David Granjon

PhD in Mathematical Physiology

19/11/1990 (28)
Married, 1 daughter

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RinteRFace

Education

2013 - 2016	**PhD in Life Sciences** Université Pierre et Marie Curie, Paris, Université de Lausanne, Switzerland *Title of the Thesis: "Modeling of Calcium Homeostasis in the Rat and its Perturbations".*

Building of a mathematical model describing calcium homeostasis, including its analysis and simulation of pathologies.

Thesis advisors: Dr. Aurélie Edwards and Pr. Olivier Bonny.

2011 - 2013	**Master's Degree in Ecosiences, MIV** Université Claude Bernard (UCBL), Lyon

Main subjects: Mathematics, Theoretical Ecology and Programming.

2010 - 2011	**Licence (3 year degree) in Mathematics and Computer Sciences for the Living (MIV)** Université Claude Bernard (UCBL), Lyon

Main subjects: Mathematics, Ecology and Computer Sciences.

2008 - 2010	**Preparatory School for Engineers** Lycée Claude Fauriel, Saint Etienne

Main subjects: Mathematics, Physics, Biology, Geology.

Current Position

Programming

06/17 - Now	**Post Doctoral Researcher**

The Interface Group, University of Zurich (UZH)

Two main projects:
- develop user-friendly interfaces of Calcium and Phosphate Homeostasis, using the R-Shiny package, javascript and C. Management of linux web servers. Design new interactive tools dedicated to teaching courses.
- build a model linking the cardiac and renal functions, to better undestand the interplay between chronic kidney disease as well as cardiac failure. Create virtual patient populations using Monte Carlo simulations.

Supervisors: Dr. Diane de Zélicourt, Pr. Vartan Kurtcuoglu.

Languages

French ★★★★★
English ★★★★★

Contacts

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Previous Experiences

01/17 - 03/17 **Post Doctoral Researcher**

CHUV | Lausanne university hospital, Switzerland

Improvements to the model developed during my doctoral thesis. Publication of a second article (see publications).

Supervisors: Dr. Aurélie Edwards and Pr. Olivier Bonny.

07/13 - 08/13 **Internship in a Team of Theoretical Physiology**

Centre for Applied Mathematics in Bioscience and Medicine (CAMBAM), Mc Gill University, Montreal, Canada

Improvements to the model developed during the previous internship.

Supervisors: Dr. Moisés Santillan, Pr. Michael Mackey.

01/13 - 07/13 **Internship in a Laboratory of Applied Mathematics**

Institut National de Recherche en Informatique et Automatique (INRIA), Team Dracula, Lyon

Title of the project: "Multiscale modeling of Zebrafish Somitogenesis"
Development of a model accounting for the intra-cellular oscillator in each cell during somitogenesis.

Supervisors: Dr. Laurent Pujo-menjouet (UCBL), Pr. Michael Mackey (Mc Gill, Canada).

03/12 - 07/12 **Internship in a Laboratory of Applied Mathematics**

Institut National de Recherche en Informatique et Automatique (INRIA), Team Dracula, Lyon

Title of the project: " Mathematical modeling of somitogenesis, reaction-diffusion systems".
Analysis of two mathematical models: cell-cycle and clock/wavefront models.

Supervisor: Dr. Laurent Pujo-Menjouet (UCBL).

06/11 - 08/11 **Internship in a Laboratory of Theoretical Ecology**

Laboratoire de Biométrie et Biologie Evolutive (LBBE), Team Modélisation et Ecotoxycologie Prédictive (MEPS), Lyon

Title of the project: " Ecotoxicology of Daphnia Magna ".
Study of the impact of pollution on the growth of Daphnia Magna through mathematical models.

Supervisors: Pr. Sandrine Charles (UCBL), Pr. Marie Laure Delignette Muller (Ecole Nationale Vétérinaire de Lyon).

Awards

2/02/18

NCCR Kidney.CH Retreat 2018.

Best Poster Award, 2nd price: *A web-based application of Calcium and Phosphate Homeostasis.*

Software Development - R packages

12/18 - Now **RinteRface**

Description: "A comprehensive collection of HTML templates for Shiny".

This project aims at bringing the most famous HTML templates to Shiny, only with R.

Documentation: https://rinterface.com

09/18 - Now **argon R Suite**

Description: "Bootstrap 4 argon HTML template".

R wrapper around the argon HTML library for static templates as well as dynamic dashboards, fuelled by Shiny.

Documentation: https://rinterface.github.io/argonR/index.html
and https://rinterface.github.io/argonDash/index.html

06/18 - Now **bs4Dash**

Description: "Bootstrap 4 shinydashboard using AdminLTE3".

Build Bootstrap 4 dashboards using the full power of AdminLTE3, a dashboard template built on top of Bootstrap 4. See more at https://github.com/almasaeed2010/AdminLTE/tree/v3-dev.

Documentation: https://rinterface.github.io/bs4Dash/index.html.

04/18 - Now **shinydashboardPlus**

Description: "Extensions for shinydashboard".

Extend shinydashboard with AdminLTE2 components. AdminLTE2 is a free Bootstrap 3 dashboard template available at https://adminlte.io. Customize boxes, add timelines and a lot more.

Documentation: https://rinterface.github.io/shinydashboardPlus/.

Publications

Coupling between Phosphate and Calcium Homeostasis: A Mathematical Model
D. Granjon, O. Bonny, A. Edwards
American Journal of Physiology-Renal Physiology, 2017.

A Model of Calcium Homeostasis in the Rat
D. Granjon, O. Bonny, A. Edwards
American Journal of Physiology-Renal Physiology, 311 (5), 2016.

Conferences and Talks

09/09/18
- 12/09/18   **NCCR Kidney.CH Summer School 2018**   Zurich, Switzerland
Poster first author: "Web-based e-learning tools of Calcium and Phosphate Homeostasis".

08/07/18
- 12/07/18   **World Congress of Biomechanics 2018**   Dublin, Ireland
Poster first author: "Addressing biomedical diversity via eLearning, an example from a physiology curriculum".

01/02/18
- 02/02/18   **NCCR Kidney.CH Retreat 2018**   Murten, Switzerland
Poster first author: "A web-based application of Calcium and Phosphate Homeostasis".

17/10/17   **Bachelor–Themenworkshops 5. Semester HS 2017**   Zurich University of the Arts, Switzerland
Oral presentation: Computational Physiology.

5/05/17   **Lunch Seminar**   Institute of Physiology, Zurich (UZH)
Oral presentation: "A mathematical model of calcium and phosphate homeostasis in the rat and its perturbations".

29/06/16
- 1/07/16   **Meeting of the Federation of Physiological Societies and the French Physiological Society**   Centre de Recherche des Cordeliers, Paris
Poster presentation: "Role of the rapidly exchangeable calcium pool in bone in calcium homeostasis".
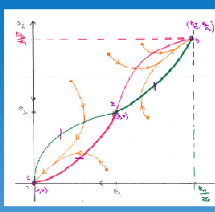
23/03/16
- 24/03/16   **Annual Franco-Swiss Meeting on Electrolytes Metabolism and Renal Physiology**   Inselspital, Bern
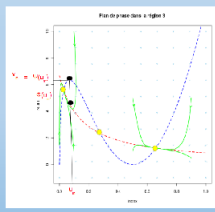Oral presentation: "A model of Ca/P$_i$ homeostasis in the Rat".
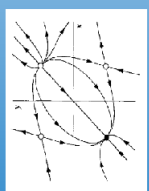
$$\lambda = A + Be^{-\lambda\tau}$$

$$x(t) = e^{\int_{t_0}^{t} p(s)ds}\left(\int_{t_0}^{t}\left(q(s)e^{-\int_{t_0}^{s}p(\tau)d\tau}\right)ds + x_0\right)$$

$$x(t) = \phi(0) + \sum_{k=1}^{n}(-1)^k\frac{[t-(k-1)r]^k}{k!}, \quad t \in [(n-1)r, nr], n \geq 1$$

$$\frac{dx_1}{dt} = \kappa_1\mu\frac{x_2^n}{x_2^n + \theta_2^n} - (\gamma_1 + \mu)x_1,$$
$$\frac{dx_2}{dt} = \kappa_2\mu\frac{x_1^n}{x_1^n + \theta_1^n} - (\gamma_2 + \mu)x_2.$$

$$\max_{(u,v)\in D\subset\mathbb{R}^2} \dot{L}(u,v) = 0$$

25/02/16
- 27/02/16   **NCCR Kidney.CH Retreat 2016**   Murten, Switzerland
              Poster first author:"Role of the bone rapidly exchangeable calcium pool in calcium homeostasis".

29/09/15
- 02/10/15   **Société Francophone de Dialyse/Société de Néphrologie**   Lyon, France
              Poster first author: "Consequences of primary hyperparathyroidism on renal calcium excretion".

19/03/15
- 20/03/15   **Annual Franco-Swiss Meeting on Electrolytes Metabolism and Renal Physiology**   Centre de Recherche des Cordeliers, Paris
              Oral presentation: "A Model of Calcium Homeostasis in the Rat".

6/02/15   **Groupe de travail Modélisation Numérique et Images** MAP5, Paris Descartes
              Oral presentation: "Calcium Homeostasis modeling and perturbations".

19/03/14
- 20/03/14   **Annual Franco-Swiss Meeting on Electrolytes Metabolism and Renal Physiology**   CHUV, Lausanne
              Oral presentation: "A Simplified Model of Plasma Calcium Regulation by PTH".

3/06/13
- 6/06/13   **Conference " In honour of Michael Mackey's 70th birthday "**   Lyon, France
              Oral presentation: "Oscillatory dynamic during zebrafish somitogenesis".

Mentoring

08/18
- 08/19   **Master Student supervisor**   Zurich, Switzerland
              Supervised a master student in computational physiology: "Turn a physiological mathematical model into a gaming engine".

02/18
- 07/18   **Master Student Co-Supervisor**   Zurich, Switzerland
              Co-supervised a master student in applied mathematics: "Computational modeling of flow and solute transport in the nephrons of a kidney".

11/15
- 06/16   **Student Supervisor**   Centre de Recherche des Cordeliers, Paris
              Supervised a high school student for the "Young Researchers" program. Introduction to modeling and experimentations.

Teaching

10/18 - 11/18	**Teaching assistant** Practical courses about : "Blood formation", 20h.	Zurich, Switzerland
04/18 - 05/18	**Teaching assistant** Practical courses about : "Hearing". Absolute audiometry, determination of isophones, clinical audiometry, auditory localization and otoacoustic emissions, 30h.	Zurich, Switzerland

Detailed Knowledge

- **Web-based Application Development** ★★★★★
  Expert in the development of R-Shiny web-applications (as well as HTML, CSS, Javascript).

- **Web-server Management** ★★★★★
  Expert in creating and managing virtual machines, dedicated to host web servers or speed up simulations.

- **R Language** ★★★★★
  Expert in R development for dynamical system analysis.

- **Version Control** ★★★★★
  Git/Github as version control software.

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- **Dynamical Systems Analysis** ★★★★★
  Steady states, linearization, stability, Lyapunov theory, limit cycle existence (Poincaré-Bendixon theorem), bifurcation analysis (Hopf bifurcation), sensitivity analysis and some control theory.

- **Differential Equations Theory** ★★★★★
  Ordinary differential equations, partial differential equations, delay differential equations basic properties and important results.

- **Algebra and Analysis** ★★★★★

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- **Physiology** ★★★★★
  Calcium and phosphate metabolism, renal physiology.

- **Ecology** ★★★★★
  Basic properties of ecosystems, evolution theory, prey-predators interactions, host-parasites systems.

Updated: 08/12/2018