

Präzisionsmedizin der Zukunft in Wien

Christoph J. Binder

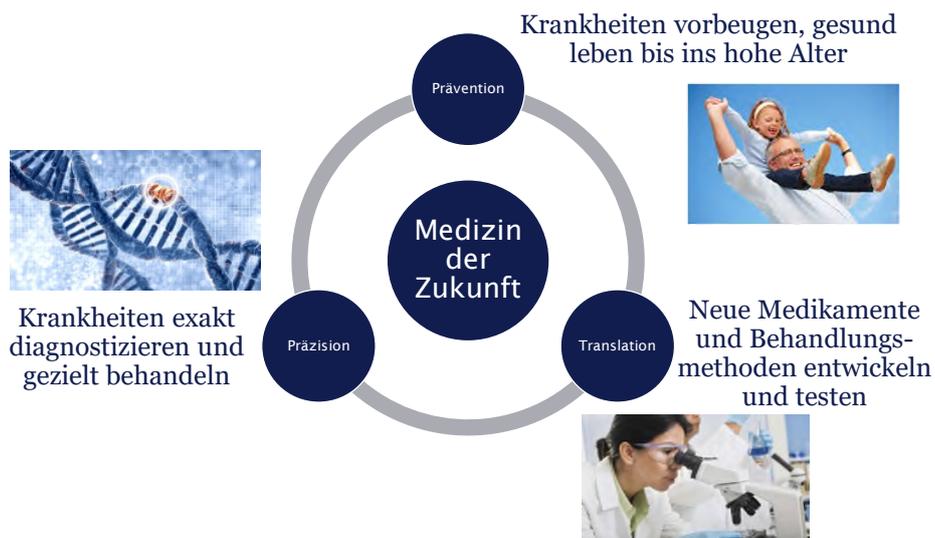
Austrian Life Science Day 2023

9.5.2023



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Die Medizin der Zukunft gestalten



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Wiener Medizinische Schule: Erbe & Verpflichtung



Karl Landsteiner:
Entdeckung der
Blutgruppen macht
Transfusionen sicher

Ignaz Semmelweis: Hygiene beugt
Infektionen vor und rettet Leben



Prävention

Medizin
der
Zukunft

Präzision

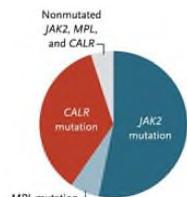
Translation

Theodor Billroth:
Meilensteine der
Chirurgie



Aktuelle Forschungserfolge der MedUni Wien

Entdeckung des
„fehlenden“ Gens
für eine Form von
Blutkrebs (MPN)



Publikation: Klampfl
et al. 2013 NEJM

Entwicklung eines Impfstoffes
für die Vogelgrippe



Publikation: Ehrlich
et al. 2008 NEJM

Baxter

Prävention

Medizin
der
Zukunft

Präzision

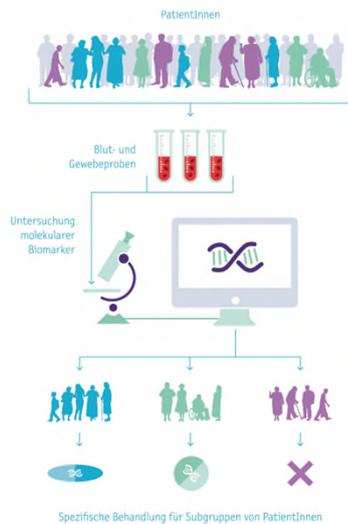
Translation

Gedanken-
gesteuerte
Prothesen



ottobock.

Wie die Medizin der Zukunft funktioniert



Präzisionsmedizin

Jeder Patient und jede Patientin ist individuell und unterschiedlich

- **Genetische Voraussetzungen**
- **Ausprägung einer Erkrankung**
- **Therapie-Erfolg und Nebenwirkungen**

Molekulare Analysen führen zu hochpräzisen Diagnosen

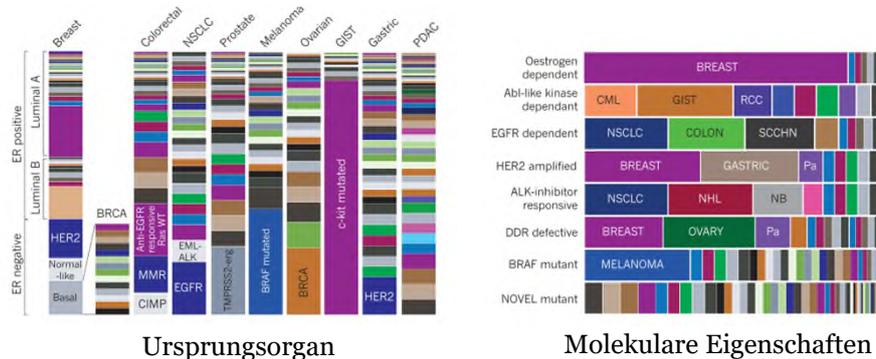
- **Genom/Proteom/Metabolom-Analysen**
- **Hochauflösende Bildgebung**
- **Systembiologie, Bioinformatik, Big Data**

PatientInnen werden mit individuell auf sie zugeschnittenen Therapie behandelt

- **Personalisierte Kombinationstherapien**
- **Individuelles Medikamenten-Screening**

Präzisionsmedizin in der Onkologie

Neue Klassifizierung von Tumoren – präzisere Behandlung



Biancin et al. (2015) Nature

Neue Technologien ermöglichen umfassende Genom-Analysen

Computer-Technologie



1979



heute

Wer besitzt/benötigt Computer?

- 1960s: Forschungsinstitute
- 1970s: Universitäten und Banken
- 1980s: Schulen und Unternehmen
- 2020: Fast jede(r) und jederzeit

Genom-Sequenzierung



2006



heute

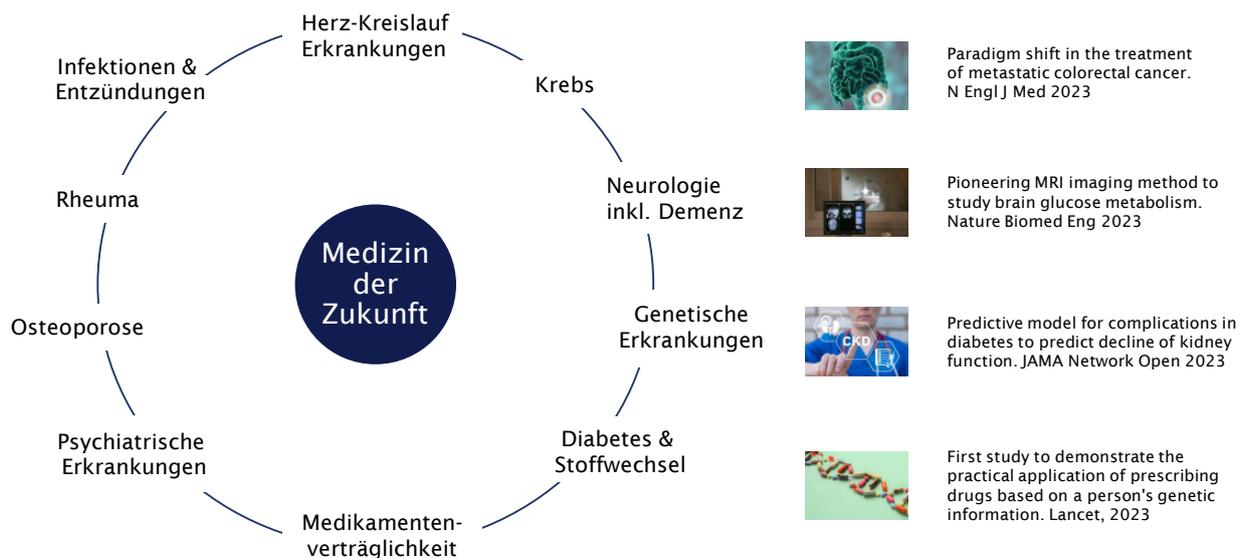
Wessen Genom wurde sequenziert?

- 1996: Das erste Bakterium (E. coli)
- 2001: Das menschliche Referenz-Genom
- 2007: Erste persönliche Genome
- 2017: Viele tausend persönliche Genome

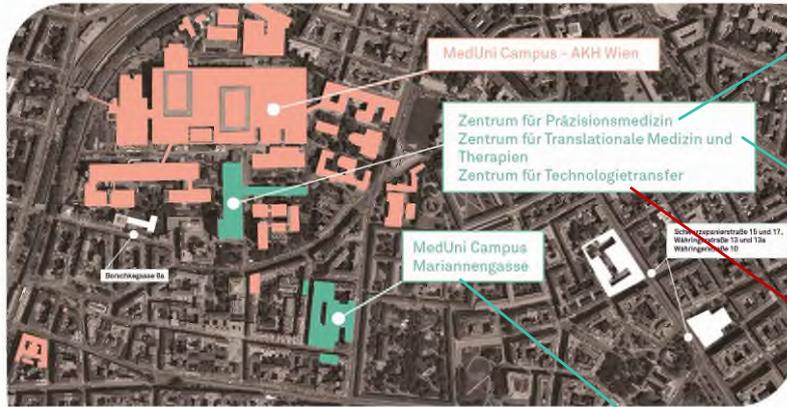


DNA-Sequenzierung und IT als Schlüsseltechnologien der Präzisionsmedizin

Wen betrifft die Medizin der Zukunft?



Neue Zentren am AKH Campus



Eric Kandel Institut
Zentrum für Präzisionsmedizin CPM
 Finanzierung: EU
 ca. 5.000 m² (6110 m²)

Zentrum für Translationalen Medizin CTM
 Finanzierung: Bund + Stadt Wien
 ca. 14.100 m²

Anna Spiegel II
 Finanzierung: Bund + Stadt Wien
 ca. 1.900 m²

Zentrum für Technologietransfer
 Private Finanzierung: PPP
 ca. 7.000 m²

MedUni Campus Mariannengasse
 Finanzierung: Bund
 ca. 35.000 m²

Ignaz Semmelweis Institut
 Finanzierung: Bund

Der Bauplatz





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Eric Kandel Institut - Zentrum für Präzisionsmedizin (CPM)

~5.000 m² Nutzfläche (6.110) ca. 250 Mitarbeiter:innen



- Projektbezogene Forschungsflächen (1750 m²)
- Computational Biomedicine, inkl. Anbindung an Hochleistungs-Rechenzentrum (560 m²)
- Technologieplattformen & neue Technologien (510 m²)
- Maus Phenotyping Units (470m²)
- Biobank (500 m²)
- Besprechungs-, Kommunikations- und Interaktionsräume



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Master Program in Molecular Precision Medicine



Master's Programme Molecular Precision Medicine

The master's degree programme in Molecular Precision Medicine is a joint programme of the Medical University of Vienna and the University of Vienna. The programme is dedicated to a molecular and mechanistic understanding of human disease and its treatment.

The course brings basic, translational and clinical scientists together with doctors to educate students in the opportunities, challenges and future perspectives of precision medicine.

Career Opportunities

The Master's programme in Molecular Precision Medicine will qualify you to pursue a career in basic, clinical or translational biomedical research, equipped with a deep molecular and mechanistic understanding of human disease.

This flagship programme is designed to provide a rigorous training in bioinformatics that will also allow you to pursue a career in data science. You will learn about target identification, drug development and the clinical evaluation of therapeutics, acquiring skills that will enable you to bridge the gap between the bench and the clinic.

Finally, you will be confronted with the ethical and socio-economic issues associated with the practice of precision medicine.

Our goal is to train the next generation of scientific leaders in the field of molecular precision medicine. We are looking forward to your application!

MEDICAL UNIVERSITY OF VIENNA

Master's Programme Molecular Precision Medicine

From bench to bedside

www.medunivien.ac.at/en/master-mpm

Course Structure

MPM1: Chromosome, Gene and Defective DNA Repair Disorders
In this module, you will develop a deep and mechanistic understanding of how DNA is faithfully replicated and repaired, how and where lesions typically arise and how they cause disease.

MPM2: Diseases of Proteostasis
Defects in protein quality control are manifested in many diseases. This module covers protein folding, quality control, trafficking and turnover, alongside novel therapeutic strategies.

MPM3: Diseases of Enzymatic Insufficiency
Many diseases are the result of enzymatic insufficiency. This module will develop a deep and mechanistic understanding of enzyme function and pathological dysfunction, including therapeutic strategies.

MPM4: Diseases of Pathological Signal Transduction
Pathological signal transduction leads to many diseases, including cancer. This module covers signal transduction mechanisms, the consequences of pathogenic lesions and therapeutic treatment avenues.



MPM5: Diseases of the Immune System
Many diseases result from failures in our body's defense mechanisms. This module examines immune diseases as well as emerging concepts in harnessing our immune system for the treatment of disease.

MPM6: Biomedical Informatics and Genomic Medicine
Molecular precision medicine requires the high-throughput profiling of genomic data. In this module, you will develop the computational skills and knowledge to interrogate these large data sets.

MPM7: From Bench to Bedside
All therapeutics trace their origins to basic discoveries in biology. In this module, you will learn how basic research is translated into therapeutics that are administered in the clinic.

MPM8: Free Elective Course
You will have the opportunity to gain practical lab experience in a participating basic or clinical research lab. Alternatively, you may elect to take courses from other approved Master's programmes.

MPM9: Ethics, Policy, Legislation and Health Economics
Precision medicine raises a multitude of ethical, policy, legislative, economic and value judgement issues. This module confronts you with these problems and prepares you to critically evaluate them.



Admission Requirements

Completed bachelor's degree in the biological sciences or medicine from an accredited university or higher education establishment.
Basic knowledge and competencies in molecular biology.
Working knowledge of English (B2 level, Common European Framework of Reference).

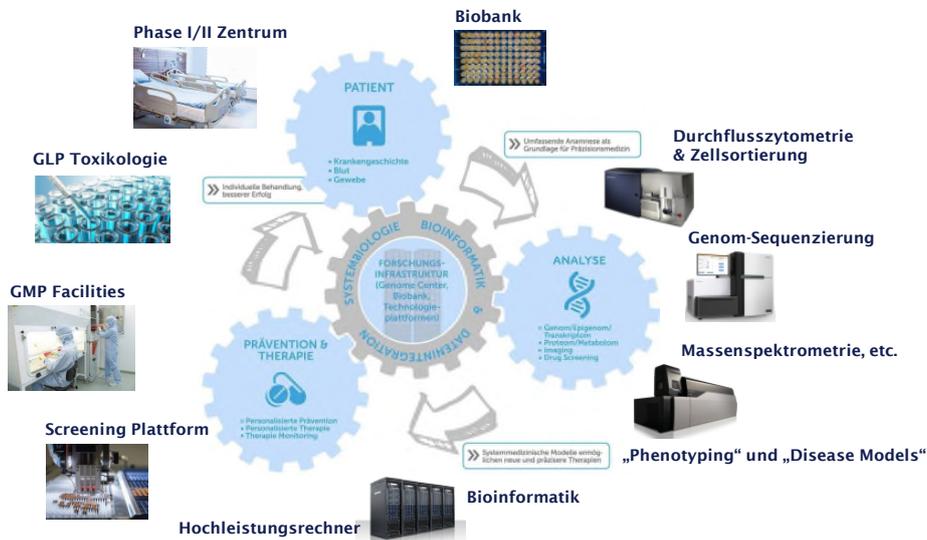
Admissions Procedure

A written application must be submitted online.
For more information see www.medunivien.ac.at/en/master-mpm



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Enge Verbindung zwischen CPM und CTM



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Zentrum für Translationale Medizin (CTM)

~14.100 m² Nutzfläche, ca. 400 Mitarbeiter:innen



- **Klinisches Phase I/II Zentrum** (22+12 Betten)
- **Core Facilities, Screeningplattform, Biobank** (2130m²)
- **Bioinformatik** (600m²)
- **GMP Unit - Radiopharmacy**
- **GMP Unit - Biologics** (840m²)
- **GMP Unit - Cell Therapy**
- **GLP Toxikologie** Labors *in vitro* & *in vivo*
- **Mausfacility** (incl. imaging & germ-free)
- **Projektbezogene Forschungsflächen** (3200m²)
- Besprechungs- und Seminarräume
- Kommunikations- und Interaktionsräume
- **Hörsaal & Seminarräume** (750 + 630 Personen)

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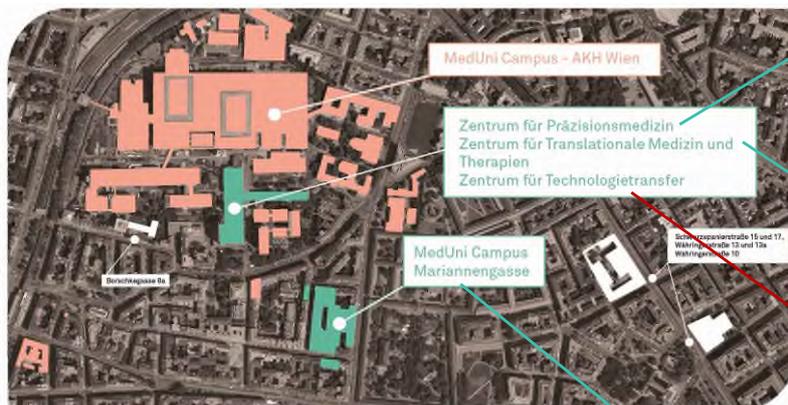
Zentrum für Translationale Medizin (CTM)



Zentrum für Translationale Medizin (CTM)



Neue Zentren am AKH Campus



- Finanzierung sichergestellt
- Finanzierung offen bzw. in Planung

<https://bauprojekte.meduniwien.ac.at>

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