




A Mobile Platform for Personalization of Insulin Delivery based on a Patch Pump and Reinforcement Learning

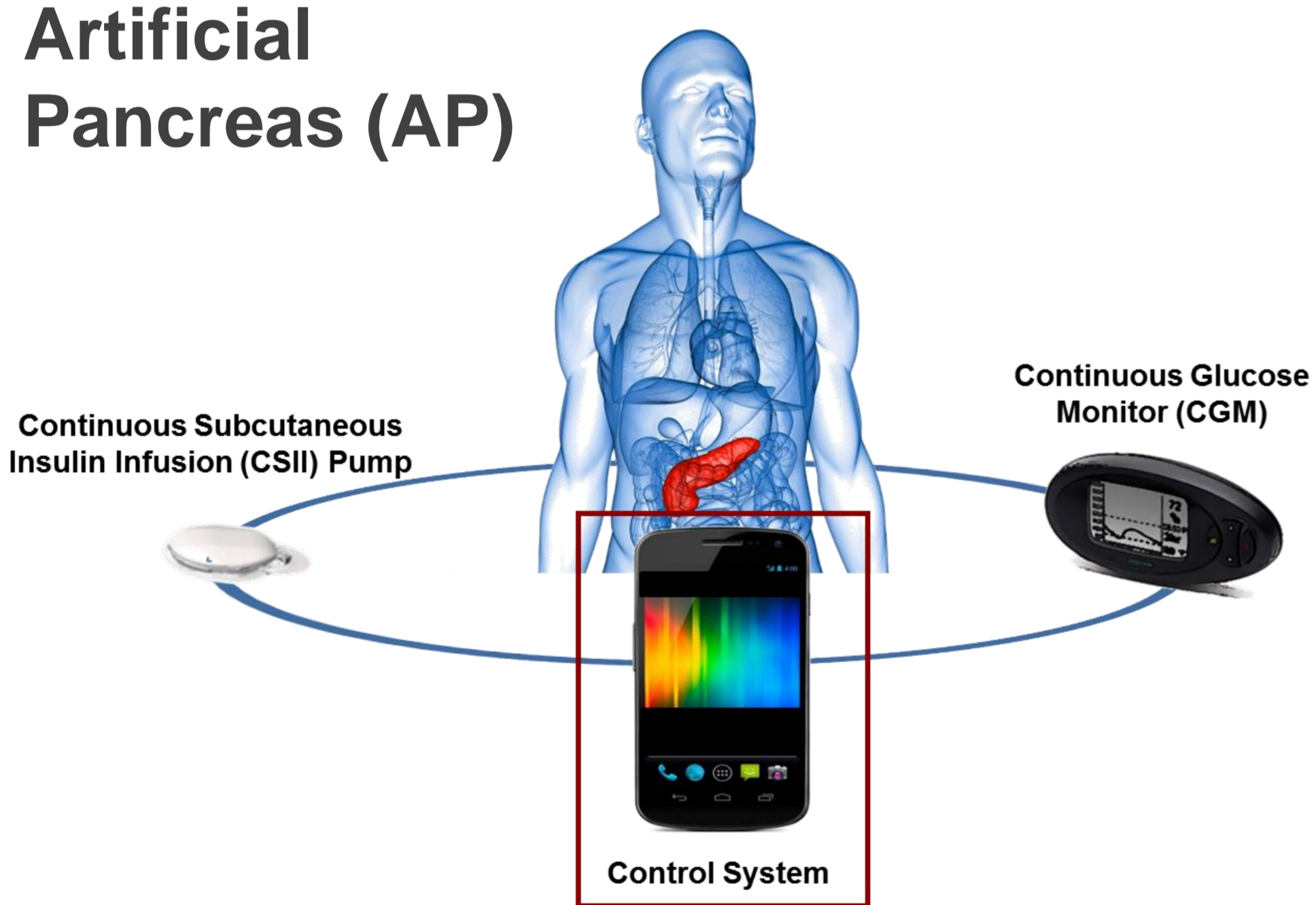


Project Coordinator	Stavroula Mougiakakou ARTORG Center for Biomedical Engineering Research, University of Bern
Partners	  
Starting date	January 2016
Duration	24 months

Scope of MyTreat is to develop a mobile platform for the personalized delivery of insulin for diabetic patients based on the combined use of machine learning algorithms, a highly accurate patch pump, glucose monitoring devices and mobile phone technologies. The platform will be evaluated in both *in silico* and clinical environment.

Scientific Innovation

Artificial Pancreas (AP)



The glucoregulatory system is

- complex and non-linear
- described by limited information
- characterized by inter- and intra-patient variability
- influenced by a number of factors e.g. meals, exercise (disturbances)
- characterized by delays

Current Status of AP

Various control algorithms:

- MPC, PID, Fuzzy logic ...
- Model based/ Model free
- Predefined control strategy
- No real-time adaptive
- Difficult to personalize
- Sensitive to disturbances

CGM and pumps: Open issues with delays and inaccuracies

MyTreat

Control algorithm:

Reinforcement Learning (RL)

- Model free
- Real-time adaptive
- Personalization capabilities
- Low computational cost
- Fast compensation times in case of disturbances

CGM and pumps: A highly accurate patch pump along with a CGM and blood glucose meters

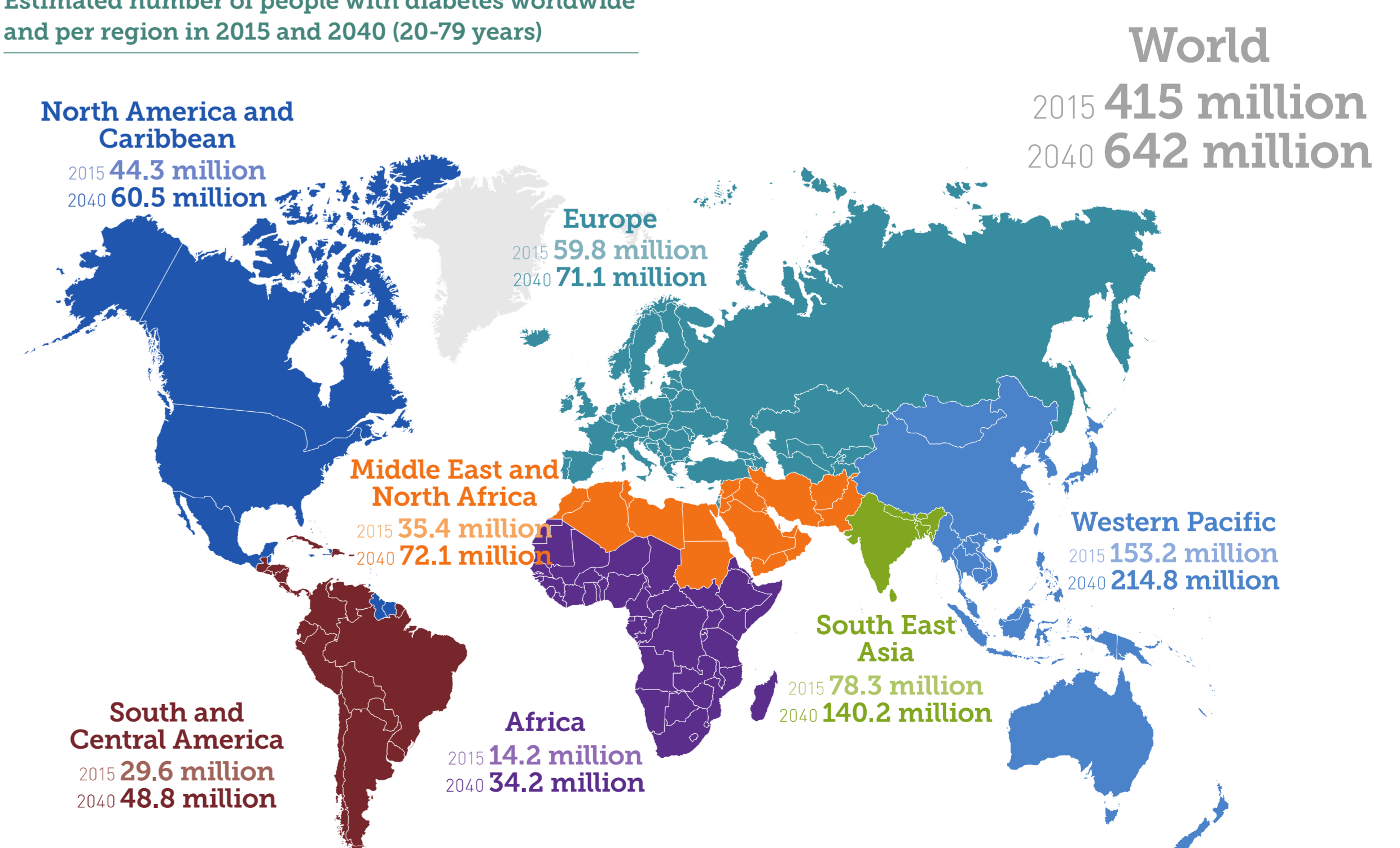
Portable platform: Highly secured portable solution

Business Potential

- In 2015, 1 in 11 adults had diabetes (415 million)
- By 2040, 1 in 10 adults will have diabetes (642 million)
- 12% of global health expenditure is spent on diabetes (USD 673 billion)
- In 2020, AP market share could reach up to 50% of individuals with type 1 diabetes (T1D)
- In 2020, AP will generate an annual revenue of up to USD 68 million

Year	2015	2016	2017	2018	2019	2020
New pump sold on that year (T1D)	155'000	164'300	174'158	184'607	195'683	207'424
Expected AP market share (T1D)	10%	20%	30%	40%	50%	50%

Estimated number of people with diabetes worldwide and per region in 2015 and 2040 (20-79 years)



International Diabetes Federation. *IDF Diabetes Atlas update poster, 7th edn.* Brussels, Belgium: International Diabetes Federation, 2015.