Editorial

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Exercise and Gut Microbiome

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Chronic diseases, including cardiovascular disease, diabetes, obesity etc. now account for 60% of all recorded deaths globally. Physical inactivity and an unbalanced diet are important risk factors in the etiology of these diseases [1-3]. The level or extent of recommended physical activity to attain health benefits is currently recommended by WHO as 150 minutes (moderate activity) or 75 minutes (high intensity activity) in a week. Understanding how physical activity improves the health conditions of an individual is a challenging and daunting task but in the last decade due to the advancement of molecular tools especially Next Generation Sequencing (NGS) we now seem to be closer to such understanding [4,5]. An important part of this new understanding is supported by the fact that we can now characterize our gut microbiome as heathier or less healthy according to microbial population profiles through NGS (through metagenomics analysis). Through various human prospective and retrospective studies it has been shown that exercise affects the gut microbiome composition and ultimately it's metabolic profile and hence shifts the microbiome towards a healthier microbial profile. In spite of the great inter- individual variation in the composition of gut microbiota its now seems clear that lowering the species diversity is associated with negative health effects while, surprisingly, physical exercise seems to supportan increase in the diversity of the gut microbiome, thereby modulating it towards a healthier profile and exerts more beneficial effects by as well [6].

The specific effect of voluntary exercise on gut parameters has been studied in several studies. One study observed an increase in the n-butyrate concentration in rats that were able to do running exercise over a period of time. Since higher levels of butyrate production have been shown to be correlated with the reduction of colorectal cancer and IBD symptoms, it has been proposed that this could be a mechanism in which exercise could protect against such pathological conditions [7]. In a study on rats in 2015,when exercise is initiated at juvenile stage, as compared to the results of adult exercise, the juvenile exercise seems to modify more genera within the gut microbiota and lead to an increase in lean body mass by increasing the proportion of Bacteroidetes and decreasing the proportion of Firmicutes [8].

In a study dealing with athletes undergoing high intensity exercise it was shown that the microbiome diversity is much higher in athletes as compared to the controls [9]. Abundance level of Lactobacillus increases as a result of exercise whereas Streptococcus, Aggregatibacter, and Sutterella levels are at higher levels in sedentary individuals. Aging is also an important parameter that determines the shifts in the microbial populations in the gut. In another recent study on gut microbiota and Short Chain Fatty Acids (SCFA) profiles in rats the microbial profiles was seen to shift with age probably correlated with the reduction in intensity of exercise in the older group [10].

Although this area of research is still in its infancy the results obtained till date strongly suggest that exercise can serve as an important factor in modulating gut microbiota and thus exerting beneficial effects on the host. In other words stable and diverse microbial profiles would seem to be a pre-requisite requirement for normal gut physiology and exercise can be seen as a tool to diversify the microflora by improving the balance of Bacteroidetes vs. Firmicutes. Such changes are seen to contribute to preventing obesity associated health conditions. Also exercise promotes the production of beneficial short chain fatty acids by altering the microbial profile in the gut. Elevated level of butyrate production in the gut seems to play a protective role in the prevention of colorectal cancer etc.

It could be proposed that exercise can be used more effectively within the population to maintain a healthy microbiota and thus support a healthy life style. Till now most of the studies examining the effect of exercise have been conducted on animal models especially mice so in order to get more clarity more direct studies on humans are needed to understand the effect of different levels of exercise on the composition of microbial profiles in the gut and their metabolic activities. In the future most likely specific exercise regimens can be used to modulate the gut microbiota in individuals taking into consideration intake of type of food, age, sex and other pertinent factors.

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