

PRESS RELEASE

Study published in the Journal of the American Chemical Society

Synthetic solutions to combat infections

- Biogune researcher, Juan Anguita, in collaboration with scientists of the University of Massachusetts, has proven the efficiency of synthetic antimicrobials.
- These synthetic compounds have a double effect, on the one hand, they combat infections directly, and on the other they activate the immune system.
- Even in pre-clinical studies, they have become good candidates for the treatment of infectious diseases, such as conjunctivitis, meningitis and pneumonia.

(Bilbao, July 2012).- Infections come from microbes (virus, bacteria) that enter our system, multiply and spread through it. These microbes, which produce diseases such as diphtheria, hepatitis, pneumonia, etc., are known as pathogens. The goal of medicine is to act against the consequences of these pathogens in people. Similarly, the goal of scientific research is to better understand their functioning to develop solutions to control these pathogens.

An international team of scientists, including Ikerbasque Biogune researcher, Dr. Juan Anguita, in close collaboration with Dr. Gregory Tew, of the University of Massachusetts Amherst (UMASS), published a paper in the Journal of the American Chemical Society –one of the journals of highest impact in Chemistry -, in which they have proven the effectiveness of synthetic antimicrobial compounds that, in addition to eliminating infections, stimulate the immune system, which helps fight infection.

The project sought to study the behaviour of certain synthetic compounds, based on natural peptides, which have been developed by a US company (Polymedix), that have a high antimicrobial activity against different micro-organisms.

The research team started to study these compounds based on the function of certain antimicrobial natural peptides that have the aforementioned dual activity, in other words, fighting against external agents while activating the immune system. The idea, therefore, was to imitate the immune response of the human body in a synthetic compound, with a positive result.

To provoke this activation of the immune system, the researchers have focused on macrophages, which are cells that act very quickly at the beginning of an infection, giving prompt response to the disease. Macrophages react immediately when, for example, we injure ourselves, to promote healing. They are also responsible for tattoos becoming permanent marks on our skin, since they are responsible for recognising ink as a strange object entering the organism.

Good candidates to fight diseases

The result of the study concludes that the dual action of these synthetic compounds can result in a better effectiveness in fighting against infection. Furthermore, the low toxicity of these compounds, has turned them into great candidates for the treatment of a broad range of infectious diseases, with the added advantage that, given the nature of these compounds, the appearance of treatment-resistant strains, as in the case of antibiotics, is improbable or non-existent.

These compounds are still undergoing pre-clinical studies, but they have become good candidates for the treatment of a great range of infectious diseases, including conjunctivitis, meningitis and pneumonia, given the low toxicity and their effectiveness to fight against infections.

"The greatest advantage of these compounds is, on the one hand, the duality of their function, directly achieving the elimination of pathogens (because they are antimicrobial), and indirectly, through the manipulation of the function of macrophages", says Dr. Anguita.

The purpose of this study is to manipulate a response that favours the elimination of these pathogens, for example, increasing vascular permeability or generating proteins attracting cells responsible for eliminating pathogens, such as macrophages and neutrophils. In short, in Dr. Anguita's opinion, "the idea is to generate a two-punch response, with direct elimination and through cell mechanisms, for example, phagocytosis, generating toxic compounds for bacteria like oxygen radicals, etc."

"In this study we measured the stimulating activities of cytokines and chemoattractant products produced by macrophages by a panel of compounds (SMAMPs – Synthetic Mimics of Antimicrobial Peptides), and one of them was identified as a stimulant on its own and in combination with LPS. We observed that this immunomodulatory capacity is due to the modulation of the production of IL-10 regulatory cytokine", concludes Dr. Anguita.