

Pharmacology of anti-infectious drugs- Inserm U1070

PhD profile
Inserm UMR 1070 –Poitiers- France

Job: PhD Student

Thesis: Study of the release and efficacy of antibiotics loaded into ceramic prostheses by in vivo microdialysis.

Project Duration: October 1, 2019 - September 30, 2022

Manager: Sandrine Marchand (sandrine.marchand@univ-poitiers.fr)

Location: UMR INSERM 1070. University of Poitiers. Health Biology Pole. 1 Rue Georges Bonnet. TSA 51106. 86073 Poitiers Cedex (<http://phar.labo.univ-poitiers.fr/>)

Financing: I.Ceram (Private) / New Aquitaine Region (50/50)

Summary: The project presented is concerned with prevention and treatment of bone infections, especially on prostheses. Indeed, this type of infection is particularly difficult to treat, due to the loss of effectiveness of antibiotics related to resistance phenomena, but also because of their diffusion difficulties in the infected tissues. The installation of devices loaded with antibiotics, allows optimized local impregnation, and is then an interesting alternative that has already proven itself. I.Ceram, located in Limoges, is the specialist in innovative biocompatible ceramic implants. The characterization of tissue diffusion of antibiotics from these systems is complex and poorly documented, but can be performed by microdialysis, a technique mastered by UMR1070.

The objective of this project is to evaluate by microdialysis the kinetics of in vivo release of gentamicin and vancomycin, loaded into ceramic prostheses. This project will initially be conducted on the small healthy or infected animal (rat) then on the large healthy animal (pig) and may extend into patients.

Activities:

- Reading and comprehension of scientific articles
- Preclinical protocol writing for submission to the ethics committee
- Work in a level 2 confined environment

- Animal experimentation

1. Develop a model of muscle infection in rats
(skills present in U1070)

- Isolate bacteria on agar medium
- Prepare culture broths
- Prepare a bacterial culture broth
- Prepare a bacterial culture in exponential growth phase
- Prepare a bacterial inoculum with an optical density reader

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2. Surgery on Rat

- Femoral catheters (vein and artery) for administration and blood sampling (skills present in U1070)
- Microdialysis probe introduction in muscle (skills present in U1070)

3. Animal experimentation on rats

- PK study with blood and dialysate sampling

4. Animal experimentation on pigs

- PK study with blood and dialysate sampling (with the help of a surgeon for catheters and microdialysis tubes)

- **Participation to a clinical study** (protocol writing, help with sampling ...)

- **Analytical assays of drugs in biological matrices** (rat and human) (plasma, dialysates) by LC-MS/MS in an ISO 9001 environment

- **Analysis of pre-clinical and clinical data by traditional PK analysis** (Phoenix WinNonlin®, Nonmem®...)

- **Writing articles, poster and oral presentations**

Aptitudes

- Rigor and organization
- The ability to work in a team
- Autonomy

Required degree level: Master 2