"Advanced nanometrology: from bench to patients"

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Studying the biophysical behaviour of cells, tissues or cell/host interactions is an on-going challenge to drive the development and/or the evaluation of therapeutic strategies. Using microscopic techniques emerging from the field of nanotechnology, such as atomic force microscopy, it is now possible to interrogate samples with capabilities beyond most optical setups. Our research has therefore involved the characterisation of connective tissues at a scale where various diseases and syndromes start affecting structural components such as collagen fibrils or molecules. Combining the high-localisation of the AFM measurements and with a traditional histological assessment provides a new approach to the notion of clinical diagnostics. Supported by over 10 years of basic nanometrology of collagen, our is aim is to develop an advanced laboratory-based adjunct diagnostic to characterise the extent of the conditions such as fibrosis, ageing, or less common collagen conditions such as scleroderma using novel tools such as atomic force microscopy. In the field of dentistry, this nanometrological approach has also opened a new era of structural and biophysical characterisation of Biofilms and Microbiome. Our recent research advances have proven how critical is the interactions of bacterial cells and surface in the thinking and development of novel antimicrobial strategies.