Applications of AFM in nanomedicine: From microbiology to cardiology

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In this presentation, we will focus on 3 applications of AFM in life science and medicine. The first one is related to the determination of the adhesive properties of *Lacotocci* to the intestinal mucus (1). We worked with different mutants unable to produce mucus binding proteins or unable to produce pili. Thanks to a deep analysis of the force curves recorded between a lacto probe and a surface covered with mucins, we were able to decipher the role of the mucin binding proteins and the role of the pili.

In the second application, *Pseudomonas aeruginosa* cells were treated with 2 major antibiotics: ticarcillin and tobramycin. We have demonstrated that treated cells present an altered shape, roughness and elasticity (2). (figure 1).

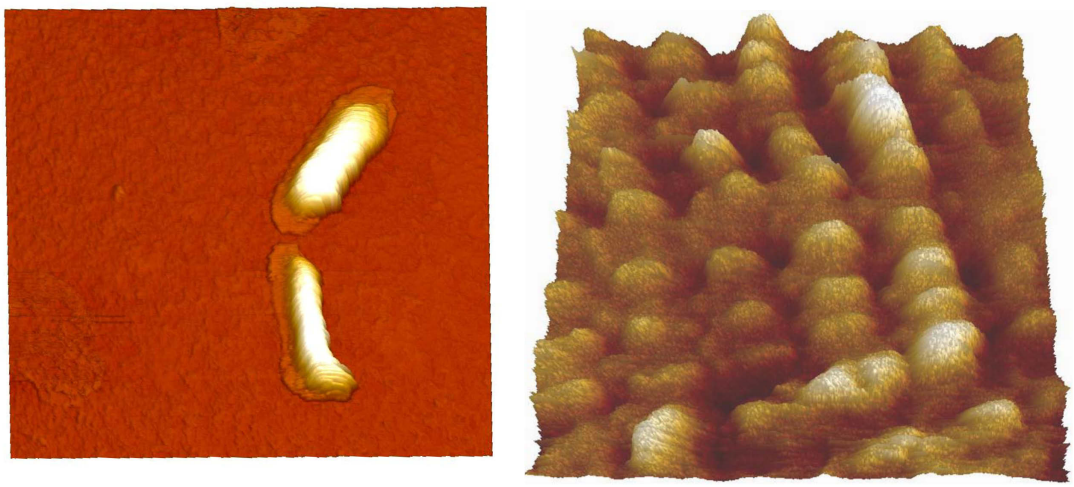

Figure 1A: AFM height image of 2 *Pseudomonas aeruginosa* cells surrounded by their mucus.
Figure 1 B: AFM 3D height image of a cardiomyocyte surface. (10 µm in large, Z range 150 nm)

Finally, I will deal with exciting results obtained on living cardiomyocytes (CM). The cells were extracted from mice heart, adhered to laminin coated petri dish and kept alive during the AFM experiments using a perfusing cell. Figure 2 shows the surface topography of a cardiomoyocyte. Z striations and myofilaments can be seen. We analyzed WT mice and KO mice for ephrin B1. This protein is supposed to be a structural protein specific of the lateral membrane of the CM. It is involved in adult cardiac tissue architecture stabilization. Therefore, The morphology and elasticity of WT and KO cells are totally different (3).

1 Dague *et al.*, Langmuir 2009.
2 Formosa *et al.*, Nanomedecine Submitted
3 Genet *et al.*, Circ. Res. Submitted