECG. In patients who have ECG changes that make us suspect the presence of a subacute disease, an exercise ECG is performed.

### **Do patients live longer if they are treated in the CPU?**

— A recent analysis of the data from our hospital (Keller et al. Clin Res Cardiology 2010) shows that patients treated with a heart attack in the CPU have a better prognosis than patients who come with a heart attack to the traditional emergency room. This shows that the concept of “Chest Pain Unit” is on the right track. Satisfaction surveys of patients with infarction treated in our CPU in Mainz also show a significantly better performance of the CPU compared to the emergency room.

**Thank you for the interview!**

This Interview with Professor Thomas Münzel, MD, Director of the Department of Medicine 2 of the University Medical Center Mainz was published in the Mainzer Rhein-Zeitung on 07/14/2010 in the article series “From the heart”.



## New Structure of the CPU and integration with the Station 4 B

— The benefit of having established a Chest Pain Unit has been clearly understood by patients as well as by colleagues from referring hospitals and from the emergency services, leading to a rapid increase in the number of patients that required our help throughout the years. To improve the quality of the patient care provided in the CPU, and to further sustain the Emergency Department, in summer 2009 we decided to reorganize the structure of our staff. We organized a shift rotation system whereby the nurses of the station 4B would rotate periodically in the CPU.

This change had the following advantages:

- It increased the synergy between emergency departments and stationary care
- It allowed concentrating medical priorities
- It increased the quality of care by training nurses and physicians
- It increased work flexibility
- It expanded our portfolio in the outpatient sector

Through years of experience, the team of the station 4B has gained specialized experience in treating patients who need cardiovascular monitoring, particularly those with heart rhythm disturbances. This staff was therefore in the best position to address all problems that may rise in the setting of acute heart attacks.

While being the best possible solution for the patients, this restructuring was a major challenge for the nursing staff, especially because it was carried out in the time space of three months. First, a system was developed whereby the nursing staff could rotate across the CPU and the station 4B. This was followed by training on the guidelines that are relevant to the diagnosis and treatment of the diseases commonly found in the Chest Pain Unit.

In addition, it was necessary to hire new staff for both stations.

The new organizational structure could be implemented as of 1<sup>st</sup> September 2009. The merger of both areas ran quickly and smoothly. The workforce is now rotating in a common pool in order to ensure a continuous professional staffing of both stations.

Thanks to the team of the emergency room, which ensured that night shifts were covered in the first months, the project was completed successfully. The personal commitment of the nursing team has contributed significantly to the success of the CPU, and overall the conclusion is very positive: the distribution of working loads is improved and the nursing staff feels that the possibility to work in the CPU is a good chance for professional improvement, since it improves their CV and varies their daily routine.

Since cardiology is one of the fastest growing medical disciplines, Standard Operating Procedure and guidelines change at a very rapid pace. Several new drugs, for instance antiarrhythmic drugs, platelet inhibitors and blood pressure medications have been added since the original CPU guidelines were written. To ensure the best possible care, these

substances are constantly integrated in our guidelines. In order to allow access to modern developments in medicine before they are widely available in Germany, our Department also participates in many international studies. This results in a dramatic benefit for patients admitted to the Chest Pain Unit, since these patients may thus receive the best therapies, sometimes even before they are available on the market.

### Outlook for 2010

— Starting in 2010, along with the six CPU beds, four additional acute care beds will be made available for patients with acute cardiac arrhythmias. This should relieve the emergency room and improve the targeted management of cardiac patients. In order to keep operating with ten beds 24 hours a day, a further logistic effort is however essential. As part of quality assurance, a CPU-qualification course for nursing staff is planned in the autumn of 2010.



Nurses and male nurses of Station 4B and Chest Pain Unit

(left to right) Sylvia Napieralski, Olga Murschel, Heico Kuhn, Frank Beier, Benjamin Osteroth, Sarah Neumann, Gordana Sakan, Laura Grifone, Luisa Wagner and Dorothe Schmitt.



## Intensive and Intermediate Care Unit

— The Intensive Care Unit underwent a major restructuring last year. In a first step, the intensive therapy area (**Intensive Care Unit / ICU area**) and the intensive care area (**InterMediate care /IMC area**) were separated.

ICU beds are extremely expensive as they require specialized personnel, monitors and special equipments for patients who need external ventilation or kidney dialysis.

Allocation of patients to these beds needs to be very selective, and these highly specialized resources cannot be wasted for patients who (fortunately) do not need them.

The aim of the restructuring was to reduce allocation errors: first, bed availability in the IMC area (where breathing machines are not available) was increased to allow more space for less severely ill patients. This resulted in a dramatic increase in the availability of beds for “true” intensive treatment.

The IMC has now a capacity of eight beds, all equipped with monitors. The monitoring system also allows invasive blood pressure

measurements. Patients are admitted to the IMC area when they fulfill strict criteria:

- Patients with acute coronary syndromes before and after coronary angiography
- Patients with severe arrhythmias requiring monitoring, and those who require an immediate intervention
- Other internal medicine patients, for example those who underwent hemostasis for upper or lower gastrointestinal bleeding, patients with metabolic dysfunction, drug overdose or similar diseases
- Patients requiring monitoring prior to organ transplantation
- Patients who can be discharged from the ICU area but still require monitoring
- In justified cases, post-operative monitoring patients, i.e. primarily medical patients after minor procedures (peripheral vascular surgery, shunt implantation, amputation for peripheral arterial disease, etc.) who need bed monitoring after anesthesia.

The IMC area is supervised from 2 – 3 nurses per shift. 10 beds and 4 – 5 nurses per shift are allocated to the intensive area.

The number of doctors on-duty is unchanged. 2 doctors are constantly present at the station 605 2A. Although they have specific responsibilities, they also help each other in emergencies. Additionally, the station 605 2A has become responsible for providing the resuscitation team for the entire building. In order to provide this type of service, all the doctors of the station receive special training in emergency procedures on a regular basis, and their qualification as first-aid specialist is certified according to the criteria of the European Resuscitation Council (ERC).

Under the clinic’s internal phone number 6262, the team can be activated at any time. This improves both the quality of emergency care and, most importantly, its time effectiveness.

The intensive care represents a bottleneck at all major hospitals. These problems can only be met with innovative concepts.

The restructuring measures initiated at the Department of Medicine 2 have already yielded positive results. The number of patients receiving care has increased by 60% and now more and more patients from surgical departments receive here a better monitoring. In addition, the flexibility of the station and the satisfaction of the staff could be increased.





Stress-ECG



ECG



Blood sampling

## Cardiology services

The following non-invasive tests are performed by trained medical professionals in our Department:

- 12-lead ECG, 24-hour ambulatory blood pressure monitoring, carotid sinus massage under ECG monitoring, pacemaker control
- Long-term (24 hours, 3 and 7 days) ECG, including implantation of event recorders
- Exercise ECG, spirometry, lung function testing and tilt table tests
- Blood sampling

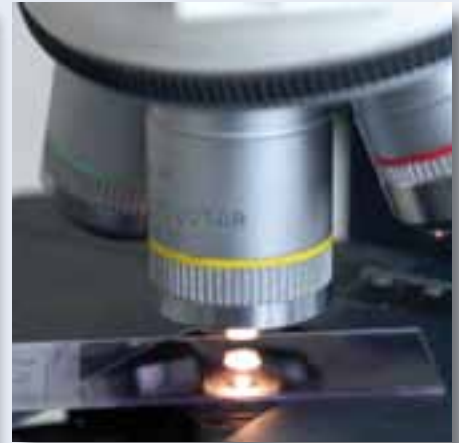
These exams are performed daily in ambulatory patients as well as in patients admitted to our own or to other specialist clinics such as Dermatology, Ophthalmology, Urology and many others.

The ECG service performs about 90 exams a day, half of which on behalf of external clinics. Our nurses and medical assistants relieve medical team by writing preliminary findings of the investigations that are then supervised by physicians.

To handle the increased volume of patients while maintaining an optimal quality of our services, structural changes were made also in this field: the area is a separate unit since 2008, and job profiles have been changed to improve the staff performance. The team of the cardiology division now comprises registered nurses, some with specialized training in intensive care, and physician assistants. All staff works in rotations, i.e. they take turns working in the various examination rooms. As a result, processes are flexible, time schedules are respected and the staff enjoy being at work.

In order to bring these changes to success, we had to retrain most of the staff and additional courses were held for new hires. The practical implementation took eight months - a phase which was characterized by the strong commitment of all those involved. This work environment is now characterized by motivation, mutual appreciation, respect and helpfulness.

The staff of the cardiology services unit: Waltraud Angsten-Siebert, Andrea Kollmus, Christiane Mertins, Dagmar Fuchs, Ouafa Fouta, Doris Haug, Heike Husch, Angelika Knappe, Barbara Müller, Theresia Pistorius, Vanessa Strack under the supervision of Mrs. Gabriele Maas.



# Jobs in the Department of Medicine 2

## Medical assistants

— The experts of tomorrow are not only young scientists, but also young people in technical, commercial and particularly health care professions. The Department of Medicine 2 is the only clinic within the University Medical Center Mainz to offering training for medical assistants. The wide range of diagnostic facilities turns our department into a very special training center.

The students assist with examinations and treatments, they work independently in recording ECGs, they take blood and perform medications, and they are also involved in the counseling of patients, organization, documentation and administration duties.

The training lasts three years, which can be reduced to two years in case of very good performance or when the student has an outstanding educational background. Requirements are previous mid- or high school education, good German language skills, empathy, good manners, teamwork, sociability and willingness to learn.

Those who wish to further develop professionally may then seek this program as a

basis for a certificate as senior specialist in patient and medical care.

The ones who are interested in training as medical assistant at the Department of Medicine 2 of the University Medical Center should contact:

### ■ Frau Sandra Müller-Bellingrod

Servicecenter Personalwesen  
Personalentwicklung und  
Grundsatzangelegenheiten

University Medical Center  
of the Johannes Gutenberg University  
Mainz

Langenbeckstraße 1  
D-55131 Mainz

Phone +49 (0) 6131 17-3204

E-mail: [sandra.mueller-bellingrodt@unimedizin-mainz.de](mailto:sandra.mueller-bellingrodt@unimedizin-mainz.de)

For course content questions contact the responsible specialists of Department of Medicine 2:

- **Gabriele Maas**  
Nurse Director  
Station 4 A, 4 B, 4 C und der Polyclinic  
Case Management  
[gabriele.maas@unimedizin-mainz.de](mailto:gabriele.maas@unimedizin-mainz.de)
- **Felix Post, MD**  
Clinical Manager  
[felix.post@unimedizin-mainz.de](mailto:felix.post@unimedizin-mainz.de)

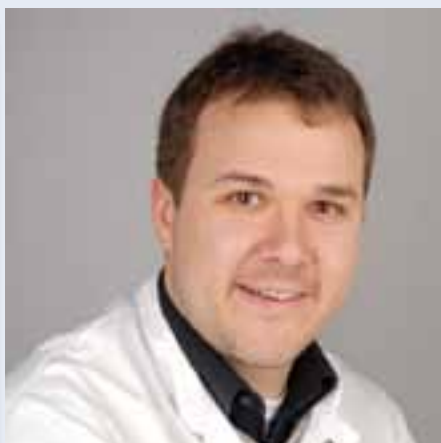


Bianca Köpke,  
a medical assistant in-training

## Staff spotlights 2009



**Philip Wenzel, MD**  
Internal medicine, Cardiology

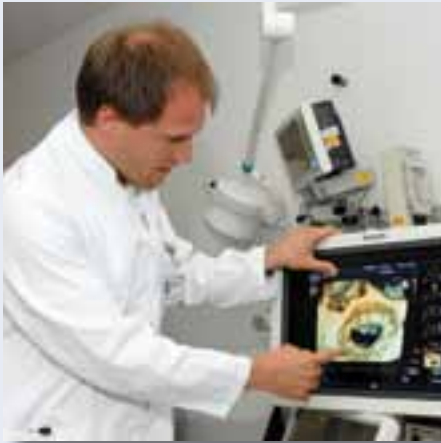


**Philipp Wild, MD**  
Internal medicine, Cardiology



**Margot Neuser**  
Graphic designer





## Philip Wenzel, MD

Philip Wenzel, MD is a specialist in internal medicine at the Department of Medicine 2. He studied in Erlangen, Barcelona and Hamburg. The 33-year-old is married and has three children.

Philip Wenzel, MD is working both in patient care and research in the Department of Medicine 2. "I am fascinated by medicine, because this field combines the social and intellectual aspects of science and allows me to look at patients from both perspectives. From the beginning I was attracted by the heart as the center of our body and the crib of our soul" says Philip Wenzel, MD.

An avid swimmer, he had initially opted for sports medicine. But while working on his thesis, he discovered to be rather fascinated by the pathophysiological mechanisms of the circulatory system. In the group of Professor Münzel (then senior physician at the University Hospital Hamburg-Eppendorf), he discovered the field of vascular biology research. Thereafter, he was a resident in Hamburg under Professor Meinertz, and later he was offered the opportunity to build the Mainz Laboratory for Molecular Cardiology.

In this research facility, he had the chance to deepen his interests, namely how oxidative stress occurs and how the different sources of oxygen radicals are interconnected in this process. "The elucidation of these relationships is important in order to develop targeted antioxidant strategies that can potentially slow or arrest the progress of various cardiovascular diseases" says Philip Wenzel. "In the program led by Professor Münzel I have benefited greatly from working with scientists such as Andreas Daiber, MD and Mathias Oelze, MD, due to their help I could write my habilitation in 2009".

In his clinical work, Philip Wenzel, MD always tries to "understand the problems of each patient and his/her particular situation. I would like that everybody receives individualized care". To succeed, we need to understand the patient's special needs, a good physician-patient relationship and a trusting cooperation with colleagues and the nursing staff are important, and innovation is also necessary. Therefore, Philip Wenzel, MD is working in the clinic and in research. "I attach great importance to bridge the gap between science and clinical practice. I have the opinion that only the combination of the two allows developing innovative concepts".

## Prizes

- Travel grant of the Council on Basic Cardiovascular Science of the European Society of Cardiology 2008
- Robert-Müller-Prize of the Johannes Gutenberg University Mainz 2008
- Travel grant of the Deutscher Gesellschaft für Innere Medizin 2010

Philip Wenzel, MD sees himself as a "physician scientist". However, creating an ideal environment that allows science and clinical practice is not an easy task. "The participation in the successful application process of the Integrated Research and Treatment Center for Thrombosis and Haemostasis gave me the possibility to get hands-on experience on how to correct structural deficiencies in this area. The Center for Thrombosis and Haemostasis, which will start operating in 2010, is in fact a model of interdisciplinary and integrative structures".

Philip Wenzel, MD has ambitious goals. The realization of this vision is important to him, yet he would opt immediately for clinical work with patients if he had to choose between science and patient care: "After all, this is why I became a doctor!"



## Philipp Wild, MD

Philipp Wild, MD is a specialist in internal medicine and cardiology at the Department of Medicine 2. His interests include clinical research on epidemiology, prevention and genetics of cardiovascular disease and echocardiography, with a particular focus on heart failure.

Since 2005 he has been trial manager of the Gutenberg Heart Study, which, with 17,000 participants from the Rhine-Main region, has become one of the largest prospective cohort studies worldwide on the causes and risks of cardiovascular, cancer and eye diseases but also diseases of the metabolism and the immune system. Philipp Wild, MD directs the sections “medical-technical investigations” and „epidemiology“ of the Gutenberg Heart Study.

Besides Philipp Wild, MD is responsible for the Thrombosis Service, another new project of the Department of Medicine 2. This new service facility, dedicated to patients at high risk for thrombotic diseases, was founded in 2008 under his supervision. Within the context of this service, several important research projects are also being developed; one example is the

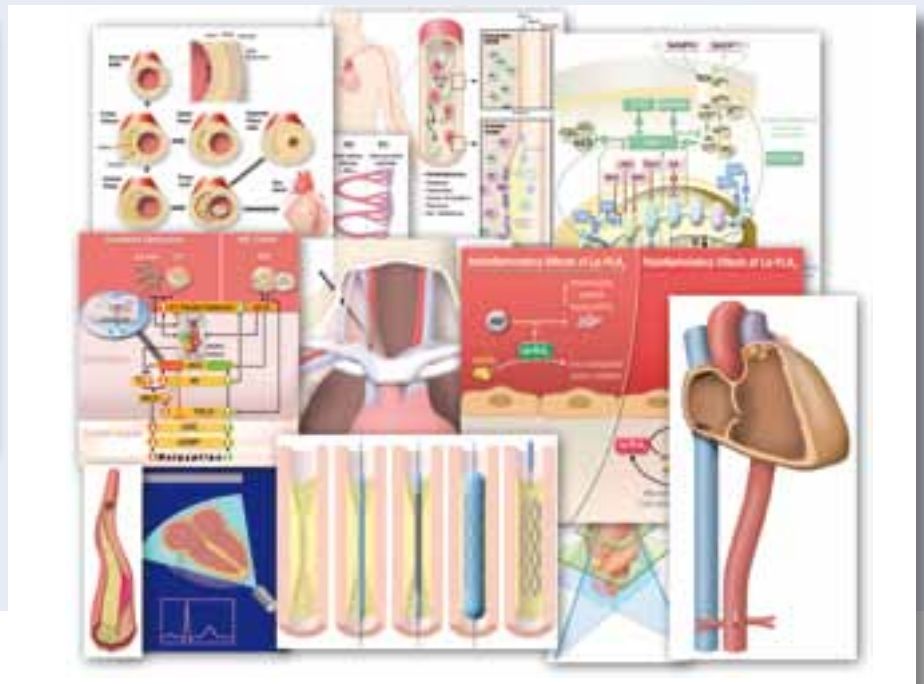
„thrombEVAL“, a cooperative project with the health industry which has also been conceived by him (more on this research project can be found on p. 45).

Philipp Wild, MD graduated summa cum laude from the Philipps-University of Marburg, then qualified to work in echocardiography research at the Heart Center Leipzig, University of Marburg, and at the teaching hospital Schwalmstadt. He is now a scientist in the field of implementation of clinical and epidemiological studies and a practicing teacher of epidemiology in Mainz.

When asked what he finds particularly appealing of his work at the Department of Medicine 2, Philipp Wild, MD replies: “The opportunity to perform advanced research in the field of cardiovascular epidemiology and genetics. In our clinic, the newest clinical and scientific concepts and ideas are continuously implemented” and he adds: “The combination of clinical work and scientific activity offers the best conditions as a scientist and as a physician and gives the possibility to develop further. I like being part of a team and value the interdisciplinary collaboration within the University Medical Center. The possibility to establish national and international

cooperation projects makes working here an exciting challenge and opens up new perspectives, for instance the possibility to collaborate in international consortia. Since July 2009 I lead a project to determine the genetic background of diastolic dysfunction (the most common form of heart failure) in a consortium of major population genetics studies“.





## Margot Neuser

„A picture is worth more than a thousand words“. What could describe the work of Margot Neuser better than a graphic of her work:

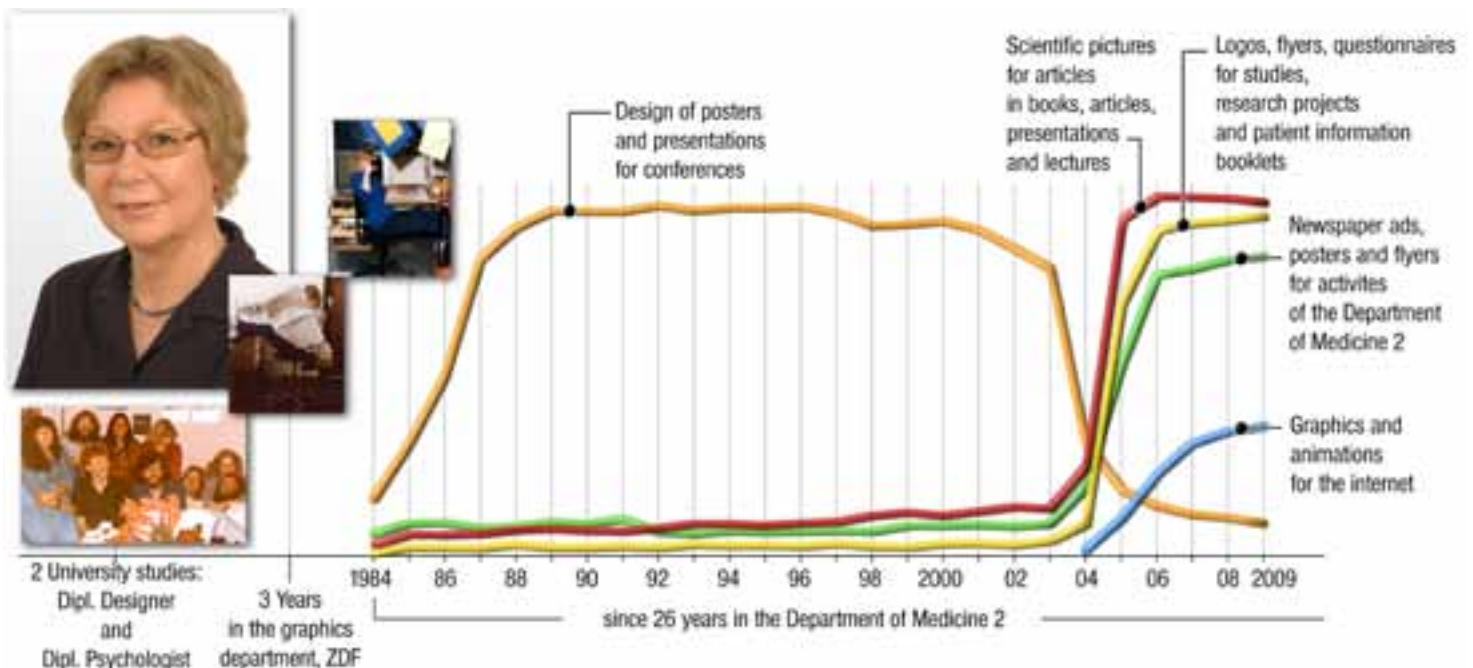
Her job is to bring complex scientific issues in a graphic form and make them easily understandable. In addition, important grant applications, logos of new

facilities, stationery and layouts carry her signature.

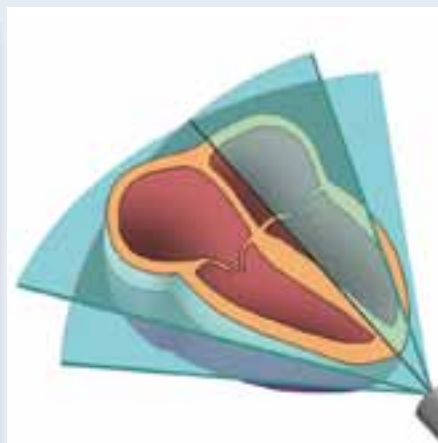
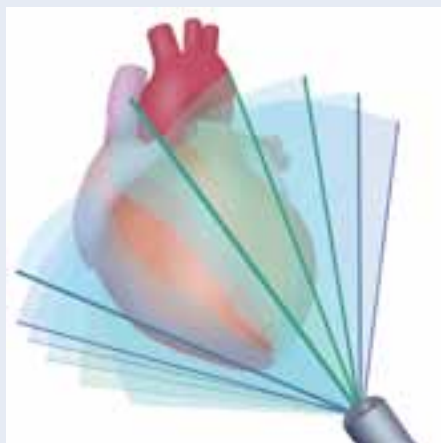
The combination of science and art, of logical evidence and artistic design, is the most enjoyable part of Mrs. Neuser's work. With the constant challenges that it brings.

She finds particularly good that the hospital management continuously challenges her skills with new projects while allowing

her the freedom necessary for artistic creation. In other words, Mrs. Neuser particularly enjoys the open mindedness of her work environment. Despite frequent overtime and tight deadlines, even after 26 years in the Department of Medicine 2, work is still a joy for her.







# New in Cardiology

## Part 2

### The Echo Lab

#### Innovations in Imaging 2009

The ultrasound-based imaging of the heart, heart valves and vessels is a central source of information for cardiac diagnosis and therapy. Echocardiography is free of radiation and thus it involves absolutely no risk for the patient and the examiner. At the same time, it has the highest accuracy in the diagnosis of heart valve disease. Normally, echocardiography provides two-dimensional images; the Department of Medicine 2 was one of the very first centers nationwide to introduce real-time three-dimensional image analysis in routine clinical examinations: transthoracic 3D echocardiography is available in Mainz since 2003; since 2007, 3D transesophageal echocardiography is also possible.

With this new method, we can image the heart not only as if it were “sliced”, but as a real 3-dimensional picture which can be rotated and analysed on- and off-line. The method was established very effectively in Mainz and today we perform about 3,000 exams a year, almost a quarter of all investigations. Compared to traditional 2D imaging, this method has clear advantages in the evaluation of valvular diseases

and in the detection of heart wall motion abnormalities such as those that can be found after myocardial infarction or heart muscle diseases. For its usefulness, 3D echocardiography has been included in the international guideline recommendations since the beginning of 2009.

#### These new methods are particularly important in four settings:

1) A detailed analysis of the mitral valve allows more detailed information on valvular defects, and this information has particular value for the surgeon: for instance, it facilitates reconstruction procedures and avoids valve replacement: this reduces the number of patients who require long-term blood thinners / anticoagulants, dramatically improving the quality of life of patients.

3D-TEE is now performed in 98% of all patients undergoing examination before surgery, and with around 2,000 tests per year our department is Germany's leader in this technique

2) 2D- or 3D-Stressechocardiography for the detection of coronary artery disease was performed in more than 1,250 patients in 2009. Recent studies have confirmed the importance of the method, showing that its validity is equivalent to that of SPECT imaging of the heart. Unlike SPECT, however, the additional advantage is that 2D and 3D stress echocardiography does not require radioactive radiations.

For the patients, this simply means that medical exams are associated with a much lower risk. A negative result allows excluding the possibility of a heart attack in the next 2 – 3 years with an accuracy of 99 %. Conversely, when it shows the presence of disease, echocardiography also provides important information for coronary interventions (vascular dilatation using a balloon and / or stent).

3) The study of the perfusion of the heart is a new process that facilitates the detection of defects in the supply of oxygen to the heart. The echo lab of





Figure:  
3D imaging of the heart using  
transesophageal echocardiography,  
LAA: left atrial appendage,  
PV: pulmonary valve,  
AV: Aortic valve,  
TV: Tricuspid valve

the University Medical Center Mainz was, next to the University Hospital of Münster, the largest German center participating in a European multicenter study for the exploration and establishment of this new method.

30 major hospitals in Europe participated. The results of the study will be evaluated during 2010 and published in the year 2010 / 2011.

- 4) 2D and 3D echocardiography allows guiding and monitoring interventional procedures on the heart, for instance the closure of congenital defects of the cardiac septa and the repair of valvular defects. These procedures are performed in patients who cannot receive classical surgery, but in the future they will probably become a true alternative therapy.

The activity volume currently reaches approximately 12,500 examinations a year, and this is steadily increasing. The University Medical Center Mainz has now become a national leader in

the field of imaging both in terms of the number and the quality of the investigations.

The near future will bring further improvements in multi-dimensional imaging, especially for adults with acquired and congenital heart defects. The laboratory is ranked as a level III facility (the highest level) by the German Society of Ultrasound in Medicine. It provides a national training center for stress echocardiography of the German Society of Cardiology and has recently obtained the certification of the European Society of Cardiology.

#### Contact:

R.S. von Bardeleben, MD

Leader of the Echocardiography Laboratory Service for diagnosis of ischemia and valvular defects, congenital disease in the adult

Phone +49 (0) 6131 17-2385 or -2892

## Treatment of heart rhythm disorders

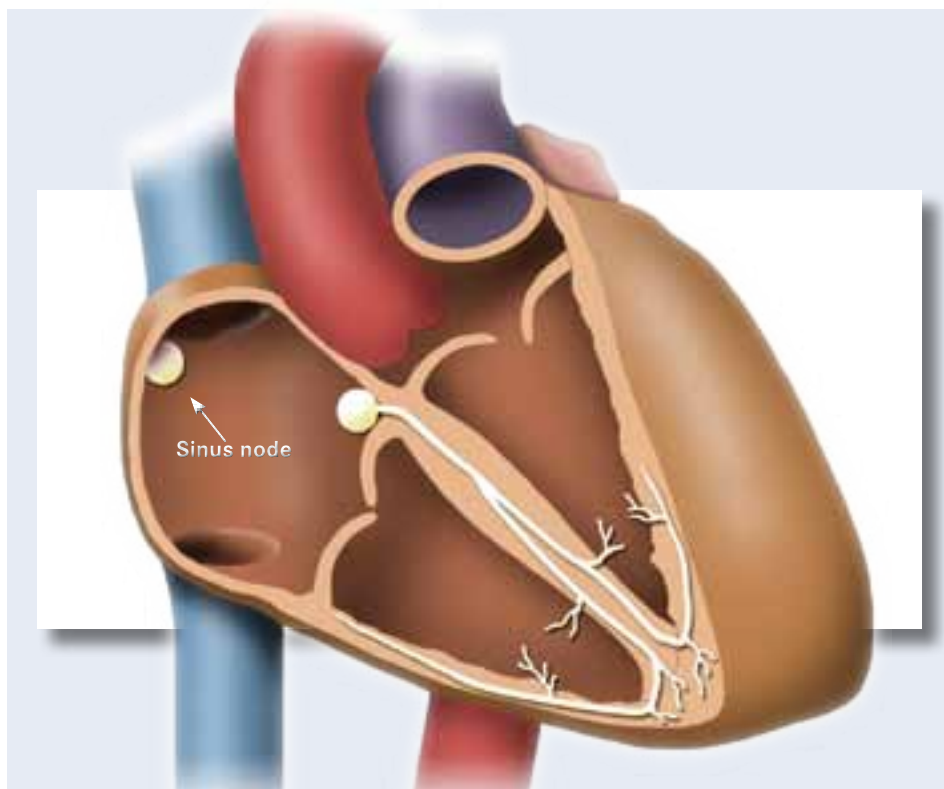
### How do implantable defibrillators work?

In the last annual report (2009) we introduced the concepts of heart rhythm diseases and discussed the corresponding therapeutic possibilities. This year, we will briefly present the role of Implantable Cardioverter Defibrillators (ICD).

### The heart

The heart muscle pumps blood through the body and thus ensures the circulation of oxygen in all organs. Like all other organs, the heart itself, which is a hollow muscular organ, needs nutrition. To work properly, it has to receive a sufficient supply of oxygen and nutrients. This is done by the coronary arteries. They cover the heart muscle as a network and ensure that it receives enough blood to maintain its function.

In a healthy heart, the muscle pumps smoothly and evenly. The rhythmic electrical impulses that control these contractions are formed in a small knot at the top of the right atrium (sinus node). The sinus node functions as a clock that guarantees the steady flow of electrical impulses. The impulses are passed through the heart wall via an intermediate station called the AV node, on to the nerve fibers of the heart chambers. This system is called the heart conduction system. The electrical impulses trigger the contraction of the heart muscle, and every heart muscle cell receives simultaneously the order to beat. The resulting heart beat then pumps the blood through the circulatory system. The number of heart beats per minute is referred to as heart rate. The heart rate depends on the load, the age and physical fitness of a person. Adults usually have a frequency of about 60 to 100 beats per minute. When the heart beats in this normal, healthy rhythm, we speak of “sinus rhythm”.



### Heart rhythm disturbances

When the conduction of electrical impulses is disturbed, this is called heart arrhythmia. Sometimes, irregular heartbeats are in the long term dangerous as they impair the supply of blood to the heart. There are several forms of arrhythmias: some of them lead to a faster heartbeat (tachycardia), other to a slower heart beat (bradycardia). When the heart ventricles beat too fast, the interval between contractions is sometimes too short to allow blood to flow into the chambers. The pumping function of each heart stroke is then inadequate, and this causes a reduced blood flow in the body, especially the brain. This results in fatigue, dizziness, and often loss of consciousness, which in turn can lead to a fall or other accidents. If the lack of blood supply is not quickly resolved, this arrhythmia can cause permanent damage. When the condition persists for several minutes, it can even cause death.

### Causes

Depending on their nature and their duration, heart rhythm disorders can be completely harmless, but they may also be life-threatening. In many cases, they are a

consequence of other diseases of the cardiovascular system (coronary heart disease, heart attack, etc.) or of other organs. The lifestyle of patients (stress, coffee, medications, drugs, smoking) may also influence the occurrence of cardiac arrhythmias.

### Therapy

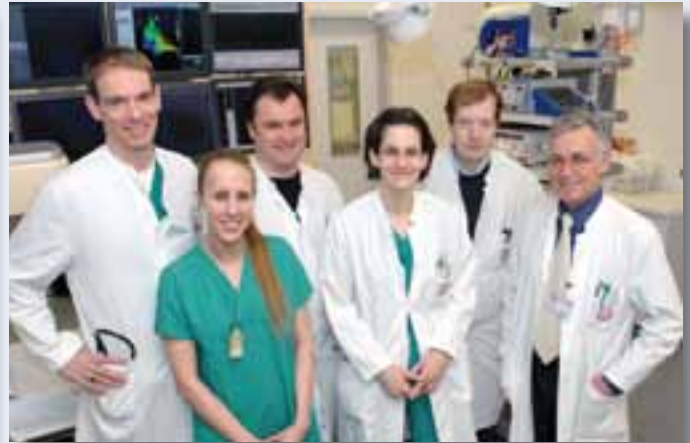
For recurring dangerous arrhythmias, an implantable cardioverter defibrillator (ICD) may be implanted. The unit is approximately 6.0 x 6.0 x 1.5 cm, 80 – 120 g heavy and surrounded by a titanium housing.

ICD systems can monitor constantly the rhythm of patients who have heart rhythm disturbances. The main task of the ICD is to recognize life-threatening forms of arrhythmia, and interrupt them by providing an electric shock to the heart muscle. This shock “resets” or “reboots” the heart’s electrical system. An ICD, in contrast to the conventional pacemaker, may thus treat both slow and fast heart rate arrhythmias.

The device is equipped with a long-lasting battery (5–10 years) and achieves its effect via electrodes that need to be placed



X-Ray of a patient with an ICD system implanted at the level of the left shoulder.



The team of the electrophysiology

PD Felix Gramley, MD, Angela Frese, Hanke Mollnau, MD, Catrin Theis, MD, Klaus Kettering, MD, Professor Ewald Himmrich, MD

through a mini-invasive surgical procedure – in the heart. Each heartbeat can be monitored, and in particular the ICD detects when the rhythm is too fast or too slow and whether the heart beats regularly or irregularly. The electrodes have direct contact to the heart muscle (the main electrode is in the tip of the right ventricle) and, if necessary, they provide electrical impulses to the heart. If the heart beat is too slow, the ICD can function as a normal pacemaker. If it is too fast, it gives a shock or gives very fast impulses that reset the heart to its normal rhythm.

A special form of ICDs is the three-chamber ICD (CRT-D): in this ICD, three electrodes are implanted into the heart (atrium, left and right ventricle). The ventricle electrodes may stimulate the two ventricles simultaneously, re-synchronising the contraction of the heart.

In addition to the above therapeutic functions, defibrillators also have diagnostic features, as they detect the occurrence of heart rhythm disturbances and store them. The data recorded can be accessed with a program, so that physicians can control whether the patient has arrhythmias and whether the ICD reacts appropriately.

In the specialized outpatient clinic for heart pacemaker and defibrillators, we follow now more than 4,000 patients at regular intervals.

The follow-up of patients with implanted pacemakers or ICD devices can in certain cases be performed by so-called telemedicine. The patient sends the data of his/her ICD over the Internet to the physician and only needs to come to the hospital if problems with the device of the heart rhythm are found.

## Contact

The arrhythmology service of the Department of Medicine 2 has several outpatient clinics:

### ■ Pacemakers and ICD

- Physician  
Phone +49 (0) 6131/17 – 7218
- For appointments  
ICD/Pacemaker implantation  
Phone +49 (0) 6131/17 – 7218
- For appointments  
ICD/Pacemaker consulting-hour  
Phone +49 (0) 6131/17 – 7058

### ■ Electrophysiological studies and ablations

- Secretary:  
Pacemaker-/ICD therapy  
Phone +49 (0) 6131/17 – 2826
- Secretary:  
Interventional electrophysiology  
Phone +49 (0) 6131/17 – 2826

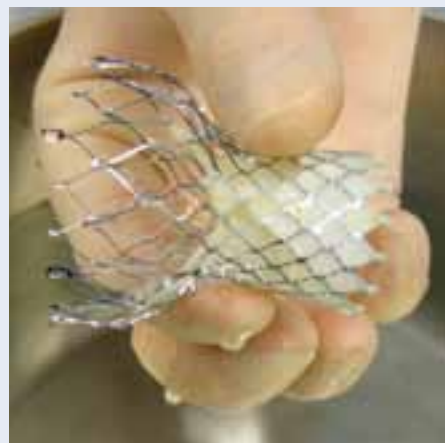
## TAVI: Heart valve implantation

— Aortic stenosis is a progressive disease of the aortic valve whereby calcium accumulates on the leaflets that compose the valve causing them to not open properly. In turn, this prevents blood from flowing from the heart to the whole body. This may be associated with collapses, stroke, heart attacks, and heart failure. Aortic stenosis is a very frequent disease in the elderly, and treatment is usually surgical.

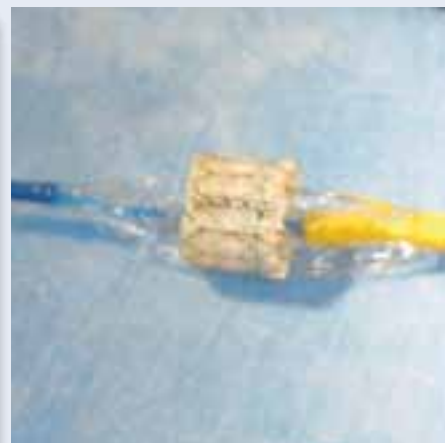
Since July 2008, in close collaboration with the Department of Cardio-Thoracic and Vascular Surgery, our department has implemented a new, much less invasive, method for treating this condition. This new technique differs from conventional operations because it is performed on the beating heart: since it requires only mini-invasive techniques, it is suited for older patients who have a high surgical risk. This new method is also called “percutaneous (through the skin) aortic valve replacement” or “**transcatheter aortic valve implantation**” (short **TAVI**) because the new heart valve is inserted via a tube system (catheter) into the heart and is unfolded there.

The advantage of this method is that it does not require opening the patient’s chest and that it allows avoiding the use of a heart-lung machine. A heart-lung machine is necessary at traditional surgeries to replace the function of these two organs for the period of operation; in some cases, especially in older patients and during prolonged interventions, complications such as stroke and bleeding can ensue from the use of this heart-lung machine.

In contrast to the deep anesthesia with conventional valve surgery, transcatheter valve implantation in principle could even be performed under local anesthesia. In our department we use some sedation to make the procedure more comfortable for the patient, but the patient is usually already awake when leaving the cardiac catheterization laboratory. Another advan-



CoreValve-valve-implent



Edwards-Sapien-valve

tage is the avoidance of large surgical scars, which allows the rapid mobilization of patients and decreases the risk of subsequent complications such as pneumonia or wound infections.

Despite these encouraging changes, it must be stressed that the conventional surgical valve replacement remains the method of choice for younger patients with lower surgical risk. The new TAVI method is rather indicated in patients who are older and/or have important concomitant diseases as in these cases the improvement of quality of life is the most important objective of therapy.

### Establishing an interventional heart valve therapy service

— With the increasing number of heart valves implanted, a service for “interventional heart valve therapy” will be opened within our department in 2010. The group will result from the fusion of three groups: the TAVI group, with Ulrich Hink, MD and Felix Post, MD, the mitral-clipping group lead by Ascan Warnholtz, MD and the echocardiography group lead by Professor Stephan von Bardeleben, MD. Members of this team are certified in all the available

interventional techniques that allow percutaneous heart valve treatment. The aim of this service is to ensure that patients with heart valve defects receive counseling and support by a competent team, and that they are followed by the same physicians that actually perform the operation.

The patients are followed during the hospital stay and after discharge by the same team. This close relationship improves the sense of security of the patient and it also has tremendous effects on the quality of the care provided.

Our service also takes part into a multi-center registry of data collecting patients’ information before and after the procedure. This large database allows us to compare the quality of our care with other groups, and to establish what type of patients profits the most from these therapies.

### The valves

— The collapsible aortic valve consists of a rigid metal cage (nitinol or cobalt chromium) which contains a porcine valve. Two different types of valves are currently available (see picture in the previous page): the self-expanding CoreValve of the com-



pany Medtronic and the Edwards-Sapien-valve, which is implanted with the help of a balloon.

Factors such as the size of the valve, the anatomy of the patient and other technical considerations determine which type of valve can be used.

### The procedure

— The favored access for the insertion of a transcatheter aortic valve is through the femoral artery, a large blood vessel in the groin. The procedure is similar to the so-called “cardiac catheterization”.

First, the femoral artery is punctured with a needle. Then, a 6mm-thick catheter is advanced into the artery until the heart and the new heart valve is placed in position. Thereafter, the catheter is removed and the valve unfolds itself. Finally, the femoral artery is sealed with a special seal system.

For patients who have diseases of the groin there is an alternative, that is the possibility of implanting the new heart valve through a small incision below the left nipple, the so-called “transapical access route”. Here, the catheter is inserted through the apex of the heart, which is then surgically closed again.

In the rare cases where also this method cannot be applied, it is possible to introduce the new heart valve through the subclavian artery in the shoulder region – the so-called subclavicular access.

The CoreValve is suited for the transfemoral and subclavicular, while the Edwards-Sapien valve can be implanted either transfemorally or transapically. Our team has experience with both valve types as well as all of these access ways and is certified for both methods.

### The team

— The transcatheter valve program is a multidisciplinary project that joins surgical and medical disciplines. The team consists

of specifically trained nurses (Silvio Kittlaß), cardiologists (Ulrich Hink, MD, Felix Post, MD), heart surgeons (N. Kayhan, MD, Kasper König, MD), anesthesiologists (Karmrodt, MD) and technicians. The University Medical Center Mainz can therefore offer all the modern techniques of aortic valve treatment.

The findings are discussed for each patient in a team, so that an individual concept of treatment is developed for each patient. A detailed discussion about the expectations of the patient, the different possibilities and the risks of the procedure then follows: the patient needs to be well informed about the advantages and disadvantages of this therapy.

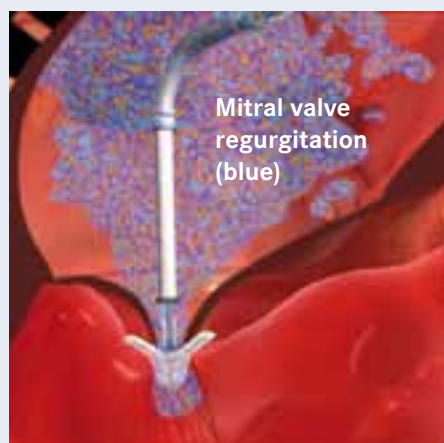
### Contacts

— Patients who have symptoms such as angina (chest pain), lightheadedness, vertigo or fainting require a rapid cardiological check up. They should first contact their family physicians, who can address them to our walk-in clinics, or in certain cases may even suggest a short hospital admission. If a disease of the aortic valve is found, several exams will need to be carried out. For such cases, the Department of Medicine 2 offers a special service, the aortic valve disease clinic.

An appointment can be set up by calling the office of Ulrich Hink, MD (Phone +49 (0) 6131-17-7267).

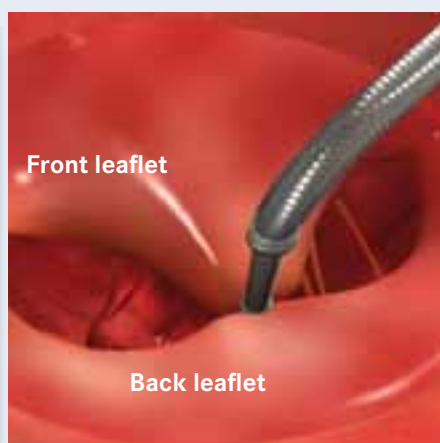


The team of transcatheter valve programm during a surgery



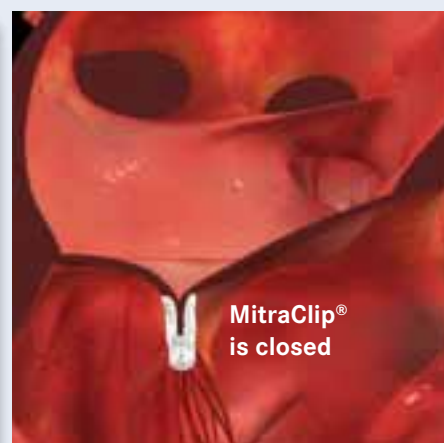
#### Mitral valve regurgitation

The clip is positioned, but the leaflets are not clamped.



#### The MitraClip® is positioned

The valve is reconstructed by fusing the two leaflets together in their centers.



#### The MitraClip® is closed

The clip is closed between the two leaflets; The regurgitation has disappeared!

## Mitralclipping: heart valve repair

### Percutaneous reconstruction of the mitral valve – a new therapy for mitral valve regurgitation

— Recently, a new mini-invasive method for the treatment of diseases of the mitral valve (mitral regurgitation) has been established in the Department of Medicine 2. Like the percutaneous implantation of aortic valves, the so-called percutaneous (endovascular) mitral repair can be performed in patients with severe mitral valve regurgitation and heart failure who are too sick to receive conventional surgery.

The mitral valve consists of two leaflets which close when the heart pumps blood into the body. This prevents the reflux of blood back into the left atrium and the lungs, determining the direction in which the blood flows in the circulation. When the leaflets do not close well (for instance because one of the strings that hold them in place is broken), blood flows back in the left atrium and accumulates in the lungs, causing shortness of breath (dyspnea), especially during exercise. This also causes an additional burden for the left ventricle

which needs to pump blood back and forth instead of forward only. Ultimately, this additional work load may cause an enlargement of the left ventricle and heart failure.

The method called percutaneous mitral valve repair uses a clip to force the two leaflets of the valve to stick together. This allows the valve to close more effectively, reducing the regurgitation of blood in the atria.



#### A MitraClip® is composed of two arms that clamp the leaflets together

The clip is introduced via a cardiac catheter inserted through the groin and is advanced into the left atrium. The surgery is performed under general anesthesia in the cardiac catheterization laboratory, and echocardiographic and fluoroscopic control is necessary.

Because the MitraClip® is implanted on a beating heart, the efficacy of the clip (and the success of the procedure) can be directly controlled; in case of unsatisfactory, the position of the clip can be corrected under guidance of three-dimensional echocardiography before the clip is finally released.

The implantation of the clip results in a permanent fusion of the two mitral leaflets to create a “double-orifice valve”. Usually, the regurgitation after clipping is insignificant, while the residual double opening on the two sides of the clip guarantees forward blood flow in the filling phase of the heart.

The final result is twofold: a reduction in pressure in the pulmonary arteries and a reduction of the pressure in the left ventricle, leading to an improvement in symptoms of heart failure.

The hospital stay is dependent on the general health and comorbidities of the patient and is usually of about 5 days, of which 2 in the Intensive Care Unit after surgery and 3 on a normal ward.

Pictures generously provided by  
Abbott Vascular Deutschland GmbH

## Angiology

**Angiology is the specialty of internal medicine that deals with diagnosing and treating diseases of the arteries, veins and lymphatic vessels.**

— Vascular diseases are very common, and many of the patients who are admitted to the Department of Medicine 2, but also many patients who are admitted to other Departments in the University Medical Center, need angiological screening. Maybe more than in other disciplines, an interdisciplinary cooperation plays a central role.

The number of patients with vascular disease is increasing steadily. This is also reflected in the annually increasing number of angiological studies in our department: a total of 11,681 vascular investigations were performed in the Angiology section of the Department of Medicine 2 in 2009.

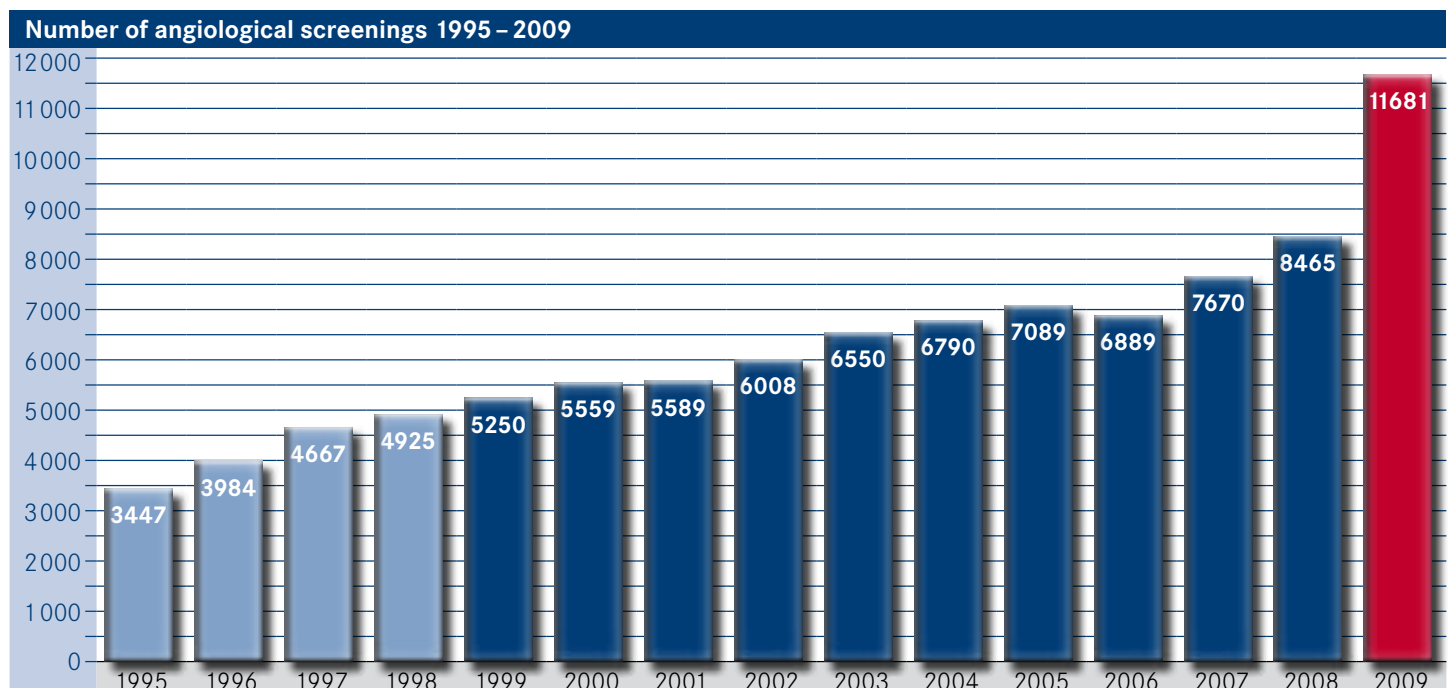
In addition to patient care, our clinic has a strong commitment to research in the field of peripheral atherosclerosis, and to the education of students. Further, we participate in several clinical studies testing new therapies and new diagnostic methods.

### Circulatory disorders of the leg and arm arteries

— A particular focus of interest of our Angiology Section is the care of patients with **peripheral arterial occlusive disease (PAD)**. PAD is a progressive disorder that limits blood circulation in limb arteries. In most cases it affects leg arteries, and more rarely the arteries in the upper limbs. The cause of PAD is almost always a progressive hardening of the arteries (**atherosclerosis**).

Typical symptoms of PAD include pain in the calves and thighs when walking, so that PAD is commonly known as “claudication”. In advanced stages, patients complain of pain also at rest because blood flow is insufficient to keep tissues alive; in this case, one speaks of a “critical circulatory failure” or “critical ischemia”. In the worst case, this may lead to leg amputation.

Many patients, however, have circulatory disorders of the leg arteries without having symptoms. This is particularly common in patients who cannot exercise due to the presence of other diseases such as heart conditions or diseases of the musculoskeletal system. Or else, diseases of the nerves (neuropathy) reduce the sensitivity to pain, and the patients do not recognize the severity of the problem. This clearly does not mean that the disease is not there and that it should not be treated: even patients who are asymptomatic benefit from diagnosis and treatment! Sometimes patients first notice that something is wrong when a wound on the foot no longer heals. Therefore it is important to establish an early peripheral arterial disease in time and to improve the circulation in the leg arteries.





Measurement of blood pressure at the foot.



Ultrasound examination of the leg's veins



cw-Dopplersonography

### Diagnostic Tests

— In our Angiology service, various tests are performed to identify the presence of peripheral arterial disease so that a timely treatment can be initiated. Most studies are performed with ultrasound devices.

For a first basic diagnosis, blood pressure is measured at the level of the patient's ankle. Normally, this blood pressure is similar or slightly higher than that at the level of the arm. When the blood pressure at the level of the ankle is lower than that of the arm (an Ankle-Brachial Index or ABI lower than 1), then the patient is likely to have peripheral arterial occlusive disease (picture above on the left).

After measurement of the ABI, an ultrasound (cw-Doppler) examination (picture above on the right) and a special measurement of blood pressure using a method called oscillography are performed (picture down on the left).

In ambulatory patients, a treadmill test is performed to quantify the distance that the patients can walk without experiencing symptoms (picture down on the right).

Since patients with critical ischemia cannot perform such test (they can often

barely walk), we measure their skin oxygen content with a special probe (transcutaneous oxygen partial pressure).

A duplex ultrasound exam is then performed, in which the arteries are seen on ultrasound and blood flow in the arteries is studied (picture above in the middle).

In patients with PAD, it is also important to perform a duplex ultrasound of the abdominal artery (aorta), as it occurs relatively

often that this artery is very calcific or enlarged (aortic aneurysm).

A cooperation with the Departments of Radiology, Vascular Surgery and Endocrinology is critical for the treatment of patients with PAD. At the University Medical Center of Mainz, this cooperation is particularly tight. Each case is discussed in interdisciplinary meetings where each specialist can express his/her opinion in order to identify the best individual therapy.



Oscillography



Treadmill test





Duplex scanning the deep thigh veins



Duplex scanning the deep lower leg veins

### Diseases of the veins

— Another focus of our Angiology service is the diagnosis and treatment of diseases of the venous system. The veins have the task of transporting oxygen and nutrient-poor blood back to the heart. Blood from the skin and muscles is collected in superficial veins and then directed to the larger deep veins and from those into the heart and lungs.

Since the blood flows in most veins against gravity (for instance from the legs to the chest), and since the forward pressure of the beating heart has effects only in the ar-

teries, the velocity of blood flow in veins is slower than in that in arteries.

A common disease of veins is the formation of a blood clot (thrombus). A blood clot in a superficial vein causes a “thrombophlebitis” (vein inflammation). A thrombus in a deep vein causes a “deep vein thrombosis”. This can occur for example after an operation, but also in patients who have not walked or moved for a long time (for instance after long airplane travels).

Deep venous thrombosis is very dangerous because the clot can move with the blood

flow in the pulmonary vessels and cause a life-threatening pulmonary embolism. It is therefore important that a deep vein thrombosis and its cause are identified and treated immediately with blood-thinning drugs. The diagnosis is performed by means of duplex scanning, by which clots of the superficial and deep venous system can be visualized.

Patients with diseases of the venous system are treated in close cooperation with the Department of dermatology, and with our Thrombosis and Hemostasis Service.

Vein with normal valves and normal bloodflow



Initial thrombosis, reduced bloodflow



Occlusion of the vein by a thrombus





### The Team

(Left to right) Medine Tunc, Gerhard Weißer, Kyung-Suk Yoo, Jörn Frederik Dopheide, MD, Professor Christine Espinola-Klein, MD, Karina Havlicek, Dorit Berz, Markus Vosseler, MD, Petra Bähies, Nicole Lüninghöner. (Not in the picture: Corina Huth, MD, Tanja Ackermann, Savvas Savvidis, MD, Nico Abegunewardene, MD)

### The Team

— A total of 13 persons are employed in the Angiology Service of our department.

- **Medical Director:**  
Professor Christine Espinola-Klein, MD
- **Vice-Director:**  
Savvas Savvidis, MD
- **Physicians:**  
Gerhard Weißer (Consultant)  
Jörn Frederik Dopheide, MD  
Markus Vosseler, MD  
Nico Abegunewardene, MD  
Corina Huth, MD
- **Medical Assistants:**  
Kyung-Suk Yoo (MTA)  
Dorit Berz (Nurse)  
Karina Havlicek (Nurse)  
Petra Bähies  
Medine Tunc (Assistant)  
Nicole Lüninghöner (Assistant)  
Tanja Ackermann (Assistant)
- **Students:**  
Gesa Linneweh  
Marie-Christine Radmacher  
Anna Westling  
Sarina Schäfer  
Janina Henze
- **Doctoral students:**  
Viviane Obst  
Marie-Christine Radmacher  
Christopher Doppler  
Martin Scheer

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## Spotlight on a working group

### IT: from an analog to a digital clinic

#### Analysis of Medical Data in the Department of Medicine 2

#### The Department of Medicine 2 – a massive data-producing machine

— What disease does this patient have? We face this question every day, and in order to get an answer we often need to perform several examinations. A thorough collection of the patient's medical history is obviously of paramount importance: What diseases did the patient have? What diseases do family members have? In cardiology, diagnostic imaging is also of great importance. Every patient's admission produces an incredible amount of data, which provide important information for the diagnosis and treatment of his/her diseases: test results, reports, discharge summaries, cardiac catheterization films, ultrasound films, etc... These data have to be stored for at least 30 years because the patient might need them, or might return to the hospital. The result is that we need to maintain an enormous database: micro-film rolls and tons of paper per year and

about 5 – 6 terabytes of digital data. These data are official, very sensitive and have legal value and therefore they must be archived in a safe but accessible way. As it is clear, a traditional analog system is not sufficient for this task: until recently, asking for an old report required an enormous expenditure of resources – especially time. For instance, if a physician needed to retrieve a patient's old blood exams, he/she had to contact the archive, where someone had to search, copy and forward the file when available. This process could take a day or even several days. Today, this mostly requires just a few clicks on the computer.

#### From analog to digital

— The gradual transition from analog to electronic data processing, an extremely complex process that involves data entry, data retrieval and data storage has now been completed at the Department of Medicine 2.

With the rapid development of IT in the 90s, the conception of solutions for medical purposes and clinical issues represented an important application of the new technologies, but at the same time it

presented specific challenges. This required the development of customized solutions for individual hospital departments, but also complex programs developed by large medical technology companies. The next problem was then to find a way to integrate all this information in one single program instead of several single computer applications which allowed storage of data but did not make their retrieval much simpler and user-friendly. Parallel to these developments, the University Medical Center established a central computer database, which serves now as the main infrastructure for the comprehensive exchange of data and shared applications.

With the start of the new millennium, the main focus shifted: the solutions previously found could now be interconnected in a digital network. In the past 10 years, a number of programs have been developed, existing applications and systems have been connected to each other, and in order to make this network accessible throughout, all rooms of the Department of Medicine 2 have been equipped with state of the art PC workstations. Moreover, programs have been simplified and reduced in number in favor of few, universal, programs: today, all doctors who possess



The IT team of the Department of Medicine 2  
(left to right) Julius Mundt, Wolfgang Klein, Siegmund Schmitt

an appropriate electronic password, can access data from a patient's ECG, ultrasound exam or cardiac catheterization using one single program. This complicated process obviously required a tight cooperation between the IT team, the doctors and the nurses.

Today, all clinical data produced in the Department of Medicine 2 are stored and archived digitally. This corresponds to a data set of 5 – 6 terabytes per year! Data are accessible from any of the now 250 PC workstations that are available for clinic, research and teaching. The staff can now gather, at any time of the day, all possible cardiac information (findings and image data), other medical information (e.g. laboratory data) and also general administrative data that have accumulated from admission to discharge, and in previous admissions, for each patient.

Thanks to this comprehensive IT installation, the Department of Medicine 2 should be considered a center of excellence, even when compared on a nationwide scale. The challenge for the next few years is primarily to further expand the network with the central systems and allow data exchange across Departments within the University Medical Center Mainz.

### How do patients benefit from these achievements of the IT department? An example

— Because medical information is today extremely more complex than before, its processing and accessibility become more important. The sooner this information is made available, especially during emergencies, the better the patient can be treated.

In 2009, the documentation system of the Department of Medicine 2 was integrated with the hospital's electronic information system. This made the documentation easier to access for physicians and patients. The user friendliness of the electronic documents has also been improved, so that access is possible through all computers within the clinic. If a patient is admitted several times, for example, all documents can be accessed from each computer, which saves time and expensive archive searches — all resources that can now be invested for the patient rather than around him/her. In one year, this evolution has already saved several lives.

The information system of the Department of Medicine 2 offers its patients and staff a very rapid and effective access to all

information considered relevant for the diagnosis and treatment of the patient. For doctors and nurses, this also means saving time, which ultimately comes back as a benefit to the patient.

Three IT specialists are employed in the Department of Medicine 2 to maintain the operability of computer systems and to constant try and harmonize the systems, eliminating errors and improving simplicity of use. The IT team of the Department of Medicine 2 obviously works closely with the central IT staff of the University Medical Center Mainz: it's not only doctors and nurse who determine whether a patient's life will be saved!





## Research

### The new Center for Thrombosis and Hemostasis in Mainz

#### 15 Million Euros for a national thrombosis center in Mainz

#### Federal funding awarded to establish an excellence center for research and treatment of thrombosis at the University Medical Center Mainz

— About 6 years ago, the Johannes Gutenberg University Mainz and the University Medical Center Mainz joined forces in an application for a Germany-wide call for proposals for the establishment of new excellence centers. An international commission of experts was composed, and after two rounds of evaluation the Federal Ministry of Education and Research decided to provide support for a new Center for Thrombosis and Hemostasis Mainz (CTH).

Starting September 2010, this ambitious 15-million euros project will support the creation of the CTH as a national reference center for the study and treatment of thrombosis and diseases of hemostasis

for a period of five years. The strengths of this project are its interdisciplinary and integrative nature at the edge between state of the art therapy and innovation in research. The main goal of the CTH is to combine cutting-edge research and innovative treatment options for patients and to set itself as an ideal facility to attract young talented scientists internationally. Central to the process is the concept of “translational medicine”, that is the capacity to provide an environment that allows transferring basic science into clinical evidence and viceversa. This concept stimulates innovative concepts of diagnosis and treatment.

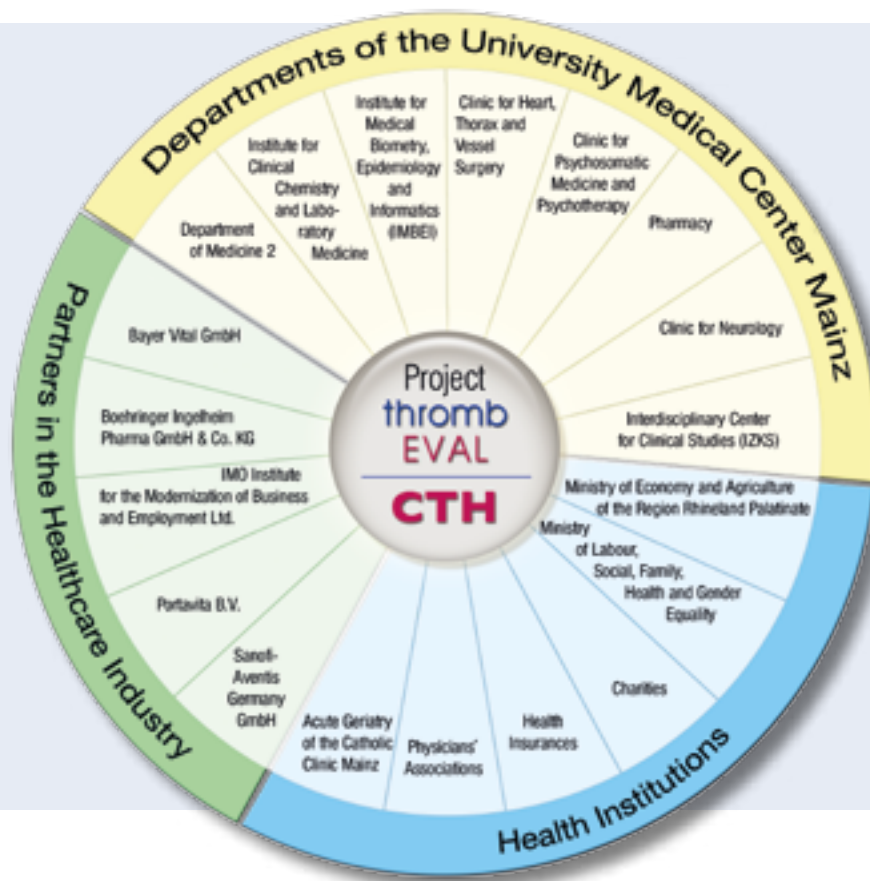
A number of teaching projects at the interface between science and clinical practice will be proposed in order to introduce motivated students to a career as clinician scientists. The CTH is going to employ up to 120 people including researchers, technicians and physicians, including four new professorships, which will deal with issues of thrombosis research and treatment.

“The CTH will not only promote excellence in research, but it will represent a unique new facility for both researchers and physicians who can exploit the possibility of a true cooperation. And patients will defini-

tely profit from this” unanimously declared Professor Norbert Pfeiffer, MD and Professor Reinhard Urban, MD, respectively Medical Director and Dean of the University Medical Center Mainz.

“A great success for the many dedicated scientists and physicians in basic research and patient care for which we have fought for four years” added Professor Georg Krausch, PhD, President of the Johannes Gutenberg University Mainz and Professor Thomas Münzel, MD, Director of the Department of Medicine 2 of the University Medical Center Mainz and spokesman for the CTH.

The state Rhineland-Palatinate will support the University and the University Medical Center Mainz with an additional million of Euro.



“thrombEVAL” – a cooperation project for the evaluation of an innovative concept in the field of supply hemostaseology.

## Health Services Research

### “thrombEVAL”

#### Health care research and translational research in Haematology as part of a national key project

#### A project in the new Center for Thrombosis and Haemostasis

As part of the Germany-wide call of the Federal Ministry of Education and Research to support new model centers, the Johannes Gutenberg University Mainz and the University Medical Center received funding to establish a Center for Thrombosis and Haemostasis in Mainz.

The project “thrombEVAL” is one of the many projects in translational research of the CTH. This is a health care research project in the field of hemostasis (coagulation medicine) that will collect data from patients in the region Rheinhessen. The project has been organized under the auspices of the Ministry of Labour, Social Affairs, Health, Family and Women and is carried out as part of a national key project (see below).

ThrombEVAL is in turn composed of five sub-projects. The basic aim is to collect data on the quality and cost-effectiveness of the care provided to patients receiving anticoagulant drugs to compare the outcome of patients treated by the standard health care system with that of patients treated within our newly established Thrombosis Service. The project will also include an analysis of the satisfaction of patients in either system and a survey of the needs of general physicians. As part of thrombEVAL, we also plan to establish a medical-scientific database, which will allow the implementation of other translational research projects. In order to collect data that are truly representative of the whole Rheinhessen region, the central study center at the University Medical Center Mainz will be joined by other study centers in hospitals throughout the region.

The importance of establishing specialized services, their impact on patients well being and health, and strategies to improve the health care in the field of thrombosis will be discussed and debated in a dedicated, newly established network that will include representatives from the various institutions and bodies of the regional health system and health economy. This

network will then guide the implementation of the project thrombEVAL, and the data collected will serve to establish new treatment models to be applied all around Germany. As well, thrombEVAL will establish a platform for close networking between health economics and health care facilities in the new Center for Thrombosis and Hemostasis.

The project has a budget of 710,000 Euro and is based on mixed funding from academic and industrial sponsors. Participation in the financing was overtaken amongst others by the state of Rhineland-Palatinate, the intramural research funding JOGU Mainz, Boehringer Ingelheim Pharma GmbH & Co. KG, Sanofi-Aventis Germany GmbH and Bayer Vital GmbH.

A team of 12 employees will bring the project forward. The planning phase of the project “thrombEVAL” is now nearing completion, and the preparation phase is starting. The project will kick off in summer 2010.

### Integration of “thrombEVAL” as a national key project in the Master Plan Rhineland-Palatinate

— “Accessibility and service for everybody” are central concepts of modern health care systems. The health sector however is also an important employer and a dynamic economic factor. In Rhineland-Palatinate, the health care accounted for 9.5% of the total gross domestic product of the region. The health economy is thus a central pillar for the economic and employment location in Rhineland-Palatinate.

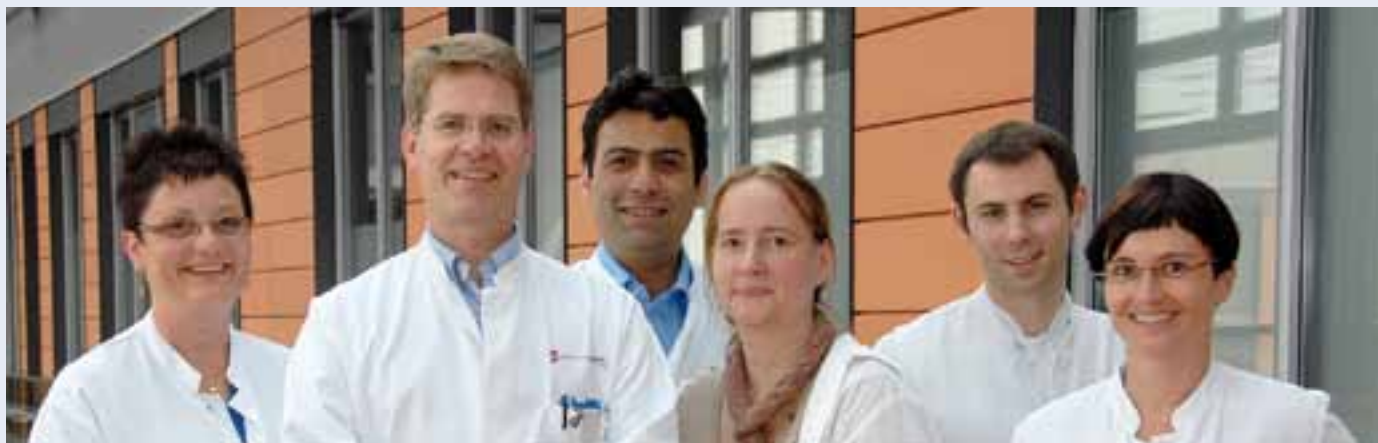
In 2007, the Health Ministry and the Ministry of Economic Affairs of Rhineland-Palatinate have launched a joint initiative of Health Economics aimed at promoting the opportunities and potential of the healthcare industry in the region, and at maintaining the high level of health care. For this purpose, a master plan was created in an effort to bring together the efforts of the State Government and of all industries and institutions who bear responsibilities in the healthcare industry.

This master plan should serve as a basis to provide chances for new projects in the health industry in the whole region. The objective is to exploit the growth and innovation potential of the sector and thus contribute to greater employment growth and an improved quality of life.

To implement the master plan, the state Rhineland-Palatinate plans a set of centrally coordinated key projects across target areas in the healthcare industry. These projects will provide a path to guide future development.

The project “thrombEVAL” takes exactly this approach and implements numerous central concepts included in the master plan:

- The centralization of the treatment in a specialized service will allow the optimization of the resources and the standardization of the level of care, strengthening the primary and secondary prevention of thromboembolic events and improving the quality of the health care.
- The care model allows for situation-specific assistance to people in nursing homes or with limited mobility, thus making a contribution to the preservation of the individual autonomy of patients.
- The standardized of data collection in an integrated database allows transparency, improving the quality of the service.
- The structure of the project represents a model of cooperation based on the integration of public and private. This concept could in the future be extended to other sectors of the health care industry.
- An innovative component of the care model is the use of an internet-based electronic case file. This project allows gathering valuable experience in the application and use of this innovative technology. The aspects of data protection and data security and the principles and the contracts for the implementation have been developed by a working group with representatives from the Ministry of Health (Department of Health Law), the country’s data protection Rhineland-Palatinate, the data protection officer of the University Medical Center, the project senior representatives of the University Medical Center and representatives of the participating companies in the healthcare industry.
- The networking of the stakeholders of the health care industry within this regional initiative allows for the evaluation of a regional model of care and for the drafting of a new model that could be implemented nationwide
- The translational concept of binding patient-oriented clinical research and basic research in a platform that allows integrated multidisciplinary scientific projects establishes the basis for the development of new growth potential in the industry focusing on hemostasis (development of new drugs and diagnostic tools in the field of coagulation medicine).
- The international cooperation with a Dutch medical technology company and the Dutch Federation of Thrombosis Services provides valuable experience in the development of integrated solutions for the German Health System.



Working group endothelial function – clinical studies

Hannelore Seiler, Ascan Warnholtz, MD, Mir Abolfazl Ostad, MD, Ursula Gräter, Frank Schmidt, MD, Astrid Thumerer

## Working group endothelial function – clinical studies

### Staff of the working group

- **Leadership:**  
Ascan Warnholtz, MD
- **Physicians:**  
Mir Abolfazl Ostad, MD  
Frank Schmidt, MD
- **Nurses:**  
Hannelore Seiler  
Astrid Thumerer
- **Doctoral students:**  
Boris Schnorbus, Robert Schiewe
- **Students:**  
Ursula Gräter

### The year 2009 in the working group endothelial dysfunction – Clinical studies

— The year 2009 was characterized by the publication of several clinical reports and studies. First of all, the results of the CEZAR study, published in the journal *Atherosclerosis*, which investigated the

influence of the pleiotropic effects of atorvastatin on endothelial function in patients with coronary heart disease. “Pleiotropic” means that a drug initially designed for an effect (lowering blood cholesterol in the case of atorvastatin), turns out to have multiple other beneficial ones (improvement in endothelial function in this case). The results of the INEF study, which investigated the influence of niacin on endothelial function in patients with coronary heart disease, were also published in *Atherosclerosis*. In addition, the results of the PENTA study, which investigated the influence of Pentaerithrithyl tetranitrate on endothelial function in patients with coronary heart disease, were published in the Journal “Clinical Research in Cardiology.” The results of the PENTA and the CASSANDRA studies were presented at the congresses of the German Cardiac Society in Mannheim in April and the European Society of Cardiology in Barcelona in August.

In addition to the publication of trial results, the multi-center study Dal-Vessel was started in our center along with another 23 centers across Europe. This study examined the influence of the HDL-increasing substance dalcetrapib on endothelial function in patients with coronary heart disease or risk factors for coronary heart

disease. Because it is the first multicenter endothelial function study in the world, it also has far-reaching methodological significance. There have been tremendous efforts with numerous training sessions in Barcelona, Amsterdam and Utrecht, in order to standardize the measurement techniques. All measurements were analyzed in a blinded manner in a core laboratory in London. The publication of the results of the study is expected in 2010.

With the formulation of a study protocol to evaluate the impact of aircraft noise we opened a new area of research. The implementation of the AIR study (aircraft noise and vascular function) will start in 2010. Finally, the investigation of endothelial function in the context of a multi-center study to evaluate the influence of psychotherapy for the treatment of depression in patients with coronary artery disease (CAD SPIRR study) was continued in 2009. The sub-study to evaluate the impact of psychotherapy on endothelial function is supported by the Stiftung Innovation Rhineland-Palatinate.





The team of the center

Gabriele Gebel, Susanne Wüst, Ilka Brandes, Bärbel Kaesberger (MTAs), Professor Sabine Genth-Zotz, MD (Director), Heike Braun (study coordinator), Frauke Dumstorff, MD, Margit Niethammer, MD (vice Director)

## Center for Clinical Studies

### Structure of the study center

- **Medical Director:**  
Professor Genth-Zotz, MD
- **Vice-Director:**  
Margit Niethammer, MD
- **Medical staff:**  
Frauke Dumstorff, MD  
Dudu Kutlu
- **Study Coordinator:**  
Heike Braun
- **Patient care:**  
Bärbel Kaesberg  
Gabriele Gebel  
Susanne Wuest  
Ilka Brandes

— In the past two decades, significant progress was made in the treatment of cardiovascular diseases, and in particular in the treatment of heart attack and heart failure. This progress was in a large part lead by the development of new pharmaceuticals and medical devices by the research industry and by the implementa-

tion of large clinical studies. The patients who participated in these studies have significantly contributed to this medical progress. By participating in a clinical study they were given the chance to receive innovative new drugs to treat their heart disease and that they receive a thorough follow-up by our highly trained and highly motivated study team. All our staff members receive continuing training and re-training on how to conduct these studies, which are always approved and monitored by ethics committees.

We work as a partner to large international pharmaceutical companies and supervise studies of phase II through IV. The focus of our studies in the cardiac catheterization laboratory is the treatment of acute coronary syndrome as well as studies of anticoagulation in coronary angioplasty and stents implantation. We put particular emphasis on the study of new coated stents. We also support long-term patients with chronic heart failure and cardiac arrhythmias.

In 2009, the study center was involved in the implementation of 31 clinical trials. We included 287 patients in ongoing studies and a total of more than 524 patients are presently followed supervised by our

center. The table in the next page shows recruitment figures witnessing to the success of the group lead by Professor Genth-Zotz, MD and Margit Niethammer, MD.

A special mention must be made to all the patients who agreed to participate in these studies. In order to perform successfully in future clinical trials, we need the cooperation of patient and study participants. With their help, we make our best to improve the quality of the health care provided today and to develop new therapies for the future.

Table of recruiting numbers of the Center for Clinical Studies

Study	Patients recruited	Patients totaly supervised
Cogent	Recruitment finished	4
Benefit	Recruitment finished	2
Certify	Recruitment finished	1
Champion	Recruitment finished	6
Crescendo	Recruitment finished	34
Current	66	71
Efficiancy HF	1	1
OnPaar	33	33
Plato	Recruitment finished	3
Rely	Recruitment finished	32
Aspire	0	1
Averroes	1	4
Excella	6	6
OASIS 8 / Future	38	38
Innovate PCI	12	12
Phönix	25	25
Proency	Recruitment finished	80
Protect	Recruitment finished	2
Rely-Able	13	20
Rocket	3	7
Shift	Recruitment finished	7
Spirit Women	4	4
Warcef	0	6
Zomaxx	Recruitment finished	12
Appraise-2	5	5
DalOutcome	13	13
Improve IT	25	48
Red HF	4	9
Tracer	26	26
Trilogy	10	10
TIMI 38	2	2
<b>total</b>	<b>287</b>	<b>524</b>



The team of the Gutenberg Heart Study under the leadership of Professor Stefan Blankenberg, MD (in the middle, first row)

## Gutenberg Heart Study

— The Gutenberg Heart Study is a major project initiated in the year 2007 by the Department of Medicine 2 of the University Medical Center Mainz.

This project is one of the world's largest studies to explore the risk factors for heart attack, stroke and cardiovascular disease.

The aim is to identify new approaches for the prevention and treatment of cardiovascular diseases, so that the risk to develop these diseases can become more predictable and that the clinical development of new drugs can be optimized.

In addition, the broad-based long-term clinical study may be able to address several other questions, including which factors increase the risk of cancer, eye diseases, diseases of the immune system (body's own defense system) and metabolism (e.g. diabetes, thyroid disorders).

In the 2008 annual report, we presented in detail the scientific background and aims of the Gutenberg Heart Study. In the following pages we would like to explain how this observational study is conceived.

### Participants

— Approximately 16,500 residents of the city of Mainz and the district Mainz-Bingen aged 35-74 years will participate. The potential participants are randomly selected from the residents' lists of the city and individual invitation letters are written and sent by the staff of the Gutenberg Heart Study. Since participants are chosen randomly, they represent well the whole residents' population, and therefore the study results may be transferred to the general population.

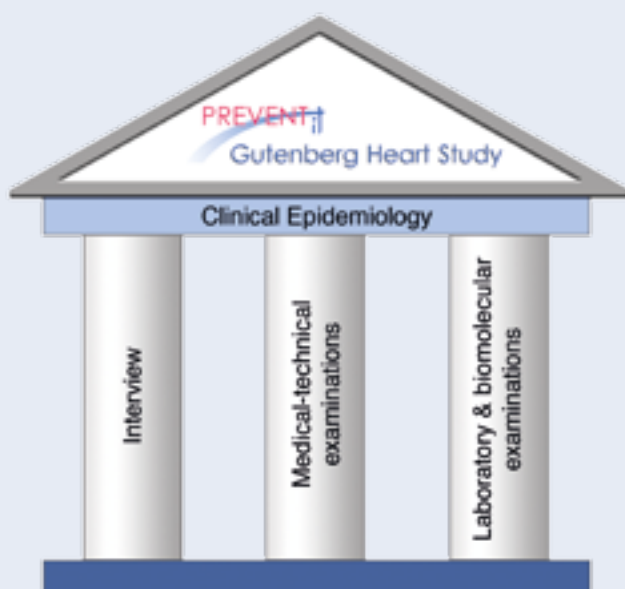
"All those who participate in the study support not only medical research but, more importantly, they provide an important contribution to improving prevention by helping develop faster and more accurate diagnostic tools", said the Minister of Education, Science, Youth and Culture of Rhineland-Palatinate, Doris Ahnen. Clearly, the participation to the study is voluntary.

In the study center, study participants receive a detailed cardiovascular assessment using the latest technology. A follow-up is carried out every 2.5 years through a telephone interview. After 4.5 years, partici-

pants are again invited to the study center and all the investigations which were carried out at the beginning of the study will be repeated.

Each participant will receive, immediately after the end of the investigations, a final report with details on all the results. Participation to the study is obviously free of charge.

The Gutenberg Heart Study benefits from a highly complex intra-university network under the direction of Professor Stefan Blankenberg, MD, and Professor Thomas Münzel, MD, director of the Department of Medicine 2. Collaborations with several institutes are critical to the success of the study.



## Organization of the Gutenberg Heart Study

Epidemiology	Clinic	Laboratory
<ul style="list-style-type: none"> <li>Computer Assisted Personal Interview (CAPI) to collect the patients' medical history</li> <li>Dietary habits questionnaire</li> <li>Mental stress questionnaire</li> <li>Physical activity questionnaire</li> <li>Work stress questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>ECG</li> <li>Blood pressure</li> <li>Echocardiography (2 and 3 dimensional)</li> <li>Ultrasound of the carotid arteries</li> <li>Measurement of the Intima Media thickness</li> <li>Measurement of endothelial function</li> <li>Measurement of lung function</li> </ul>	<ul style="list-style-type: none"> <li>Blood fats</li> <li>Blood sugar</li> <li>Parameters of inflammation</li> <li>Parameters of thyroid function</li> <li>Electrolytes</li> <li>Parameters of kidney and liver function</li> </ul>

The Gutenberg Heart Study benefits from a highly complex intra-university network.

### Leadership and direction Department of Medicine 2

- Professor Stefan Blankenberg, MD
- Professor Thomas Münzel, MD

### Participating Institutions

- Department of Medicine 2
- Institute of Clinical Chemistry and Laboratory Medicine
- Institute for Medical Biometry, Epidemiology and computer science (IMBEI)
- Department of Psychosomatic Medicine and Psychotherapy Augenlinik und Poliklinik
- Department of Ophthalmology
- Several other departments of the University Medical Center Mainz

- All the above institutions are critical to the success of the study. A total of 60 employees work towards the success of this interdisciplinary scientific survey.

The following investigations are carried out:

### Personal interview and survey using questionnaires:

— Using a computer-assisted personal interview, study participants are interviewed with regards to numerous known and suspected risk factors. Questions are asked about medical history, lifestyle (eg diet, physical activity, smoking), potential health stressors in domestic and professional environment, women or male-specific risk factors.

### Resting blood pressure and resting heart rate:

— Blood pressure is measured several times under standardized conditions. Furthermore, the heart rate is recorded at rest.

### Lung function testing:

— The respiratory capacity of the lungs is examined and the carbon monoxide content is measured.

### Assessment of endothelial function using ultrasound of the brachial artery and finger volume pulse analysis (flow-mediated vasodilation):

— The endothelium is the endothelial lining that covers all blood vessels. The measurement of the function of this important tissue can be performed using

ultrasound or pulse volume study of, respectively, the brachial or finger blood vessels. For this, a blood pressure cuff is applied to the upper arm, and the index fingers of both hands are positioned in capsules containing an air cushion. After a 5-minute ischemia of the upper arm determined by inflating the blood pressure cuff, the response of the endothelium of the brachial and finger blood vessels is measured. This endothelial function is considered to be a sensitive early parameter to determine the risk of heart and circulatory diseases.

### Pulse wave analysis:

— Pulse wave analysis, which is measured via an infrared-based noninvasive measure at the level of the finger, provides information about the stiffness and function of large arteries. This investigation is carried out in parallel to the measurement of endothelial function.

### Determination of body size:

— Body measurements (height, weight, etc) are taken.

### Electrocardiogram (ECG):

— Using an ECG, the electrical activity of the heart is measured.





Personal interview



Lung function testing



Assessment of endothelial function

### Peripheral occlusion pressure measurement:

— The leg arteries are examined for circulatory problems. For this purpose, a blood pressure cuff is applied to the lower leg and the blood flow to the leg arteries is measured.

### Ultrasound of the heart / Echocardiography:

— This method can estimate the performance of the heart as well as changes such as an enlargement of the ventricles and a thickening of the heart muscle. These measurements are carried out in two and three dimensions. An initial assessment of the heart valves is also performed. If a serious, previously unknown anomaly is found in the heart valves, an additional investigation is performed.

### Ultrasound of the bifurcation of the carotid artery:

— In this study, the bifurcation of the carotid arteries is measured: the method detects the presence of a narrowing and quantifies the thickness of the vessel wall (intima-media thickness); atherosclerosis and increased blood pressure are the major factors that may lead to a thickening of the vessel wall, which in turn may be associated with an increased risk of stro-

ke. Furthermore, the region is examined with regard to the presence of calcium deposits (plaques).

### Eye exam:

— This includes testing of visual acuity and refractive power of the eyes, an intra-ocular pressure measurement and the determination of corneal thickness. An examination at the slit lamp can reveal a damage to the cornea or on the back of the eye. Furthermore, a screening study of the visual field and a photograph of the fundus are performed. The results of these studies may detect eye diseases, for instance the consequences of high blood pressure or diabetes. At the conclusion, a few tear drops are collected with absorbent paper bags.

### Sample collection, extraction of urine, tears and tooth pocket smear:

— In the study, various body fluids are collected. This includes a venous blood sample, a urine sample, tears and smears from periodontal pockets. From a part of the blood routine laboratory values are obtained to determine cardiovascular risk markers and blood counts. The other part of the blood samples, urine samples, the tears and smears of the tooth pockets are preserved after appropriate treatment in

refrigerators in secured areas of the study center and of the Institute of Clinical Chemistry and Laboratory Medicine for future investigations.

### Implementation of genetic tests

— The genetic studies (determination of DNA and their messenger RNA) on samples of blood and tears will help to discover genes that affect the personal risk of cardiovascular disease (e.g. heart attack or stroke), but also of cancer, of diseases of the immune system (body's own defense system) and of the metabolism (e.g. diabetes - diabetes). Study participants are also asked questions regarding their family history to test for an increased risk for hereditary diseases. If diseases are found, the participants are invited back to a genetic counseling.

### Privacy Policy

— The handling of personal data, the study results, and the biomaterials is in line with the country's Data Protection Act.



Exe exam



Veneous blood sample



Hotline



Discussion of results

**If you have further questions about the study, we will be happy to help.**

**For more information please contact:**

PREVENT-it center for cardiovascular prevention

Langenbeckstraße 1,  
D-55131 Mainz

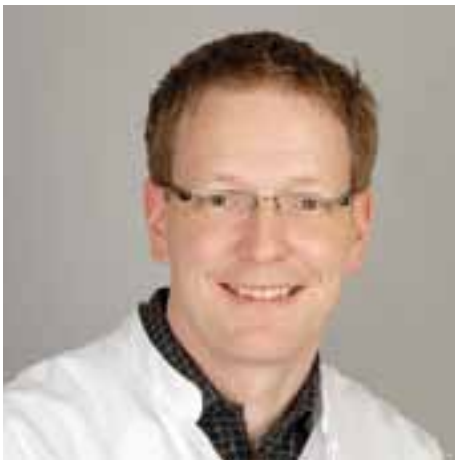
Phone: 0800 / 4450112  
(free from land phones)

Mo – Fr  
10.00 – 12.00 and 14.00 – 20.00

Fax +49 (0) 6131 / 17 – 3403

E-mail: [info@prevent-it.de](mailto:info@prevent-it.de)

# PREVENT



Michael Lauterbach, MD

### Habilitation 2009 Michael Lauterbach, MD

(3. Classified  
Paul-Schölmerich-Prize 2008)

#### Titel of the Habilitation Thesis:

Mechanisms and significance of the interaction between leukocytes and endothelial cells in ischemia and reperfusion injury and diseases induced by immunocomplexes.

#### Title of the Habilitation:

Lecture on the 02.12.2009 on the topic:  
Shock

### Title of Cardiology Specialist in 2009

In 2009, five physicians from the Department of Medicine 2 have obtained the title of specialist:

- **Jörn Fredrik Dopheide, MD:**  
Specialist in Internal Medicine
- **Hanke Mollnau, MD:**  
Specialist in Internal Medicine
- **Nicole Toussaint, MD:**  
Specialist in Internal Medicine
- **Stergios Tzikas, MD:**  
Specialist in Internal Medicine and Cardiology
- **Philipp Wild, MD:**  
Specialist in Internal Medicine

## Promotions 2009

Name	Gebiet	Note	Examiner	Thema
Brinkmann, Henrike	Medicine	cum laude	Professor Thomas Münzel, MD; Sabine Genth-Zotz, MD	Percutaneous coronary intervention in very old patients
Gauer, Markus	Medicine	cum laude	Professor Ludwig Sascha Weilemann, MD; Marc-Alexander von Mach	Intoxication by antidiabetic drugs
Göbel, Sebastian	Medicine	magna cum laude	Professor Thomas Münzel, MD; Professor Andreas Daiber, PhD	Influence of sirolimus on vascular function. The role of vascular oxidative stress, reactive oxygen species and vascular nitric oxide formation
Jagodzinski, Annika Desiree	Medicine	magna cum laude	Professor Thomas Münzel, MD; Professor Christine Espinola-Klein, MD	Significance of endothelial dysfunction in patients with peripheral, arterial occlusive disease
Keßler, Marcel	Medicine	magna cum laude	Sabine Genth-Zotz, MD; Ascan Heinrich Warnholtz, MD	Immune activation in chronic right heart failure due to chronic thromboembolic pulmonary hypertension. A progress monitoring
Manke, Tobias	Medicine	rite	Professor Ulrich Dietz, MD; Professor Harald Darius, MD	Histomorphological effects of intramyocardial Radio frequency ablation. Immediate results and long-term results
Nehring, Claudia Ursula	Medicine	cum laude	Professor Hans-Jürgen Rupprecht, MD; Sabine Genth-Zotz, MD	Natriuretic peptides in mitral valve diseases
Nick, Eva Christina	Medicine	magna cum laude	Ascan Heinrich Warnholtz, MD; Sabine Genth-Zotz, MD	On the influence of clopidogrel and aspirin vs. ASA on flow-dependent dilatation of the brachial artery in patients with coronary heart disease
Osmer, Nicola	Medicine	cum laude	Professor Thomas Münzel, MD; Sabine Genth-Zotz, MD	Invasive coronary diagnostic and therapy as a primary diagnosis in patients with cardiogenic shock
Papazoglou, Panagiota	Dentistry	cum laude	Professor Stefan Blankenberg, MD; Professor Christine Espinola-Klein, MD	The significance of the soluble transferrin receptor for the diagnosis and prognosis of patients with coronary heart disease
Povel, Carl Benedikt	Medicine	magna cum laude	Professor Wolfgang Heinrichs, MD; Sabine Genth-Zotz, MD	Evaluation of the heart catheter simulatory system CATHI (Catheter Instruction System)
Rolfes, Elisabeth-Christina	Medicine	magna cum laude	Professor Helmut Schinzel, MD; Dirk Carsten Peetz, MD	Monitoring coagulation and thrombosis prophylaxis with low molecular weight heparins in pregnant women at high-risk
Schlump, Jan-Ulrich	Medicine	magna cum laude	Georg Horstick, MD; Professor Oliver Kempfski, MD	Ischemia and reperfusion of the heart. Epicardial echocardiography to monitor regional wall motion
Stieber, Fabian Ulrich	Medicine	magna cum laude	Ascan Heinrich Warnholtz, MD; Sabine Genth-Zotz, MD	On the influence of delayed released niacin to the local shear stress of oxygen-induced hyperemia in the brachial artery in patients with coronary heart disease
Thiermann, Yardena	Medicine	magna cum laude	Sabine Genth-Zotz, MD; Ascan Heinrich Warnholtz, MD	Immune activation in patients with chronic right heart failure due to chronic thromboembolic pulmonary hypertension
Tzikas, Stergios	Medicine	magna cum laude	Professor Stefan Blankenberg, MD; Sabine Genth-Zotz, MD	Biomarkers in acute coronary syndromes. Evaluation of multiple biomarkers and point of care testing in the diagnosis and prognosis of acute short time chest pain patients



## Publication Highlights

THE NEW ENGLAND JOURNAL OF MEDICINE

### ORIGINAL ARTICLE

## Sensitive Troponin I Assay in Early Diagnosis of Acute Myocardial Infarction

Till Keller, M.D., Tanja Zeller, Ph.D., Dirk Peetz, M.D., Stergios Tzikas, M.D., Alexander Roth, Ph.D., Ewa Czyz, M.D., Christoph Bickel, M.D., Stephan Baldus, M.D., Ascan Warnholtz, M.D., Meike Fröhlich, M.D., Christoph R. Sinning, M.D., Medea S. Eleftheriadis, Philipp S. Wild, M.D., Renate B. Schnabel, M.D., Edith Lubos, M.D., Nicole Jachmann, Ph.D., Sabine Genth-Zotz, M.D., Felix Post, M.D., Viviane Nicaud, M.A., Laurence Tiret, Ph.D., Karl J. Lackner, M.D., Thomas F. Münzel, M.D., and Stefan Blankenberg, M.D.

## “New England Journal of Medicine”

**The diagnosis of a heart attack is now twice as fast**

**Scientists at the University Medical Center Mainz successfully test new method for early and reliable diagnosis**

— By using a novel method to detect acute myocardial infarction, the diagnosis of a heart attack is now possible in only three hours instead of the usual six. The key is the assessment of the blood levels of the so-called highly sensitive troponin. This is the conclusion reached by scientists from the Department of Medicine 2 and the Institute of Clinical Chemistry and Laboratory Medicine, University Medical Center Mainz who organized a multi-center study with over 1,800 participants. This insight is so groundbreaking for science and patient care that it was published in the 27<sup>th</sup> of August 2009 edition of the New England Journal of Medicine, the world’s most prestigious medical journal. The Chest Pain Unit at the University Medical Center Mainz applies the sensitive troponin test methods already in practice.

Till Keller, MD and the research team used data from over 1,800 patients admitted to our specialized cardiac emergency ward (Chest Pain Unit), to the Bundeswehr Central Hospital Koblenz and to the University Hospital Hamburg -Eppendorf with a suspect of acute myocardial infarction. In addition to standard cardiac care, the blood concentration of the marker troponin was assessed at three and six hours in these patients. This protein, which is slowly released into the blood in the course of an acute heart attack, is an indication of damaged or dead heart muscle cells. The biochemical analysis of blood samples was performed with an established method for troponin detection as well as with a more sensitive troponin assay.

By using this new generation troponin assay, the doctors can have a diagnosis of acute heart attack not only earlier (after three instead of six hours), but also in a

more reliably way than before. Conventional methods of detection prove reliable only six hours after the occurrence of heart attacks.

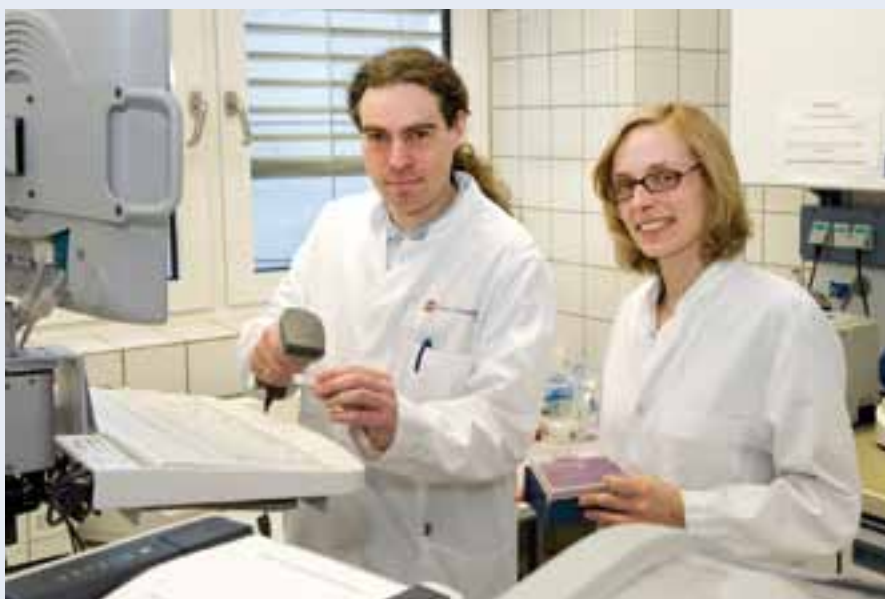
Importantly, an independent multi-center study in Switzerland confirms the results of the Mainz study. The data from this research group were published in parallel in the same journal, highlighting the importance of the results for use in clinical practice. In the Chest Pain Unit of the Department of Medicine 2 of the University Medical Center, the determination by this sensitive troponin test method.

“This new test method allows a rapid and reliable diagnosis of acute myocardial infarction and leads to even more rapid and improved care of those patients who present with suspected heart attack” said lead investigator Professor Stefan Blankenberg, vice Director of the Department of Medicine 2.

“The development of troponin T satisfies a long-awaited need, and the two studies confirm that the improvement of diagnostic methods may translate directly into improvements in patient care” adds Professor Karl Lackner, Director of the Institu-

te of Clinical Chemistry and Laboratory Medicine.

“With the structures of the Chest Pain Unit and the Cardiology Department we offer all patients from Mainz and the surrounding regions state of the art facilities. By using the latest generation of troponin assays, it is now possible to optimize the early diagnosis and treatment even further”, says Professor Thomas Münzel, Director of the Department of Medicine 2.



Till Keller, MD, and Tanja Zeller, PhD,  
two important members of the study team

## Publications list 2009 of the Department of Medicine 2

- 1** Abegunewardene N, Vosseler M, Gori T, Hoffmann N, Schmidt KH, Becker D, Kreitner KF, Petersen SE, Schreiber LM, Horstick G, Munzel T

**Authors of the institution:**  
Abegunewardene N, Vosseler M, Gori T, Schmidt KH, Becker D, Horstick G, Munzel T

Usefulness of MRI to Differentiate Between Temporary and Long-Term Coronary Artery Occlusion in a Minimally Invasive Model of Experimental Myocardial Infarction

CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY. 2009; 32 (5): 1033-1041 Article
- 2** Albert FW, Eichler H, Haubelt H, Loreth R, Matzdorff A, Peetz D, Pindur G, Schinzel H, Seyfert U, Hellstern P

**Authors of the institution:**  
Schinzel H

Haemostatic testing prior to elective surgery? Yes!

Hamostaseologie. 2009; 29 (1): 58-63
- 3** Becker C, Taube C, Bopp T, Becker C, Michel K, Kubach J, Reuter S, Dehzad N, Neurath MF, Reifenberg K, Schneider FJ, Schmitt E, Jonuleit H

**Authors of the institution:**  
Taube C, Reuter S, Dehzad N

Protection from graft-versus-host disease by HIV-1 envelope protein gp120-mediated activation of human CD4(+)CD25(+) regulatory T cells

BLOOD. 2009; 114 (6): 1263-1269 Article
- 4** Benachour H, Zaiou M, Herbeth B, Lambert D, Lamont JV, Pfister M, Siest G, Tired L, Blankenberg S, Fitzgerald PS, Visvikis-Siest S

**Authors of the institution:**  
Blankenberg S

Human formyl peptide receptor 1 (FPR1) c.32C>T SNP is associated with decreased soluble E-selectin levels.

Pharmacogenomics. 2009; 10 (6): 951-9
- 5** Benjamin EJ, Rice KM, Arking DE, Pfeufer A, van Noord C, Smith AV, Schnabel RB, Bis JC, Boerwinkle E, Sinner MF, Dehghan A, Lubitz SA, D'Agostino RB, Lumley T, Ehret GB, Heeringa J, Aspelund T, Newton-Cheh C, Larson MG, Marciante KD, Soliman EZ, Rivadeneira F, Wang TJ, Eiriksdottir G, Levy D, Psaty BM, Li M, Chamberlain AM, Hofman A, Vasan RS, Harris TB, Rotter JI, Kao WHL, Agarwal SK, Stricker BHC, Wang K, Launer LJ, Smith NL, Chakravarti A, Uitterlinden AG, Wolf PA, Sotoodehnia N, Kottgen A, van Duijn CM, Meitinger T, Mueller M, Perz S, Steinbeck G, Wichmann HE, Lunetta KL, Heckbert SR, Gudnason V, Alonso A, Kaab S, Ellinor PT, Witteman JCM

**Authors of the institution:**  
Schnabel RB

Variants in ZFHX3 are associated with atrial fibrillation in individuals of European ancestry

NATURE GENETICS. 2009; 41 (8): 879-881 Article
- 6** Benz PM, Blume C, Seifert S, Wilhelm S, Waschke J, Schuh K, Gertler F, Munzel T, Renne T

**Authors of the institution:**  
Munzel T

Differential VASP phosphorylation controls remodeling of the actin cytoskeleton

JOURNAL OF CELL SCIENCE. 2009; 122 (21): 3954-3965 Article
- 7** Beyer C, Kerz T, Glassl O, Konradi J, Krause C, Mewes T, Pittermann P, Sandstede M, Welschehold S

**Authors of the institution:**  
Sandstede M

Von der Tracheotomie zur Dekanülierung

Shaker-Verlag 1. Aufl. 2009, 109 Seiten
- 8** Breuckmann F, Post F, Erbel R, Munzel T

**Authors of the institution:**  
Breuckmann F, Post F, Munzel T

Acute Thoracic Pain: Chest Pain Unit – the Certification Campaign of the German Society of Cardiology

HERZ. 2009; 34 (3): 218-223 Article
- 9** Breuckmann F, Post F, Erbel R, Münzel T

**Authors of the institution:**  
Post F, Münzel T

Akuter Thoraxschmerz: Chest Pain Unit Gesellschaft für Kardiologie.

Herz. 2009; 34 (3): 218-23
- 10** Connolly SJ, Yusuf S, Camm J, Chrolavicius S, Commerford P, Flather M, Hart RG, Hohnloser SH, Joyner C, Pfeffer M, Gaudin C, Blumenthal M, Marchese C, Pogue J, Hart R, Hohnloser S, Anand I, Arthur H, Avezum A, Budaj A, Ceremuzynski L, De Caterina R, Diaz R, Dorian P, Flaker G, Fox KAA, Franzosi MG, Goldhaber S, Golitsyn S, Granger C, Halon D, Hermosillo A, Hunt D, Jansky P, Karatzas N, Keltai M, Kozan O, Lanas F, Lau P, Le Heuzey JY, Lewis BS, Morais J, Morillo C, Paolasso E, Peters RJ, Pfisterer M, Piegas L, Pipilis A, Sitkei E, Swedberg K, Talajic M, Valentin V, Van Mieghem W, Varigos J, Ameriso S, Atrá M, Avezum A, Berwanger O, Bonilla C, Bornstein N, Budaj A, Chamiec T, Chan YK, Cottin Y, Csiba L, Cybulski J, Czepliel A, De Raedt H, Diaz R, Dvorakova H, Eikelboom J, Ergene O, Fodor G, Galli M, Gardinale E, Golitsyn S, Granger C, Gross B, Goodfield P, Halon D, Happonla O, Healey J, Himbert D, Hunt D, Jacobsson F, Jansky P, Kalvach P, Karatzas N, Keltai M, Kies B, Laine M, Lam A, Le Heuzey JY, Lewis BS, Lewis S, Leys D, Maggioni AP, Massaro A, Mayosi BM, Norrving B, Okay T, Oláh L, Osende JO, Oto A, Peeters A, Penicka M, Perakis A, Piegas L, Pipilis A, Pizzolato G, Rafti F, Renkin J, Siva A, Steg PG, Stockins B, Strozynska E, Swedberg K, Turazza F, Vanderhoven L, Vizek S, Widimsky P,

- Zaborski J, Albers G, Hankey G, Norrving B, Shuaib A, Silva J, Wyse DG, Cairns JA, Gent M, Hirsh J, Marler J, Pritchett E, Wittes J, Beresh H, Floyd L, Gasic Z, Holadyk-Gris I, Lawrence M, Moro I, Perry S, Roberts J, Rodrigues T, Robinson L, Stevens C, Worthy L, Yuan F, Guerrero RAA, Allall O, Amuchastegui LM, Boskis M, Labarta MHB, Castellanos CR, Chiale P, Cuneo CA, Czcczuo A, Gabito AJ, Garrido M, Guzman LA, Hasban EG, Hershson AR, Hominal MA, Krauss JG, Luciardi HL, Marzetti EM, Montana OR, Rabinovich RF, Ramos HR, Sanchez AS, Schygiel PO, Sumay GM, Vogel DR, Zaidman CJ, Aroney GM, Ashby DT, Barlow MA, Cooke P, Cross DB, Fitzpatrick MA, Garrahy P, Karrasch J, Nelson GI, Rees D, Roger SD, Rogers J, Singh BB, Stickland JF, Waites JH, Walsh WF, Eichinger J, Huber K, Leisch F, Boland J, Conraads VM, Cools FJC, De Roy L, El Allaf D, Mairesse GH, Vankelecom B, Abrantes J, Armaganijan D, Atie J, Blacher C, Bodanese LC, Braga JCF, Braile MV, Chaves H, Coelho OR, Cunha CLP, De Lima GG, de Paola AAV, Esteves JP, Francischetti A, Francischetti AE, Lorga-Filho AM, Maia LN, Marcussi DM, Marin-Neto JA, Meneghelo ZM, Rocha RM, Nogueira PR, Oigman W, Paiva M, Precoma DB, Rabelo W, Rabelo A, Rassi S, Rassi A, Reis G, Rossi PR, Neto JMR, Saraiva JK, Sobral-Filho DC, Zimmermann SL, Ashton TA, Bhargava R, Carroll S, Chehayeb R, Connors SP, Constance C, Costi P, Coutu B, Crystal E, Douketis JD, Fortin C, Fox BA, Gupta MK, Krahn AD, Kuritzky R, Kwok K, Leader R, Ma P, Mangat I, Maranda CR, Matangi MF, Moddel G, Mukherjee A, Nawaz S, Palaic M, Pandey AS, Rebane TM, Ruel M, Sapp JL, Senaratne MP, St-Hilaire R, Talbot P, To TB, Vakani M, Weigel MA, Wulffhart Z, Yao L, Zaniol D, Conejeros CR, Corbalan R, Dussailant GR, Escobar E, Hassi ME, Parra CA, Stockins BA, Varleta PE, Berka L, Dedek V, Florian J, Hejhal O, Herold M, Klimsa Z, Kotik I, Simon J, Smetana K, Spinar J, Spinarova L, Tousek F, Husted S, Nielsen T, Pehrson S, Tuxen C, Harjola VP, Huikuri HV, Kettunen RVJ, Melin JH, 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Research grant awardee  
Maïke Knorr, MD

## Grants and Awards

### Foundation Heart of Mainz

#### The Foundation Heart of Mainz finances its first research grant

— **Maïke Knorr, MD** was awarded the first **research grant from the Foundation Heart of Mainz**, consisting of salary support in the amount of 36,000 Euro for one year.

She will work in the Laboratory for Molecular Cardiology of the Department of Medicine 2 under the direction of Professor Daiber pursuing the characterization of the role of inflammatory cells of the myelomonocytic series in the pathogenesis of endothelial and smooth muscle dysfunction in arterial hypertension.



FOUNDATION  
HEART OF MAINZ

### Foundation Heart of Mainz

Its scope is the fight against heart attack and the prevention of cardiovascular diseases as well as any intervention that counteracts the progressive increase in the incidence of these diseases.

This begins with prevention, i.e. the implementation of lifestyle changes and the early diagnosis of diseases, and ends with the improvement of the therapies available for patients who have suffered from an acute myocardial infarction.

Achieving these objectives requires innovative research, a first-class equipment and modern facilities for the training of our doctors. The Foundation Heart of Mainz aims at strengthening the fight against heart attack and other cardiovascular diseases by promoting research and teaching, and fostering the continuous improvement of patient care at the Department of Medicine 2.

The Foundation Heart of Mainz has the following priorities:

- To support pre-clinical and clinical research, for instance the recognition of new causes of atherosclerosis and of new forms of treatment, the prevention of diseases and the promotion of healthy lifestyles with the aim to improve the patients' quality of life
- To improve the diagnosis and treatment of coronary heart disease and its risk factors, of cardiac arrhythmias and peripheral arterial disease
- To award prizes for outstanding achievements in research and clinical care of our patients and to sponsor training grants.





The Margarete-Waitz-Foundation awards doctoral prize to outstanding young scientist  
Jan Kanty Fibich, Florian Bönner, MD, Professor Thomas Münzel, Professor Reinhard Urban

## Margarete-Waitz-Foundation

### The Margarete-Waitz-Foundation awards doctoral prize to outstanding young scientist

— **Florian Bönner, MD** was awarded the 2009 prize of **3,000 Euro** from the 2009 Margarete Waitz Foundation for his doctoral thesis.

In his thesis graded "summa cum laude", F. Bönner, MD addressed the question of whether the use of new inhibitors, so-called "complement C5a receptor antagonists", may reduce, acutely and in long-term studies, the damage induced by heart attacks in a small animal model.

Heart attack is one of the most common diseases and causes of death in western industrialized nations. Although the death rate could be reduced significantly in the last ten years, still many of the patients who survive an acute heart attack suffer from massive long-term consequences. They develop heart failure, caused by a phenomenon called "remodeling", a tissue reconstruction that follows the death of parts of the heart. The work of F. Bönner, MD investigated whether the pharmacological inhibition of the complement system

(C5-component) can reduce the extent of myocardial injury. The study conducted by F. Bönner, MD was extremely complex and detailed. With his research, our understanding of the pathophysiology of myocardial infarction in experimental small animal models has been greatly improved and developed.

Florian Bönner, MD completed his thesis work at the Department of Medicine 2 and is currently an assistant physician at the Department of Cardiology, Pneumology and Angiology, as well as a research associate at the Institute for Heart and circulatory physiology at the University Hospital of the Heinrich-Heine University in Dusseldorf.



Margarete Waitz Research Fellow 2008  
Thomas Jansen, MD

**The 2008 Margarete Waitz Research  
Fellow Dr. Thomas Jansen  
has completed his two-year postdoc.**

— After his year of research at Emory University in Atlanta (USA), Thomas Jansen, MD joined the laboratory of the internationally renowned Professor Thomas Renné, MD at the prestigious Karolinska Institute in Stockholm (Sweden) in Juli 2009.

This laboratory has produced outstanding work in the field of blood coagulation (Factor XII) and researched cell structure proteins (including VASP) clarifying their importance in vascular medicine. In the group of Professor Renné, T. Jansen, MD tested a new monoclonal antibody as a diagnostic marker for metabolic diseases such as diabetes mellitus. With the help of the antibody, metabolic processes specific to the activity of one of the most important key enzymes of the organism (AMPK) could be described in detail.

Thomas Jansen, MD has resumed his job as a researcher in the group of Professor Münzel on 1<sup>st</sup> July 2010 and he will also be clinically active as physician in the Department of Medicine 2.

He will also certainly continue his translational research project in close cooperation with the Karolinska Institute.

**About the Margarete-  
Waitz-Foundation:**

The Margarete-Waitz-Foundation was founded in 2004 from the estate of Margarete Waitz.

The mission of the charitable Foundation whose headquarters are in Mainz is to promote research and patient care at the Department of Medicine 2 of the University Medical Center of the Johannes Gutenberg University of Mainz, and in particular the medical and scientific talent of young physicians.

The Foundation has a capital of 1.4 million Euro and can donate 50,000 Euro annually.

Winners must have received their doctorates from the Department of Medicine 2 and must have given a significant contribution to medical and scientific research.



#### Paul-Schölmerich-Prize for internal medicine 2009

From left to right: Johannes Zipfel, MD, Christine Rückwardt, Frank Weidemann, MD, Professor Christoph Wanner deputizing for the prize winner Florian Custodis, MD, Professor Thomas Münzel

### Paul-Schölmerich-Prize for internal medicine 2009 to Florian Custodis, MD from the Universitätsklinikum Homburg/Saar

— Florian Custodis, MD, 34, from the University Hospital Homburg / Saar is the winner of the 2009 Paul Schölmerich prize for Internal Medicine. The 10,000 Euro prize was awarded to him for his work which helps to explain the role of heart rate in the development of endothelial dysfunction, the first step of atherosclerosis.

The second prize of 1,000 Euro, donated by the Foundation Heart of Mainz, went to Frank Weidemann, MD, 41, of the University of Würzburg. In his award-deserving work F. Weidemann showed that treatment with recombinant alpha-galactosidase benefits patients with Fabry disease particularly if this therapy is initiated before myocardial fibrosis has developed. With the improvement of the morphology and function of the left ventricle, an improvement in the capacity of the patients treated was also observed.

The works of the first and second prize winners appeared both in the major journal in the field of cardiology, *Circulation*.

The third prize of 1,000 Euro, donated by the German-Romanian Academy, rewarded the work of Mihaela Grecu, MD, of Iasi in Romania, 39. M. Grecu, MD demonstrated that among patients with AV node reentry tachycardia, those older than 65 years have longer AV nodal conduction time and refractory period. This may explain why these patients develop this type of arrhythmia only when being older.

### The German-Romanian Academy

The Department of Medical Sciences of the German-Romanian Academy, under the direction of Professor Münzel, awards the Paul Schölmerich prize for clinical or experimental work in the field of internal medicine and intensive care.

The prize was first awarded in 2007. The prize honors the German-Romanian Professor Paul Schölmerich, former director of the Department of Medicine 2, University Medical Center of the Johannes Gutenberg University Mainz, one of the leaders of internal medicine in Germany.

The German-Romanian Academy is an international forum for science, ethics, theology, literature and art, based in Mainz. The aim of the nonprofit organization is to promote science, culture and international understanding and the establishment of scientific, cultural and spiritual links between Germany and Romania.



The „D Runner 2009“ and their medical and sports coaches

1<sup>st</sup> from left Felix Post, MD, Harald Schmid, MD, second from left and Kathrin Stelzer, MD, third from right

# Prevention

## D-RUN – the run towards a new lifestyle

### The Department of Medicine 2 supports a unique project

— What the ten participants in the Internet-docu-soap „D-Run 2009“ in December 2008 considered virtually unimaginable became reality on 10<sup>th</sup> May 2009: they have successfully completed the half distance of the Novo Nordisk Gutenberg Marathon – on top of that, they did it despite their diabetes and although they were totally untrained only a few months before.

The so-called „D-runners“ are the protagonists of a unique project for health education focused on diabetes and the prevention of its consequences, such as severe cardiovascular disease.

The long-term goal of „D-Run“ is to help people who have diabetes improve their lives forever. According to the initiators of the project, a campaign aimed at raising awareness among the general population for the disease diabetes mellitus is an important part of this task. The short-term, but nonetheless ambitious goal of the project was to bring unfit individuals affected

by diabetes in the condition to run the Mainz Half Marathon – and this in only four months.

The University Medical Center Mainz provided support to the participants in their preparation. Felix Post, MD, a specialist in internal medicine, cardiology and critical care at the Department of Medicine 2, examined the participants thoroughly and checked their tolerance to exercise at the beginning of the project. All the D-runners started training together. „Diabetics should not just run a marathon without being prepared. But sports and diabetes – that is no contradiction“ said Professor Thomas Münzel, Director of the Department of Medicine 2 of the University Medical Center Mainz, and continued: „It is important for us to show how sport and prevention may dramatically change the prospects of the patients. An active lifestyle helps to avoid the late complications of diabetes and thus improves the quality of life“.

The Internet docu-soap „D-Run“, which can be found under [www.d-run.de](http://www.d-run.de), shows how ten people with diabetes succeed in positively changing their life by changing their lifestyle. Even before the marathon, the D-runner show was a medical success,

as three of them could quit insulin therapy. The documentary series, which received the Health Media Award 2009, also provided information about dealing with diabetes and gave important information that this type of patients have to care about.

That all D-runners could complete the half-marathon was a great result, only surpassed by the fact that all participants kept faith to their healthy lifestyle thereafter. This success was the result of a great team work of all D-run organizers, among which was Harald Schmid, several times European champion in hurdles and Sports Director of D-run. In 2010, we will be more and more motivated!








# Activities



Date	Activity	Talks
20.01.2009	<b>Hot Topics in Cardiology and Cardiac Surgery</b>  Supported by Boehringer Ingelheim	<ul style="list-style-type: none"> <li>■ The "Heart network Mainz" – words or substance?</li> <li>■ Hotline. New study findings. Gutenberg Heart Study</li> <li>■ Modern therapy of atrial fibrillation</li> <li>■ Percutaneous aortic valve implantation – the surgeon's view</li> <li>■ Percutaneous aortic valve implantation – the cardiologist's view</li> </ul>
11.02.2009	<b>Symposium</b> <b>"Cardiology in the elderly"</b>  Supported by several industries	<ul style="list-style-type: none"> <li>■ Coronary interventions in the elderly – do we need drug eluting stents?</li> <li>■ Therapy of arrhythmias in the elderly – which medications and which pacemakers?</li> <li>■ Transcatheter ablation in the elderly: only AV-nodal ablation?</li> <li>■ Heart failure medications: how much is too much?</li> </ul>
21.03.2009	<b>XX. MAINZ SYMPOSIUM FOR ANGIOLOGISTICS</b> <b>"Modern aspects of peripheral arterial disease"</b>  Supported by several industries	Symptoms and Diagnostic tools <ul style="list-style-type: none"> <li>■ Looking back at 20 years of Mainz Symposia</li> <li>■ Symptoms und diagnosis in Angiology</li> <li>■ The diabetic foot</li> <li>■ Diagnostics in radiology</li> </ul> Chances and limits of modern therapy <ul style="list-style-type: none"> <li>■ Conservative therapy</li> <li>■ Interventional therapy</li> <li>■ Surgery</li> <li>■ Discussion of cases</li> </ul>
10.06.2009	<b>Symposium</b> <b>"Cardiology between routine and innovation"</b>  Supported by Novartis	<ul style="list-style-type: none"> <li>■ From research to clinic – News from the Department of Medicine 2</li> <li>■ New concepts on arterial hypertension: drugs, combinations, vaccine?</li> <li>■ Opportunities and limits of biomarkers in cardiology</li> <li>■ Does prevention save money?</li> <li>■ Therapy of left main coronary stenoses and multivessel disease: stents versus surgery</li> </ul>
05.12.2009	<b>Symposium</b> <b>Update in Cardiology: heart rate and coronary artery disease</b>  Supported by Boehringer Ingelheim	<ul style="list-style-type: none"> <li>■ Significance of hypertension in everyday clinical routine</li> <li>■ Sleep apnea syndrome</li> <li>■ Organ protection</li> <li>■ Psychological aspects of arterial hypertension</li> <li>■ New drugs in the treatment of hypertension: indication for non-responders</li> </ul>
Every 2 month	<b>Angiologic meeting</b>	<ul style="list-style-type: none"> <li>■ 1 – 2 Titles each time</li> </ul>

## Activities – Foundation Heart of Mainz 2009

Date	Activity	Title
21.03.2009	<b>ISB-Fundraising dinner</b>	
May – July 2009	CPU-Awareness campaign <b>“Fight together against chest pain”</b>	<ul style="list-style-type: none"> <li>■ Awareness campaign in cooperation with the 1. FSV Mainz 05</li> </ul>
08.05.2009	<b>Open doors lectures for patients</b>	<ul style="list-style-type: none"> <li>■ Update on new therapies and diagnostic modalities</li> </ul>
07.07.2009	<b>Infostand at the Mainz railway station within the “Women’s Health Initiative”</b>	<ul style="list-style-type: none"> <li>■ Mainz Chest Pain Unit (CPU)</li> <li>■ Cardiovascular diseases in women</li> </ul>
29.08.2009	<b>Infostand at the MVB-investors’ fair 2009</b>	
21.11.2009	<b>Open doors event for patients “Heart failure”</b>  In cooperation with the German Heart Foundation	<ul style="list-style-type: none"> <li>■ News from the Department of Medicine 2 and from the American Heart Congress Conference</li> <li>■ Diagnosis and therapy of heart failure</li> <li>■ What ist the connection between heart valve diseases and heart failure?</li> <li>■ Atrial fibrillation: a cause of heart failure?</li> </ul>
25.11.2009	<b>Fundraising dinner</b>	
November 2009	<b>Auction of Udo Lindenberg’s “No panic in Mainz”</b>	





## Information Campaign 2009 – Chest Pain Unit

### Together, against chest pain

The University Medical Center Mainz, the 1. FSV Mainz 05 and Boehringer Ingelheim start another public awareness campaign against heart attacks.

Heart attack, stroke and heart disease: cardiovascular diseases are still the first cause of death in Germany. About 40% of patients who suffer a heart attack die before they can reach the hospital. The main reason is that many patients are ashamed to alert a medical emergency: too much time is lost between the appearance of symptoms and the decision to call an ambulance.

Another focus of the campaign is to emphasize the fact that symptoms of heart disease can be radically different in women as compared to men. Women and older patients often do not have the classic angina pectoris – located in the chest, radiating to the neck or left arm – rather, they feel atypical symptoms such as shortness of breath, abdominal pain or sweating. A wrong assessment of these complaints often causes significant delays.

To improve this situation, it is especially important to inform everybody about what to do when an emergency occurs: in the case of a heart attack, every minute counts. “Time is heart muscle”. Therefore, the Department of Medicine 2 of the University Medical Center Mainz, the 1. FSV Mainz 05 and the Boehringer Ingelheim Pharma GmbH & Co, together with the Foundation Heart of Mainz, participated actively to the regional initiative Women’s Health organized by the State Rhineland-Palatinate, by the German Heart Foundation, by the German Society of Cardiology and by the Cardiopractice Mainz. This campaign, which originally started in 2007, puts the spotlight every year on new, equally important topics. “Joined offensive against heart attacks “: the 2009 campaign aims at shortening the time that is lost between onset of symptoms and the decision to contact the emergency medical services.

In line with this concept, the Department of Medicine 2 was one of the first university clinics in Germany to open a Chest Pain Unit in 2005. The Mainz CPU is designed to provide patients with acute chest pain rapid and efficient care in order to shorten the time interval before a diagnosis is made. Since it is an emergency

department, patients need to no referral by the home physician to come at any time – day or night – to the Chest Pain Unit.

This issue is also important to our cooperation partners. The contribution of the 1. FSV Mainz 05 in this education campaign was extremely effective in ensuring that people understand how important it is to respond quickly and adequately in case of emergency – thus saving their own lives or that of their relatives. The Mainz Chest Pain Unit has become an important reference in Mainz and a stronghold in regional medical care. Education on health issues is also a central theme for Boehringer Ingelheim. The Ingelheim Company takes risk awareness and knowledge campaigns particularly at heart and has supported many activities against heart attacks in the past years.

During the campaign, three different themes were advertised: the titles were “offensive against chest pain“, “long-term success is predictable – even in the case of heart attacks” and “Women’s hearts are different – also during heart attacks“. Posters were visible from May to July 2009 on buses and trains in the area of Mainz, and large-format banners covered the facade of the main station.

## Offensiv gegen den Brustschmerz...



Foto: Peter Nitzsche

Der 5 B-Sturm ist die 1 A-Lösung für die Bundesliga!

Suchen Sie bei Beschwerden umgehend die **Chest Pain Unit (Brustschmerzeinheit)** der Universitätsmedizin Mainz auf. Sie hat rund um die Uhr, 7 Tage die Woche geöffnet.

**NOTRUF: 112**

93% aller überlebenden Herzinfarktpatienten zögern über eine Stunde, bevor sie einen Arzt kontaktierten.

Eine gemeinsame

## Langfristiger Erfolg ist planbar ... ... auch beim **Herzinfarkt!**



Suchen Sie bei Beschwerden umgehend die **Chest Pain Unit (Brustschmerzeinheit)** der Universitätsmedizin Mainz auf. Sie hat rund um die Uhr, 7 Tage die Woche geöffnet.

**NOTRUF: 112**

Häufig sterben Menschen am Herzinfarkt, vor allem an dessen Folgeerkrankungen. Nach einem Herzinfarkt ist es wichtig, frühzeitig langfristige Therapieziele zu vereinbaren.

Harald Strutz  
Präsident des 1. FSV Mainz 05



## Frauenherzen schlagen anders...

... auch beim **Herzinfarkt!**



Foto: Peter Nitzsche

Suchen Sie bei Beschwerden umgehend die **Chest Pain Unit (Brustschmerzeinheit)** der Universitätsmedizin Mainz auf. Sie hat rund um die Uhr, 7 Tage die Woche geöffnet.

**NOTRUF: 112**

Die meisten Frauen sterben am Herzinfarkt. Die Alarmzeichen sind andere als bei Männern. Es treten atypische Beschwerden wie **Schweißausbruch, Atemnot oder auch Oberbauchschmerzen** auf.

Brigitte van Essen  
Landesinitiative Frauengesundheit Rheinland-Pfalz

Eine gemeinsame Gesundheitsinitiative von:



The Annual Report  
of the Department of Medicine 2  
has been supported by



## Acknowledgement

## Imprint

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■ **Editor**

Barbara Reinke

■ **Titel design**

Margot Neuser

■ **Graphics**

Margot Neuser  
Abbott Vascular Deutschland GmbH  
(Title, Page 36)

■ **Photos**

Barbara Hof-Barocke  
Anne Keuchel  
Peter Pulkowski  
Abbott Vascular Deutschland GmbH  
(Title, page 36)  
New England Journal of Medicine  
Allgemeine Zeitung Mainz  
Mainzer Rhein-Zeitung

■ **Layout**

Creative Graphics  
Heike Oswald Medien, Satz & Druck  
Am Polygon 3 – 5  
55120 Mainz

We thank all authors and contributors to  
the Annual Report 2009.



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By supporting the **FOUNDATION HEART OF MAINZ** you will have a direct impact on saving lives and improving the quality of life for those affected.

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FOUNDATION  
HEART OF MAINZ

Dear all,

Each year about 300,000 people in Germany suffer a heart attack and roughly 65,000 of them die. Experts forecast that this number will double by the year 2025.

The mission of the **FOUNDATION HEART OF MAINZ** is the timely diagnosis and effective treatment of heart attacks and the early stages of other cardiovascular diseases, in order to counteract to projected rise in these diseases.

This begins with the prevention of and screening for these diseases and ends with the optimal care of those who have suffered an acute heart attack.

These goals can only be realized through intensive research, state-of-the-art equipment and first class education of our medical team. In order to overcome these challenges, we need your financial support.



Sincerely

*H. Hünzel*

Head, Department of Medicine 2  
Mainz University Medical Center

The objective of **FOUNDATION HEART OF MAINZ** is the early detection and effective treatment of myocardial infarction and the early stages of other heart diseases in order to counteract the predicted increase in these disorders. The foundation, founded in 2007, supports research and teaching and continuous improvement of patient care at the Department of Medicine 2.

The **FOUNDATION HEART OF MAINZ** has the following focus to

- do preclinical and clinical research: e.g. recognizing the causes of arteriosclerosis and developing new forms of therapy,
- support the disease with the aim of improving the quality of life,
- optimize the diagnosis and treatment of coronary heart disease (CHD) and its risk factors, cardiac arrhythmia and peripheral arterial occlusion (PAOD),
- award prizes for outstanding achievements in research and in the clinical care of our patients,
- establish foreign scholarships.





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of Medicine



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