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What did we Learn Today?

Tore Midtvedt*

Department of Microbiology, Tumor and Cell Biology, Karolinska Institute, Sweden

Commentary

Around a year ago I ended a symposium, entitled "The Gut and the Brain", taking place at Nobel Forum, Stockholm, Sweden by asking that simple question. Now another year has passed in the worldwide classroom in which we are learning about the giant puzzle, named our intestinal microbiota (IM) given to us by Mother Nature. During this year we have realized that studies on host-microbes interactions is by far the most rapidly expanding field in biological sciences. Improvements in technology are continuously giving us new information about when, where and how pieces of this enormous puzzle ts created and how they may interact with each other for shorter or longer periods. Out of the many sub-fields that have expanded, I will limit myself to comment upon some few.

The term epigenetic programming was introduced into biology some few decades ago. In the last year, focus has been on intra-uterine epigenetic programming, based on new data indicating presence of microbes in the uterine wall and/or placenta. Irrespectively of whether there exists living microbes in this area or not. it is now well established that the fetus is reached by microbial products – as well as other "environmental" factors, capable of starting an epigenetic programming before birth and continuing thought life. In summary, all individuals have a "fluid genome" this making truth to the statement "panta rhei", i.e. everything floats, by Heraklitos around 2.500 year ago. This new information has to be far better included into clinical practice.

Another field to be mentioned is improvement in holographic microscopy, thereby unmasking the intricate alterations taking place intracellularly in individual microorganisms following tiny pH-alterations in their intracellular milieu, thereby creating important new ways for studying ecological interactions on an a cellular level.

Going from micro-scale to macro-scale I will focus upon increase usage – and knowledge – about so-called food preservatives, that is substances added to our food in order to prevent or inhibit spoilage of food due to bacteria, fungi or other microorganisms. It is well established that such substances act upon our IM and may also act upon the host. Propionic acid and its salts are most probably the most commonly used food preservatives worldwide, especially in developed countries. It has been known since long that it may change behavior in some invertebrates and now there is a rapid body of information indicating that the same might occur in vertebrates, including man. In fact, exposure to propionic acid has been linked to development of symptoms in autistic children. Hopefully, this will be clarified in the year to come. If it is substantiated that propionic acid in some way influences upon symptoms – and also on development of autism - then it has to be rapidly removed from all usage in food. It is my personal opinion that Innovate companies should prepare for that situation by already now investigate proper alternatives. They exist!

During the last year it has been an "explosion" in theories and assumptions regarding the importance of IM "dysbiosis" as causes to or involvement in a long series of pathophysiological conditions of hitherto almost unknown etiology (Figure 1). As a consequence, it has been several attempts – and publications – in order to restore

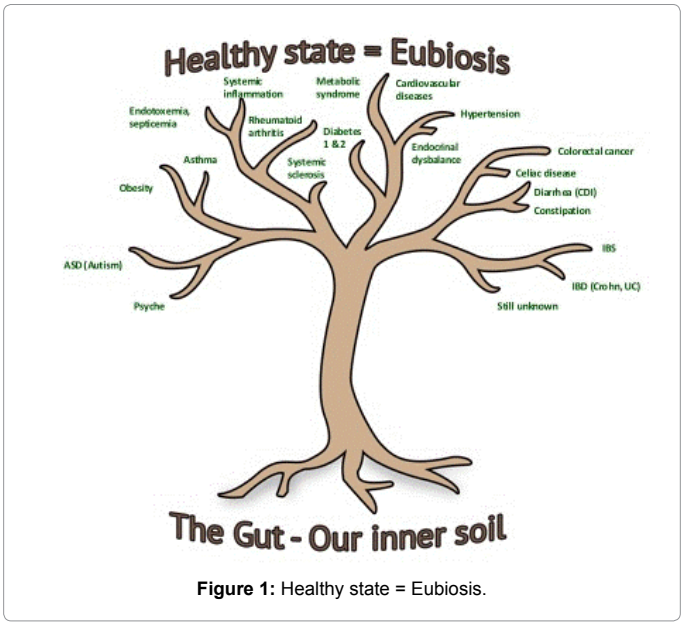

Figure 1: Healthy state = Eubiosis.

this assumed dysbiosis. In principle, a restoration can be achieved by giving fresh intestinal content (feces transplantation), cultivated whole intestinal content or a varying number of selected bacterial strains (often well known probiotic strains). All three approaches have their pro's and con's and for the time being, it is not possible to come up with a final declaration: the winner is…..!

But it indeed possible to forecast that this area will be the hottest one in the year to come and it is also possible to forecast that in some few years we will have specific microbial restoration solutions for several of the conditions depicted in Figure 1. We have to realize that most of the dysbiotic conditions are man made (antibiotics, food additives, insufficient dietary intake etc.) and, therefore, have to be man solved.

The final goal will be to have adequate information on a personalized IM, thereby being able to bring a diagnosed dysbiosis back to an eubiotic state. In my mind, this is not a dream, but a realistic future goal.

***Corresponding author:** Tore Midtvedt, Department of Microbiology, Tumor and Cell Biology, Karolinska Institute, Sweden, E-mail: Tore.Midtvedt@ki.se

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