"EYES Observership Program"

Routine and Research Labs & Outpatient Clinics - Methods established at the Division of Endocrinology and Diabetology, Department of Internal Medicine and the Endocrinology Lab Platform, including the Department of Obstetrics and Gynaecology Medical University Graz, Austria - Overview 2024

Clinical phenotyping

Some participation in clinical patient workup will be possible via the outpatient clinics of the Division of Endocrinology and Diabetology, where about 10.000 patients are seen per year in the Endocrinology and as well in the Diabetology Outpatient clinics with a large variety of common and rare diseases, as well as endocrine and diabetological function tests, measured in our lab. In the outpatient clinics as well as on the division's ward, we use "lean management" aspects for our organisation. In addition, many clinical studies are conducted every year including specific diabetes tools and endocrine or osteologic pharmacological interventions.

Clinical routine laboratory and imaging

We have and established large routine/research endocrine laboratory named the "Endocrinology Lab Platform" – here, about 500k analyses are performed per year including all kinds of hormones, biomarkers of bone and metabolism, andrology as well as research assays. Measurements are done by ELISA, EIA, CLIA, RIA, GC-MS and microscopical techniques by specialised technicians and researchers. Further, bone biopsies and histomorphometry of bone tissue is done in rare cases.

Clinical and research Imaging

The Division of Endocrinology and Diabetology is equipped with a Lunar iDXA (GE HealthCare) for high resolution dual x-ray absorptiometry measurements of bone. We perform clinical standard evaluations, but the DXA is also used for research purposes, TBS and lateral vertebral spine evaluation. Body composition can be measured alongside bone parameters to get a more holistic picture of the metabolic and osteologic status of a patient.

Further, an Xtreme CT II (SCANCO), a high-resolution peripheral quantitative CT-scanner of the seconds generation. With this HRpQCT, we are able to scan with a resolution of > 58 µm, which allows for the assessment of trabecular and cortical parameters for clinical questions as well as for research purposes.

Ultrasound imaging is done routinely in the outpatient clinics as well as on the ward of the Division of Endocrinology and Diabetology every day e.g. for thyroid or other diagnostics.

Research - SNP Genotyping (TaqMan 5´Exonuclease Assay)
Single nucleotide polymorphisms (SNPs) are the most frequently occurring genetic variations in the human genome, with the total number of SNPs reported in public SNP databases currently exceeding more than 650 million rs records. In our lab, SNPs within the coding regions of a gene are analysed for research purposes and serve as biological markers for inheritance of specific loci.

Research - Gene Expression (TaqMan Gene Expression Assays)
There is abundant variation in gene expression between individuals, populations, and species. Phenotypes arise form a complex interaction of the genome and various environmental factors. Regulation of gene expression takes place at different levels of modifications such as epigenetic, transcriptional, posttranscriptional, translational and post-translational protein modifications. Measuring gene expression is done in our lab for a better understanding of biological processes and their regulation. Identifying the regulation of candidate genes can provide potential biomarker information for diagnosing, monitoring, and treating endocrine and other diseases.

Research - miRNA Analysis (LNA-enhanced miRNA qPCR)
Micro RNAs (miRNAs) are small non-coding RNA molecules that mediate post-transcriptional gene regulation. Changes in miRNA expression have been associated with various diseases, including cancer, and metabolic diseases such as diabetes and fertility disorders. One important area of current miRNA research involves the assessment of systemic miRNA profiles present in serum or plasma samples. The identification of miRNAs associated with specific diseases is performed in order to develop diagnostic biomarkers and potentially monitor disease progression. However, the low abundance, short sequences and high similarities make miRNA detection challenging.

Research - Protein expression and NGS
Protein expression from tissue can be routinely assessed by western blot in our lab. For proteomics, a dedicated core facility is providing mass spectroscopy services at the center for medical research (ZMF) of the Medical University Graz. There is also an established cooperation for NGS technologies including microbiome characterisation techniques and genetic sequencing approaches.

Research - Animal modelling
Depending on the time of the visit, it may be possible to participate in animal experiments as an observer or actively by prior arrangement. If you are interested in working on rodent or larger animal models, please contact us in good time.

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