

# ExactCure: personalization of you Medical Digital Twin

*Calibration of pharmacokinetic models of drugs and integration of patient data*

H2020 SOCIETAL CHALLENGES: Health, demographic change and wellbeing

PRODUCTIVE SECTOR: Biomedicine and Health Care, Chemical and Pharmaceutical Industry

## PROBLEM DESCRIPTION

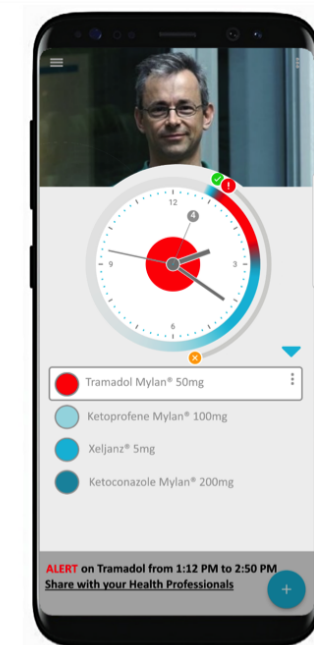
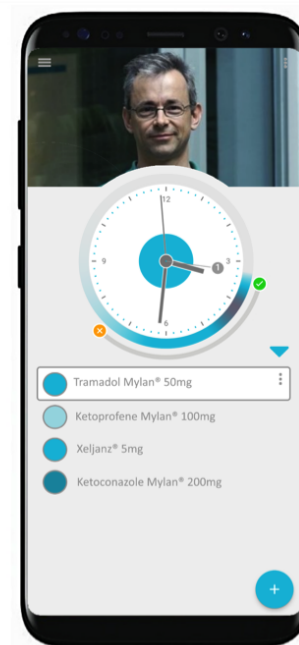
Inappropriate medications kill more people than car accidents do! 3 times more, costing France 10 billion euros of health insurance / year. Why is it so complex? We are all different, we differently respond to drugs. ExactCure leverages a proprietary Artificial Intelligence in order to create personalized biomodels of drugs. These models allow adjusting an ideal posology and tightly monitoring the therapy in a web/mobile medical device for health professionals and patients.

## CHALLENGES AND GOALS

- Analysis of the dynamic properties of pharmacokinetic structures
- Integration of lacunar patient data
- Mapping of population models to individual characteristics

## MATHEMATICAL AND COMPUTATIONAL METHODS

Pharmacokinetic models reflect the fate of a drug in an organism, from absorption to distribution, metabolism and elimination. They are systems of Ordinary Differential Equations. Their dynamics is calibrated on populations of patients thanks to clinical trials. Their parameters are random variables that integrate the inter-patient variability. They are Non Linear Mixed Effect Models. Our ExactCure/Inria collaboration leverages skills in dynamical systems and control theory in the context of pharmacokinetics modelling.



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## Results and Benefits

In the framework of pharmacokinetics modelling, personalization means that kinetic parameters need to be estimated/adjusted from personalized data. For that purpose we have begun to develop cutting-edge technologies that allow rigorous and smart integration of such personalized data in our proprietary calibration pipeline. The underlying mathematical techniques form the cornerstone of very challenging collaborations between ExactCure and Inria.



### **Personalized Biomodeling of Drugs**

**A significant advancement in our core calculation algorithms has been achieved. It opens the way to a best-in-class personalization algorithm for patients.**



BIOCORE is an Inria team at Inria Sophia Antipolis (Nice, France) with an expertise in dynamical systems and control theory, especially in the field of biomathematics.



ExactCure (Nice, France) is a eHealth company that leverages a proprietary Artificial Intelligence dedicated to personalized medicine.