

# CLINI<sup>Q</sup>IP



Improved survival chances  
for critically ill patients

Increased efficiency and  
safety in clinical practice

# Closed Loop Insulin Infusion for Critically Ill Patients

## Mission

improve survival chances  
in intensive care

Healthy people can develop atypical physiological symptoms in intensive care units. Shock and trauma of surgery may increase glucose levels and lead to symptoms comparable to those of diabetes mellitus. Recent medical studies have brought evidence that treatment of high glucose levels with insulin will dramatically improve survival chances in these patients. However, treatment of glycaemia with target glucose levels close to the physiological range is labour-intensive and although the cause/effect is well-known, hospitals are hesitant to implement tight glycaemic control.

In a combined effort, clinicians and scientists have joined forces in the CLINICIP project to develop an **intelligent glucose monitoring and control system for critically ill patients**. The overall goal of the **CLINICIP system** is to establish glycaemic control on an automated basis in order to improve survival chances in intensive care units and increase efficiency in clinical practice.

A total of 13 firms, universities and non-university research organisations from all over Europe are co-operating in this Integrated Project, which is scheduled to run from 2004 to 2007.

## Approach

close co-operation of  
medicine and engineering

### ► Clinical research

Clinical research will follow a two-pronged approach, including basic physiological research and practical clinical studies. Physiological research will focus on investigating the properties and behaviour of adipose tissue under traumatic conditions and its suitability as a possible route for automated glucose regulation. In addition, a wide range of clinical trials will be carried out to test components, subsystems, and finally the complete system as developed within the project in a clinical setting.



## ► System development

### Body interface

The body interface plays a key role in measuring glucose and metabolite levels in critically ill patients. Different routes will be investigated: extravascular as well as intravascular approaches will provide access for the continuous measurement of glucose and metabolites to facilitate tight blood glucose control.

### Sensor system

Four different sensor systems will be developed to measure the glucose concentration in blood and interstitial fluid delivered by the body interface. Additional metabolite sensors measuring lactate, carbon dioxide, oxygen and pH will be developed for the characterisation of adipose tissue.

### Main platform

Data as provided by the sensor system is transmitted to the main platform, which acts as the brain of the **CLINICIP system**. It interacts with the control algorithm, which calculates the insulin infusion rate.

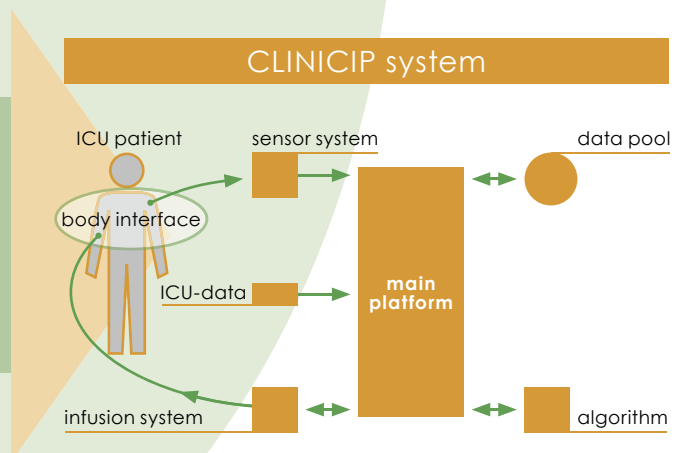
The main platform will be developed in a stepwise approach, first as a decision support system still requiring manual glucose measurements and thereafter as a control system with automated glucose measurement and insulin administration to facilitate tight glucose control.

### Infusion system

The infusion system will act as the second body interface of the **CLINICIP system**. In order to establish tight glycaemic control, the main platform communicates with the infusion system and actively regulates the intravenous insulin infusion.

## ► Data management

All data from clinical studies will be entered into a knowledge pool where the participating medical institutions can store and share their findings. Data and treatment recommendations will also be made available to hospitals outside the consortium in order to raise awareness about the importance of glycaemic control for critically ill patients. These centres will be invited to use the **CLINICIP system** to adapt their clinical work to the newly developed evidence-based practice and to expand the established knowledge pool.



## Partners



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## Contact Details

### **Coordinator**

Karin Rehatschek

### **JOANNEUM RESEARCH Forschungsgesellschaft mbH**

### **Institute of Information Systems & Information Management**

Steyrergasse 17  
8010 Graz

AUSTRIA  
Phone: +43 316 876 1144  
Fax: +43 316 876 1191  
[karin.rehatschek@joanneum.at](mailto:karin.rehatschek@joanneum.at)

### **Scientific Coordinator**

Martin Ellmerer

### **Medical University Graz**

### **Department of Internal Medicine – Diabetes and Metabolism**

Stiftingtalstraße 24  
8010 Graz

AUSTRIA  
Phone: +43 316 385 72806  
Fax: +43 316 385 72839  
[martin.ellmerer@healthgate.at](mailto:martin.ellmerer@healthgate.at)

[www.clinicip.org](http://www.clinicip.org)