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In recent years there has been a substantial increase in the number of diseases with the inflammatory component such as such as allergy, asthma, rheumatoid arthritis, inflammatory bowl disease (IBD, which includes ulcerative colitis and Crohn's disease), chronic sinusitis, and many other conditions. The majority of these diseases are multifactorial, with the contribution of genetic and environmental factors. Among the latter, the role of certain microorganisms and viruses in triggering or sustaining the inflammatory process is most controversial. In rheumatoid arthritis, for example, the following bacteria and viruses have been implicated in triggering the disease: Mycoplasma spp., Proteus mirabilis, Escherichia coli, Staphylococcus spp., Bordetella spp., Acinetobacter spp., the parvoviruses, Epstein-Barr virus, and retroviruses. The list of putative microbial triggers of rheumatoid arthritis is still growing, and it becomes essentially impossible to make a causation link between certain infectious agents and the disease. In the light of these disappointing results there are calls for even larger studies with the use of more advanced and large-scale technologies. The primary function of the immune system is the maintenance of body homeostasis and protection against any threats to it via several lines of elaborate and complex immune defense. Given even higher complexity that involves the microbiota and the corresponding host-microbe interaction, the conditions for this equilibrium become even more challenging. In the absence of a defined

pathogen, for example, the spectrum of microorganisms involved in triggering inappropriate immune responses may include polymicrobial communities or the cumulative effect of several microbial/viral factors. Under the normal circumstances there is a fine-tuned balance between commensal microbiota and the host's immune responses. However, when this balance is compromised, for example in IBD, a massive immune response is launched against commensal microbiota resulting in chronic inflammation. Besides the microbial/viral factors, the balance of the immune system can be compromised by other causes. Given, for example, the close and inclusive interaction of the immune, nervous and endocrine systems, the list of these provoking factors can expand even more. For instance, it has been demonstrated that even mild sleep deprivation may increase the production of interleukin-6 and C-reactive protein. Understanding the complex role of microbial and environmental factors in inflammatory and autoimmune diseases, therefore, is the main subject of this topic.