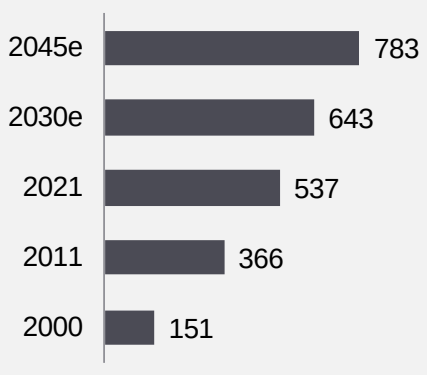
FutureBridge

BREAKING BARRIERS IN DIABETES

Artificial Pancreas in Action

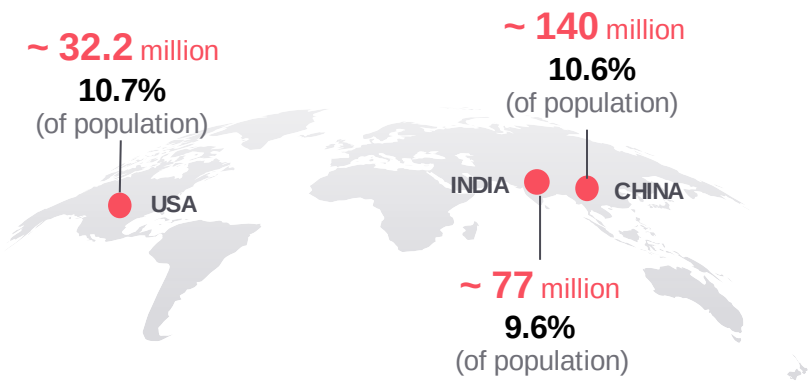
Epidemiology and Prevalence of Diabetes

Global diabetic patients
(in millions)



By 2045, 1 in 8 adults, approximately 783 million, will be living with diabetes.

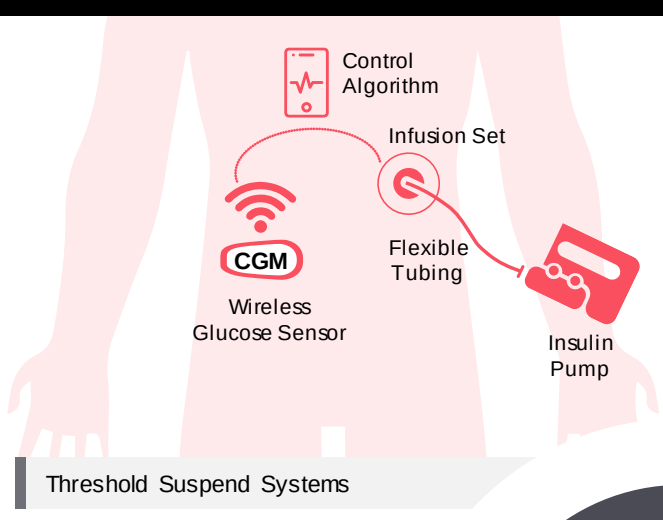
Countries with the highest number of diabetics by 2021



Rise in the prevalence of diabetes is fueling
- Enhanced adoption rate and
- Need for innovation

in artificial pancreas systems

Artificial Pancreas Systems: Why Consider Them?



- Advanced algorithms ensure **precise insulin dosing**, **minimizing errors**
- Integrated continuous glucose monitor (CMG) for continuous and **real-time glucose level tracking**
- Auto-adjusts insulin with continuous glucose monitor (CMG) data, **simplifying meal management**
- Prevents hypoglycemia risk by **adjusting insulin based on real-time glucose data**

Types of Device
- Threshold Suspend Systems
- Hybrid Closed-Loop System
- DIY Hybrid Closed-Loop System
- Bi-hormonal Systems
- Bio-artificial Pancreas
- Fully Closed-Loop System
- Implanted Artificial Pancreas

ARTIFICIAL PANCREAS

Essential features & components
- Insulin Delivery
- Glucagon Delivery
- Meal and Insulin Detection
- Glucose Monitoring
- Predictive Algorithms
- Long-Term, Implantable Systems

Limitations of Current Artificial Pancreas Systems

- **No-prick** or completely non-invasive are not available
- Unavailability of **highly accurate algorithms** for predicting glucose levels in real-time
- Dealing with the **variability** in insulin **absorption rates**
- **Adapting** to **changes in physical activity** levels and their impact on glucose dynamics
- **Integration** with other diabetes management tools and technologies
- **Addressing** the influence of **hormonal fluctuations** on glucose regulation
- **High cost** of **insulin pump**
- Accurate assessment for risk of **hypoglycemia** and **hyperglycemia** not available
- Lack of intuitive and **user-friendly** interfaces
- **Inconsistent performance** and **durability** over extended periods of use

Innovative Technologies in Artificial Pancreas System

INREDA	Bi-hormonal fully closed loop system	Artificial pancreas monitors glucose, adjusts hormones, no patient intervention needed.	
Defymed	Mail Pan ®- Bioartificial Pancreas (BAP)	Biocompatible membranes encapsulate insulin-secreting cells, allowing glucose and insulin passage, blocking antibodies.	
PANCREUM	All-in-one Integrated System	Pancreum's integrated platform replaces multiple body-worn devices, controlled by a single handheld controller.	
DE MONTFORT UNIVERSITY LEICESTER	Implantable Artificial Pancreas	Implantable insulin device adjusts insulin release based on blood glucose, ensuring optimal levels automatically.	

The Role of Big Data and AI in Advancing Artificial Pancreas Systems

- Machine Learning
- Artificial Neural Networks
- Deep Learning
- Bioinspired Reinforcement Learning Algorithm

- **Fully automated system**
- **Real-time CGM data monitoring**
- **Personalized Treatment**
- **Data Logging and Analysis**
- **Insulin Dosing Optimization**
- **Adaptive Control for Hypo- and hyper-glycemia**

Conclusion

- **AI-Enhanced CGM Sensors:** AI improves CGM sensor accuracy for real-time blood glucose monitoring, optimizing calibration, data processing, noise reduction, and error detection.
- **Biometric Data Integration:** Future APS includes biometric data (heart rate, skin temp, etc.) in a closed-loop system, enhancing sophistication in glucose level management.
- **Dual Hormone Systems:** Development of dual hormone artificial pancreas systems, integrating insulin and stable synthetic glucagon, advances comprehensive glucose regulation.
- **Advanced Algorithms:** APS focuses on advanced algorithms addressing person-to-person and day-to-day glucose variability for adaptability and personalized regulation.
- **Quality of Life Improvement:** Overall, these advancements promise to significantly enhance the effectiveness and personalization of glucose regulation, ultimately improving the quality of life for individuals managing diabetes through APS.

Prospective Developments in Next-Generation Artificial Pancreas Systems

- Automated insulin delivery without user input
- Higher time in range for optimal glucose levels
- Improved time-in-target range
- Integration with other devices
- Closed-Loop system for type 2 Diabetes

About FutureBridge

FutureBridge is a techno-commercial consulting and advisory company. We track and advise on the future of industries from a 1-to-25-year perspective to keep you ahead of the technology curve, propel your growth, Identify new opportunities, markets and business models, answer your unknowns, and facilitate best-fit solutions and partnerships using our platforms, programs, and access to global ecosystems and players.