

Seminario

Martedì 29.05.18, ore 11.00

Aula 1 Marconi, Area CNR, via Madonna del Piano 10, Sesto F.no (FI)

DNA-based engineering and sensing

Dr Ivan Barisic

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The antibiotic resistance crisis has become the major threat to our modern healthcare systems. An exponential increase of infections caused by multidrug resistant (MDR) pathogens is observed in patients all over the world. Pan-resistant bacteria that cannot be treated with existing antibiotics have evolved and are spreading now. There are two major approaches to win the antibiotic resistance race. The first comprises the development of novel diagnostic methods that can precisely characterise resistance mechanisms at a low cost and very fast. These tests are required for the identification of sources and spreading routes of MDR bacteria in hospitals and the environment. Additionally, they are the basis for the implementation of infection control measures. Within the the two ongoing H2020 projects FAPIC (www.fapic.eu) and MARA (www.maraproject.eu) we are aiming to develop such novel tests.

The second approach to fight resistant pathogens is based on the development of novel antibiotics. In the last decades, the pharmaceutical industry has mostly stopped studies on novel antibiotics due to the low profitability of antibiotics and the high cost associated with drug development. Thus, universities and research institutes have become the major drivers concerning novel antibiotics. In the highly ambitious MARA project, we aim to create DNA-based nanostructures and robots that can recognise bacterial pathogens, perforate their cell membranes, and thus, kill the bacterial cells. However, further technological advances are required to realise and stabilise DNA nanostructures in living organisms. The approaches to overcome these limitations will be discussed.

Dr. Ivan Barisic is a young scientist and holds a MSc and PhD degree in molecular biology from the University of Vienna. His research focuses on the development of innovative detection technologies for antibiotic resistance mechanisms. He is an expert regarding the hybridization behaviour of oligonucleotides and his research on this topic resulted in the development of the first highly specific solid-support based enzymatic DNA detection reaction using a novel oligomeric DNA oligonucleotide structure. A patent (EP14185938.9) was filed for these supramolecular structures and it is the key technology in the H2020 project FAPIC he initiated. In addition, he coordinates the H2020 FETopen project MARA that aims to develop autonomous DNA-based sensor molecules (AUDENAs; patent filed EP15196819.5) for pathogen identification. Additionally, he is developing dynamic DNA nanostructures within the framework of MARA.