Healthcare industry BW

Tübiom – the gut flora's role in human health and disease

It's the mix that makes it work: a large number of different bacteria live in our intestine and ensure proper digestive functioning. CeMeT GmbH has launched the Tübiom project to explore bacterial gut flora and how it alters with lifestyle, diet and disease. The long-term objective is to derive recommendations for intestinal health.

Isabell Flade has been managing director of CeMeT GmbH since August 2014. Her doctoral research focused on the relationship between colitis and the intestinal microbiome of mice.

Bacteria outnumber human cells by a factor of approximately 10. So says the website of a company called CeMeT from Tübingen. However, surprisingly little is yet known about the composition of the bacterial community, the interaction between individual species of bacteria and how bacteria interact with human body cells. CeMeT GmbH hopes to be able to close an important gap in knowledge concerning the human gut flora and has launched a project called Tübiom (Tü for Tübingen, and biom for biome) to specifically study the intestinal microbiome.

The company plans to perform a large-scale study in order to find out whether and how diets, lifestyles and health profiles influence an individual's gut flora. Participation in the study is open to people of all ages. All they need to do is send in a stool sample and fill out a questionnaire. The evaluations will be anonymised and help the researchers to find out which bacteria are present in the intestine in which quantity. The statistically verified gut flora profiles will be used to develop new approaches for the diagnosis and prevention of diseases as well as for optimising therapy decisions.

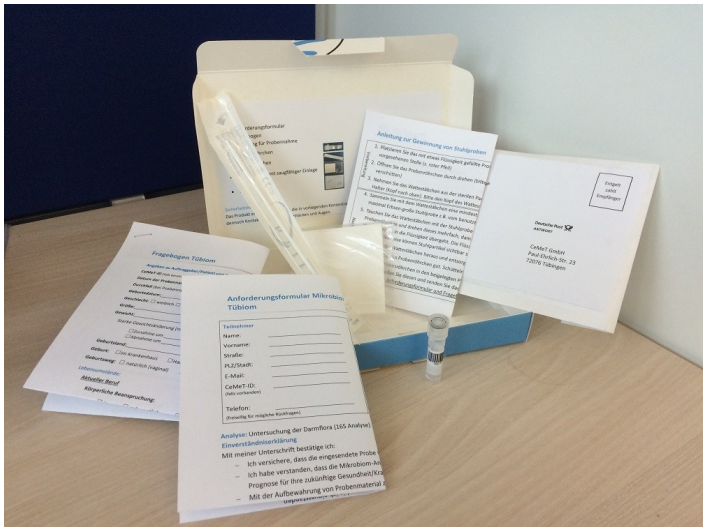
Isabell Flade, who is heading up CeMeT GmbH's Tübiom project, received her doctorate in 2012 from Tübingen University where she was a member of a DFG-funded research training centre. Her thesis dealt with the molecular basis of bacterial survival strategies in the human gut. "We are a start-up company and are unable to finance such a comprehensive project on our own.
We would, therefore, like to work with business and research partners to drive the project forward," says Flade, whose research team has the ambitious goal of recruiting 10,000 people who are willing to send in a stool sample and fill out a lifestyle, diet and medical history questionnaire.

Each participant receives his/her results and is offered medical counselling

Apart from contributing to medical research, each study participant can also benefit personally from participating in the Tübiom project. Flade explains how: "Each participant receives information about the composition of his or her gut flora. If any of the participants become ill at a later stage, this information can then be used as reference. In addition, we give everyone the opportunity to talk to a medical doctor at the University Hospital, something that might be useful in cases where the gut microbiome triggers pathophysiological processes leading to disease. At present, the microbiome provides little information about disease progression and other parameters need to be taken into account when making therapy recommendations. But we hope that our project will change this. This is one of the reasons why we plan to establish anonymised databases and make these available to study participants for further research and comparison.

Flade and her team have developed an examination kit that works with minimal amounts of stool thanks to state-of-the-art analysis methods. The researchers believe that this will make people considerably more willing to participate in the study. "Participants will only be required to put a very small amount of stool from a piece of toilet paper into a tube. We are talking pinhead-size quantities. They then put the tube into a pre-addressed envelope and send it to us," says Flade. The tube contains a buffer solution that stabilises bacterial DNA. As is now standard, the researchers use 16S ribosomal RNA sequence information for identifying the bacterial species. Next-generation sequencing methods are used to study selected hypervariable regions of the 16S rRNA gene, which is highly conserved between species. This information is then used to identify bacterial families and genera. Moreover, the analysis is semi-quantitative, which enables statements to be made about the gene copy number in a given sample. "The difficulty is that some bacteria have only one copy, while others can have 15 16S rRNA gene copies. Therefore, we can only deduce relative information about copy numbers. This does not, however, minimise the importance of the information in terms of human health," says Flade.

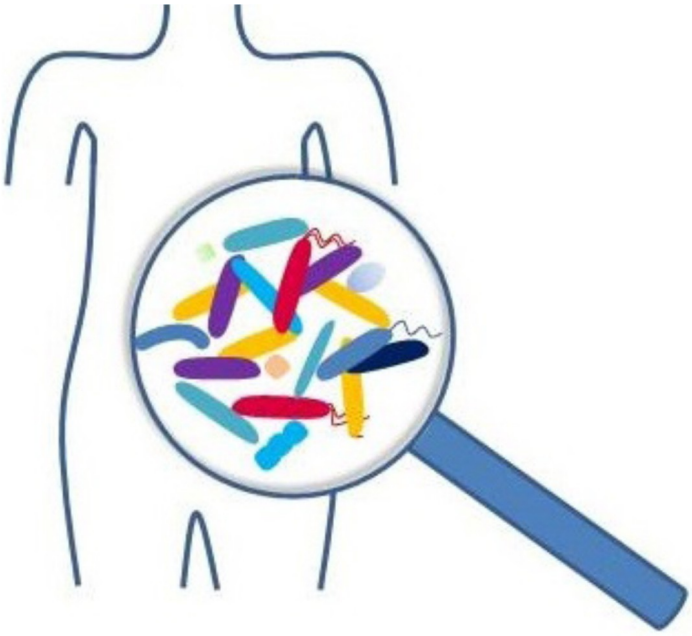
The major objective of the Tübiom project is to improve diagnosis, prevention and disease therapy

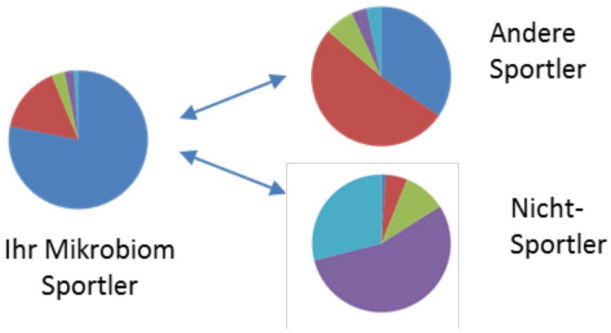


CeMeT GmbH has developed a stool examination kit that works with very small amounts of sample.

It has been known for quite a while that the intestines of obese people contain a lower number of Bacteroidetes bacteria and a higher number of Actinobacteria than normal-weight people. Moreover, in 2014, researchers were able to connect certain strains of bacteria to the pathogenesis of colon cancer. Flade is convinced that more such findings will be published in the near future and that these will have direct consequences on the treatment of disease. “I am sure that if we can use stool samples to establish a risk profile for certain diseases, we will be able to considerably improve the prevention of such diseases. We could also then develop recommendations on which probiotic bacteria to eat or which diet to follow.” In addition, microbiome analyses have the potential to improve the way drugs are administered. “Orally ingested drugs can be toxic in particular concentrations in some people and not have the slightest effect in others.

This could be because certain gut bacteria degrade or alter drugs and hence produce a different effect,” says Flade. Flade hopes that the Tübiom project and the resulting databases will help her uncover such relationships and contribute to optimising diagnoses and therapy decisions. Although still a long way off, the researchers also envisage developing screening and diagnostic tests at CeMeT GmbH. The idea of using the Tübiom project findings to validate bacterial materials is already fairly well established. However, before all this can be turned into reality, the company needs to recruit the planned 10,000 people who are thirsty for knowledge and keen to contribute to medical progress. Scientific support is also welcome. Flade would be delighted to hear from scientists who would like to get involved in the Tübiom project.





The intestinal microbiome, formerly called gut flora or gut microbiota, is the entire microbe population that lives in our intestines (top); the Tübiom project allows study participants to compare their own microbiomes with other microbiomes (bottom).