New approaches in the characterization of polycystic ovary syndrome (PCOS)

Summary

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Supervisor:	Prof. Dr. Barbara Obermayer-Pietsch
Availability:	This position is available.
Offered by:	Medical University of Graz
Application deadline:	Applications are accepted between March 24, 2021 00:00 and May 05, 2021 23:59 (Europe/Zurich)

Description

Background:

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women, with a frequency fo 10-20% in women worldwide (!) depending on the definition (Rotterdam consensus in 2003) (1). A wide spectrum of possible phenotypes, symptoms and sequelae are based on at least two out of three criteria: clinical or biochemical hyperandrogenism, oligo- or amenorrhea and/or polycystic ovarian morphology. Importantly, many women are predisposed to other comorbidities or consecutive diseases, including insulin resistance, with a high risk for the development of gestational diabetes or diabetes mellitus type 2, low grade inflammation as well as dyslipidemia and obesity (2).

As the pathophysiological background of PCOS has not been fully elucidated, we pursue several approaches in the complex characterization of this important clinical constellation, which is of utmost interest for the affected women and their families. Interestingly, there is also a "male" part of PCOS, where first line relatives of PCOS women have also a distinct phenotype including the expression of higher androgen levels (3) and metabolic syndrome, which is important to be further investigated.

By using new microbiome techniques, genetics and specific hormonal analyses (4), we were already able to describe many diversities in PCOS, e.g. isoflavone metabolism and androgen patterns (2). These panels may be used as potential diagnostic and monitoring tools for PCOS conditions and might also improve hormonal and metabolic control in patients during adolescence and adulthood.

In a prospective clinical trial, the EU project SPIOMET4HEALTH on new therapeutic approaches in PCOS, starting in 2021 and several local large cross-sectional and longitudinal PCOS cohorts, biobanking and full phenotyping we have the opportunity for a closer look at the complex background and intervention potential in this important condition.

Hypothesis and Objectives:

It has been shown that measurements of hormonal, genetic and microbiome markers such as isoflavones and specific androgens may help to improve individual PCOS diagnostics. We aim to develop a new panel of analyses to characterize hormonal, genetic and metabolic profiles in PCOS women in cooperation with the EU project SPIOMET4HEALTH and our ongoing local PCOS study cohorts. We will evaluate mass-spec-, genotyping- and metagenomics-based measurements in prospective and existing biobanking cohorts including baseline and follow-up based on intensified phenotyping. Specific clinical validation will be assessed using these potential biomarkers including up-to-date technologies within European partner institutions and the Endocrinology Lab Platform in Graz.

Methodology:

The PhD candidate will be involved in study planning, procedures and analyses of the EU project SPIOMET4HEALTH and the large local cohort's data and material as well as further ongoing clinical studies. In a close cooperation with the technicians and scientists of the EU framework and other international and local partners, new biomarker panels will be generated and measurements for risk patients will be established using metabolomic, genetic and metagenomic techniques to further clarify the significance of specific candidate molecules e.g. out of steroid signaling pathways.

References:

1. Fauser, B.C.J.M. Revised 2003 Consensus on Diagnostic Criteria and Long-Term Health Risks Related to Polycystic Ovary Syndrome. Fertil. Steril. 2004, 81, 19–25.

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3. Liu DM, Torchen LC, Sung Y, Paparodis R, Legro RS, Grebe SK, Singh RJ, Taylor RL, Dunaif A. Evidence for gonadotrophin secretory and steroidogenic abnormalities in brothers of women with polycystic ovary syndrome. Hum Reprod. 2014;29(12):2764-72.
4. Haudum C, Lindheim L, Ascani A, Trummer C, Horvath A, Münzker J, Obermayer-Pietsch B. Impact of Short-Term Isoflavone Intervention in Polycystic Ovary Syndrome (PCOS) Patients on Microbiota Composition and Metagenomics. Nutrients. 2020;12(6):1622.

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