

MLL-KOLLOQUIUM

Donnerstag, 09.05.2019, 16¹⁵ Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

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Breath diagnostics revisited: From individual islands of stability to comparison of healthy and cerebral palsy cohorts

Three main issues will be addressed:

1. Status of breath analysis:

To date, reliable, effective, accurate and low-invasive medical diagnostics allowing for detection of a broad variety of diseases do not exist, although many research groups are trying to develop them. Diagnosis via breath has been an attractive option for many centuries because a breath biopsy has several unbeatable advantages over a blood biopsy. It is completely non-invasive and patient-friendly, and may be processed rapidly, allowing for the collection of many samples per day. In this regard, a relevant question should be posed: why is breath analysis still in its infancy and not a routinely-used tool for clinicians? The reason lies certainly not in an insufficient sensitivity for relevant substances, since e.g. gas chromatography mass spectrometry allows the detection of hundreds of volatile organic compounds (VOCs) at the level not available at the moment for mid-infrared spectroscopy.

2. Humans as islands of stability:

By testing reliability of conventional Fourier-transform mid-infrared spectroscopy of human breath combined with water vapor suppression in a small test study, we found that for healthy individuals, concentrations of small VOCs stay reproducible at least for 18 months. A set of these data configures a multidimensional individual's island of stability (IOS). We determined the relative value and duration of several factors affecting the IOS: coffee and alcohol intake, physical and mental exercises, smoking, fasting, medication as well as a circadian rhythm. A stable unique IOS can be considered as a universal biomarker sensitive to the onset of a disease.

3. Breath analysis for disease detection:

Results of a pilot study of cerebral palsy will be discussed. In brief, the accuracy of distinguishing a diseased group of 14 patients from a reference group achieved 90%. I also plan to show first results of an ongoing study of urologic cancers.