Dear reader,

When you are reading this words, I will have already departed to cover the 7th congress of the European Federation of Periodontology in Vienna. Thousands of professionals involved in periodontology and dental implantology are expected to gather in the Austrian capital in June to discuss latest research results and concepts to fight periodontal diseases.

Although occasionally overlooked, the prevalence of those diseases remains one of the biggest challenges that all professionals in every field of dentistry have to face nowadays in daily practice. From orthodoxic treatment to long-term maintenance of dental implants, almost every clinical success depends on a healthy periodontium.

Owing to deteriorating trends in health like the obesity epidemic with its side effects in large parts of the US and Europe, this challenge is expected to rise considerably in the years to come, since periodontal inflammation and gum disease have been proven to be closely related to the general state of health.

Unfortunately, in many countries, periodontology still plays a minor role when it comes to dental education as well as the number of chairs and positions established at universities and dental schools.

In addition, interdisciplinary cooperation between periodontists and other fields of dentistry is still lacking, despite the fact that dental professional organisations recommended to check the periodontal status before starting any treatment.

The participation of many dental implant specialists at this Europerio is a ray of hope that the dental community is beginning to realise that the role of vaccination is to activate the production of memory B cells and antibodies against the pathogen. This dogma however is too simple. Recent evidence suggests that immunization can modulate the host response and shift the response, a key element in successful protection. The nature of the cellular response and which molecules are secreted by the site by these cells are critical to disease processes, as well as protection.

What is the process of developing a vaccine? First, we have to identify the key pathogens, and then identify and isolate virulence factors from the pathogens as candidate antigens. The candidate vaccine should be tested first in preclinical models followed by safety and efficacy tests in humans.

Eighteen years ago, a research group headed by Roy Page from Seattle was the leader in periodontal vaccination research. They vaccinated primates with whole-cell P. gingivalis, and demonstrated partial protection against experimental periodontitis. Interestingly, they found that the levels of specific antibodies against P. gingivalis were high in all animals that were exposed to the bacteria, immunized and non-immunized, and antibody production was not able to explain the protection achieved.

From then on, significant efforts were made in targeting molecules that are virulence factors for vaccine development. The open-ended approach that vaccines have been targeted at a selection of (pathogenic) microorganisms, but only open-ended approaches, where there is no selection for specific species to be detected, can be used for oral microbe immune studies.

The open-ended approach that has been most widely used for oral microbial communities and oral inflammation is the NGS technique. This is a gene-clone-library approach. Indeed, by using this technique, several uncultivated bacteria have been identified to be associated with periodontitis, but after the first NGS study in which several orders of magnitude (i.e. millions) bacterial 16S RNA codes were analysed, it became clear that so far we had only explored the tip of the iceberg.

Modern molecular analyses and in particular next-generation sequencing (NGS) techniques have revolutionised oral microbiology. Being able to analyse all oral bacteria, the oral microbiome, is of particular relevance and importance because it is well known that micro-organisms cooperate collectively in a polymicrobial ecosystem, causing chronic oral infections, such as periodontitis.

Studies of cultivable sub-gingival micro-organisms has already shown that the predominant bacteria in periodontal disease are Gram-positive facultative rods and cocci. In periodontitis, there is a decrease in the number of these “healthy” organisms and an increase in the number of “pathogenic” anaerobic-negative rods and spirochetes.

Indeed, cultivating sub-gingival micro-organisms has provided considerable knowledge on the pathogenic bacteria associated with periodontitis, but unfortunately this is limited by the fact that it focuses (by definition) on cultivable micro-organisms. As has been underlined frequently in the past, many oral bacteria cannot be cultivated and therefore conclusions are drawn on an incomplete picture. With this in mind, and because scientists started to realise that the polymicrobial ecosystem actively sustains oral health, even before NGS, microbial microbial analyses have been developed, which give a better, more complete overview of the oral microbial ecology in health and during disease.

Many molecular microbial analyses have been selected at a periodontitis vaccine. In 2012, no clinical trials in animals...