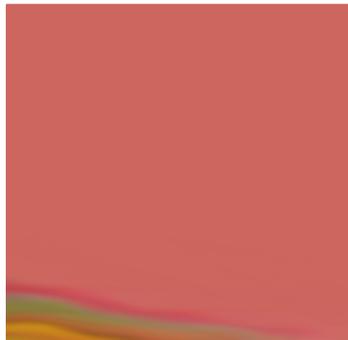
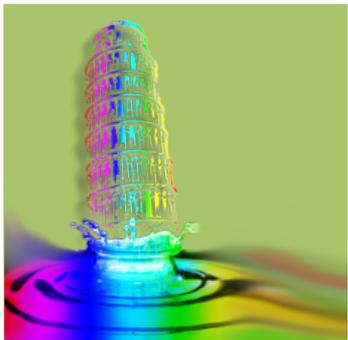




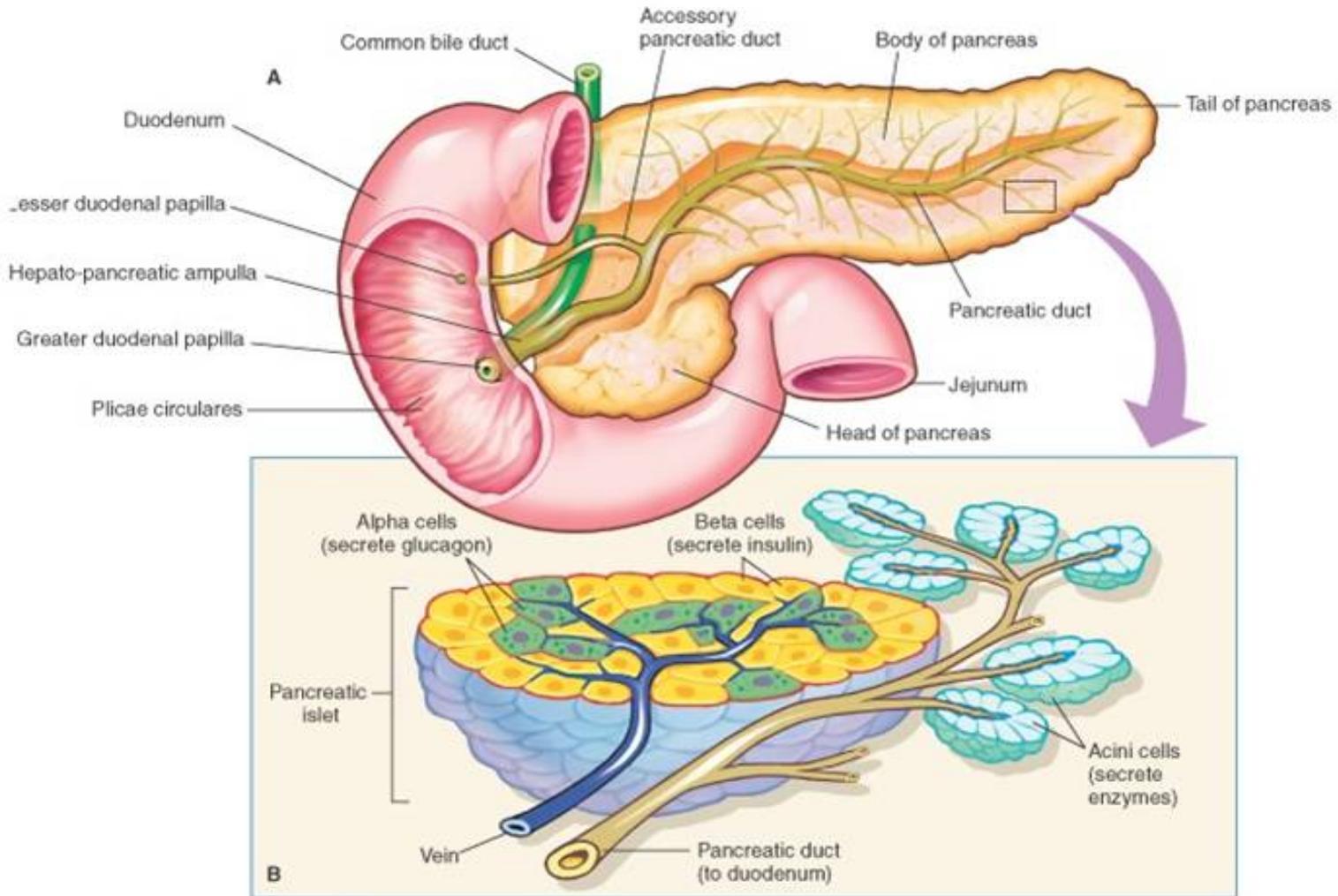
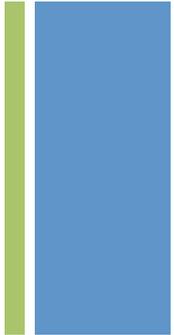
# Pancreas

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# PANCREAS





# REGOLAZIONE DEL GLUCOSIO

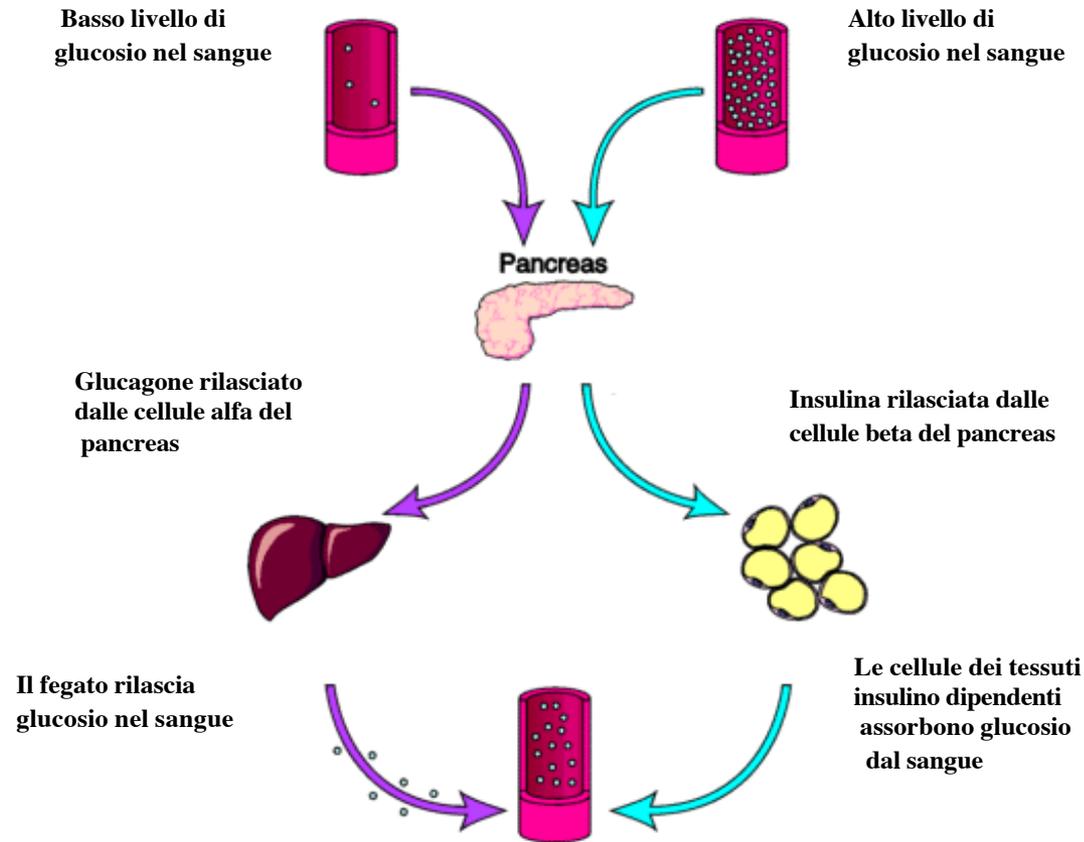
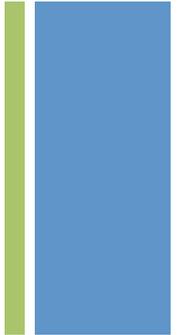
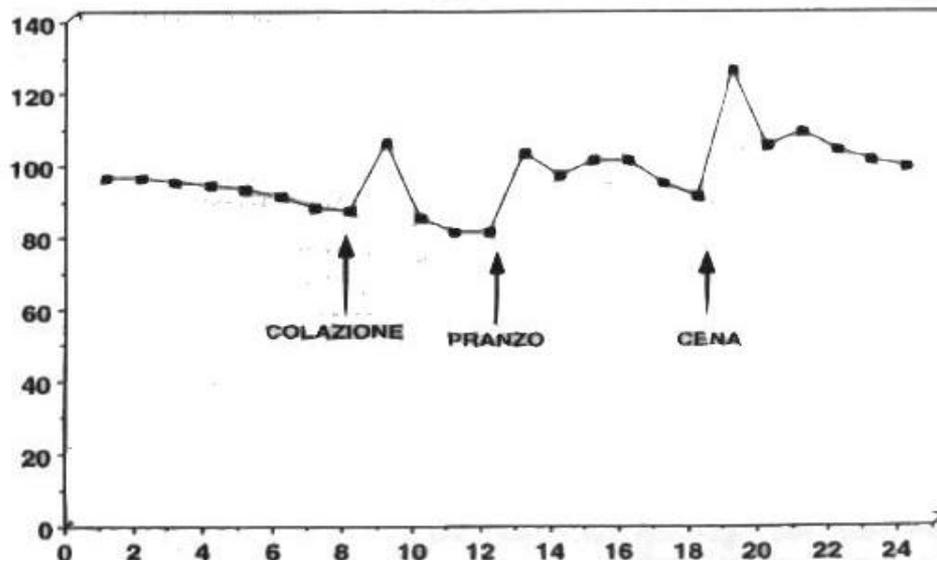


Figura 4: il controllo del glucosio



Glicemia  
mg/dl



Insulinemia  
 $\mu$ U/ml

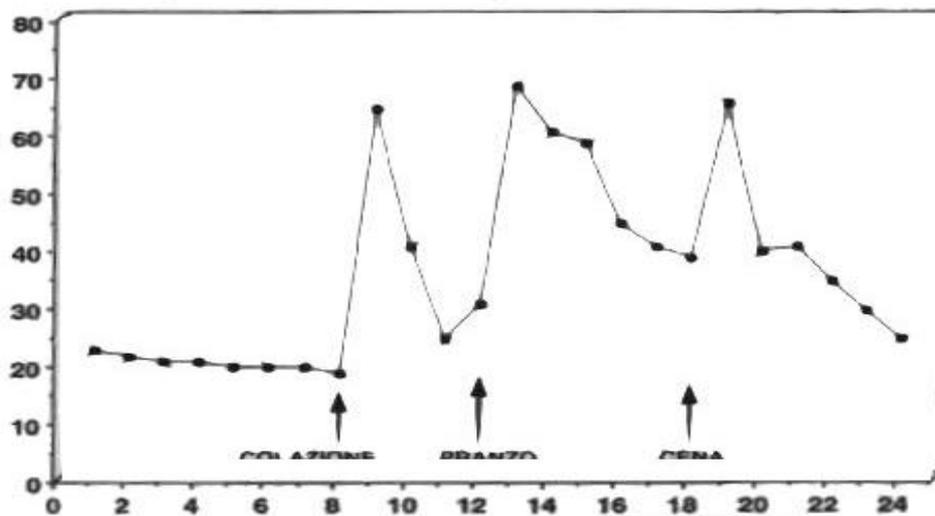


Figura 6: escursioni giornaliere di glicemia e insulinemia





# SECREZIONE INSULINICA

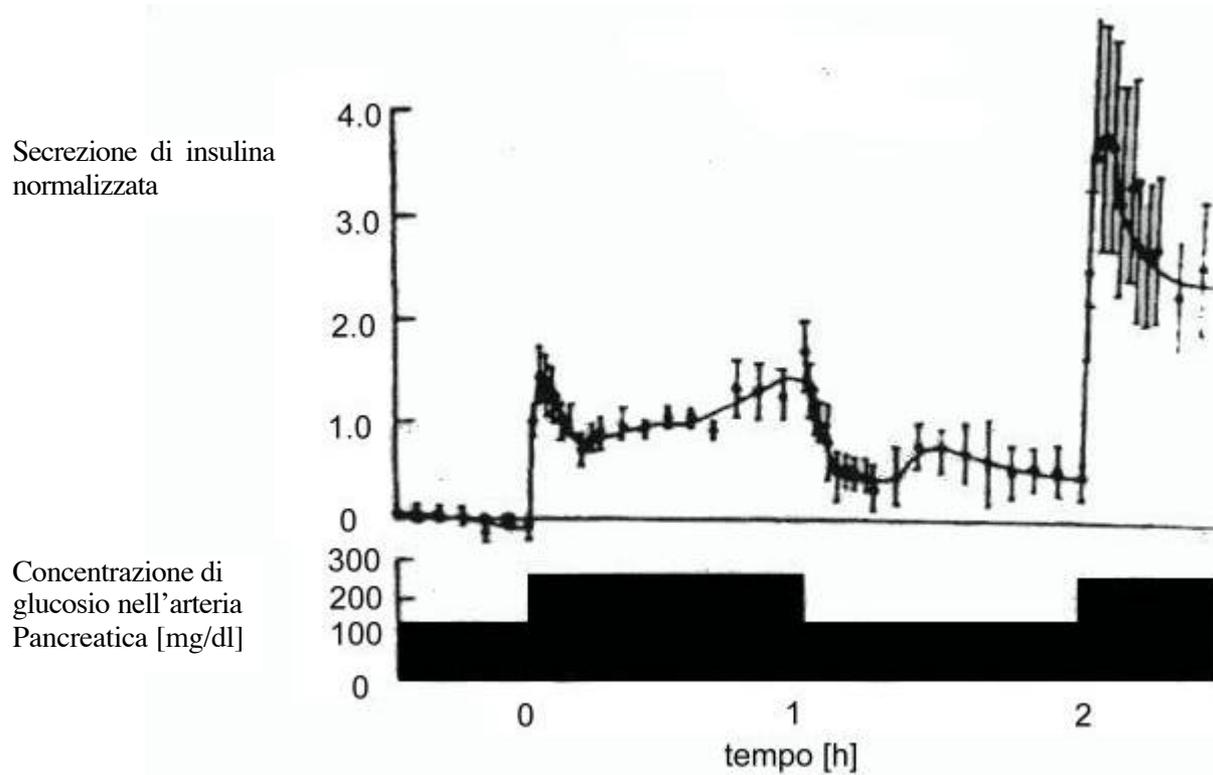
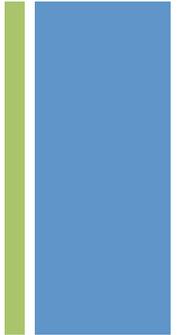


Figura 7. Risposta delle beta cellule a uno stimolo a gradini di glucosio



## TABELLA 1.

Criteri per la diagnosi di diabete mellito indicati dall'ADA  
nelle raccomandazioni 2009

Criterio	Note
Glicemia a digiuno ( <i>fasting plasma glucose</i> , FPG) $\geq 126$ mg/dl (7,0 mmol/l)	Il digiuno è definito dall'assenza di assunzione di cibo nelle precedenti 8 ore
Sintomi di iperglicemia e riscontro casuale di valori di glucosio plasmatico $\geq 200$ mg/dl (11,1 mmol/l)	La casualità corrisponde al dosaggio in qualunque momento della giornata senza tenere in considerazione il tempo trascorso dal pasto I sintomi classici di iperglicemia sono poliuria, polidipsia e calo ponderale non altrimenti spiegato
Valori di glucosio plasmatico $\geq 200$ mg/dl (11,1 mmol/l) a 2 ore dalla prova da carico (test di tolleranza al glucosio orale [ <i>oral glucose tolerance test</i> , OGTT])	In base alle indicazioni OMS, il test deve essere eseguito con un carico di glucosio contenente un equivalente di 75 g di glucosio anidro dissolti in acqua



# PANCREAS ARTIFICIALE

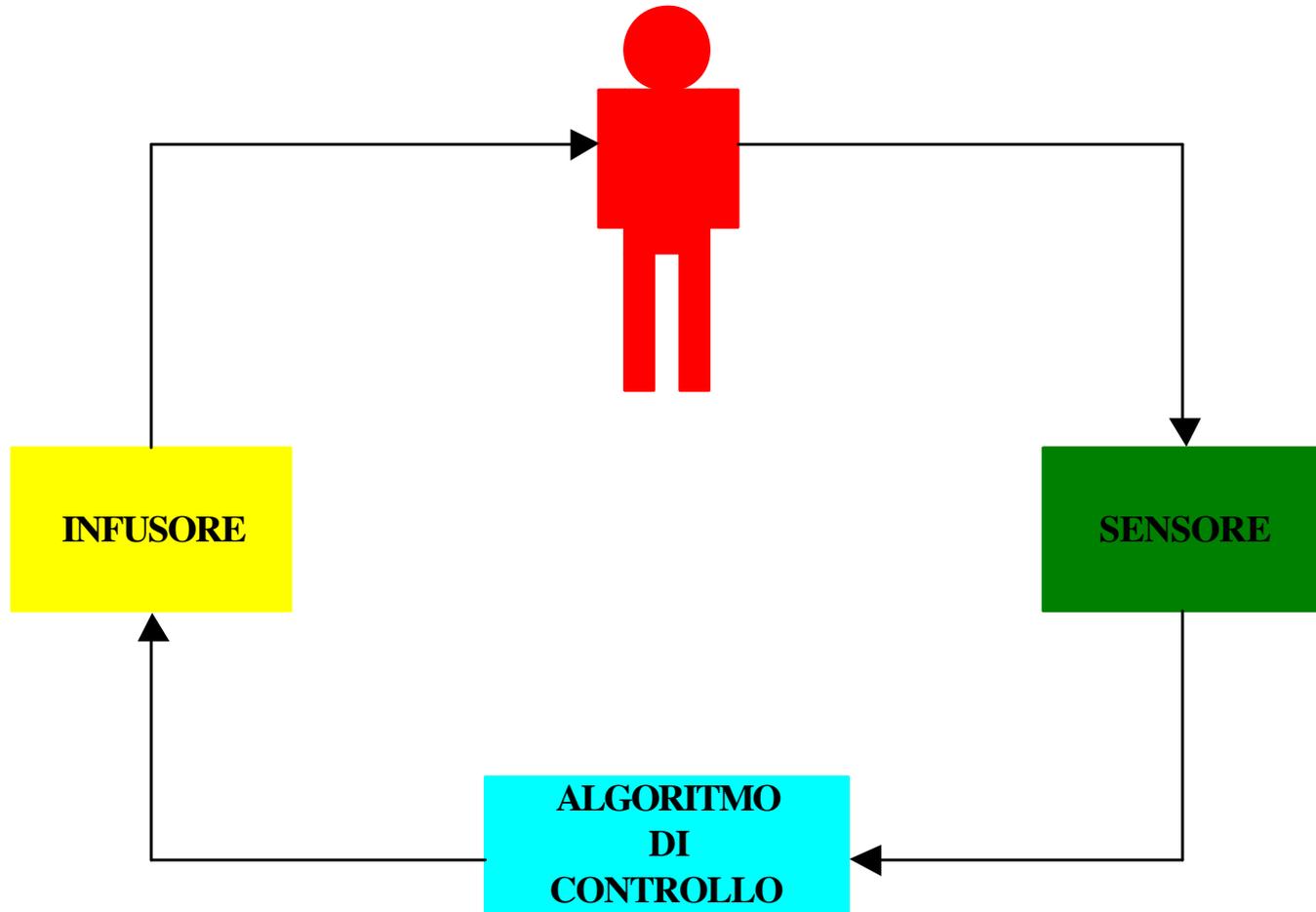
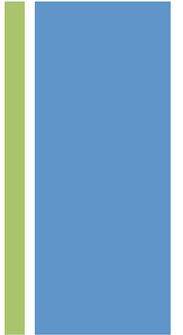
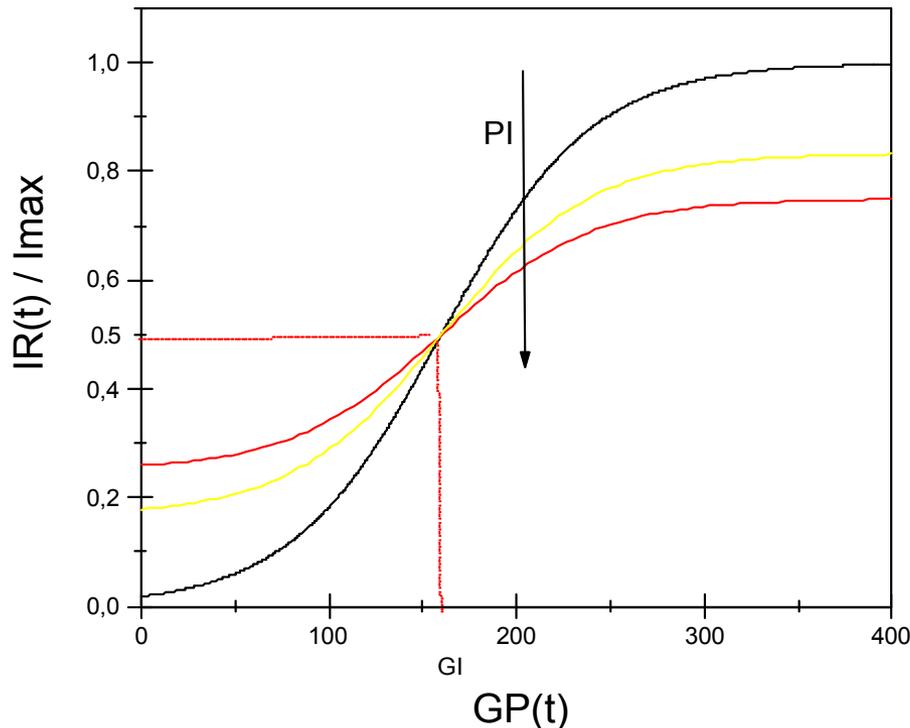


Figura 9: schema di principio di un pancreas artificiale

# + Algoritmo di controllo del pancreas artificiale di Albisser



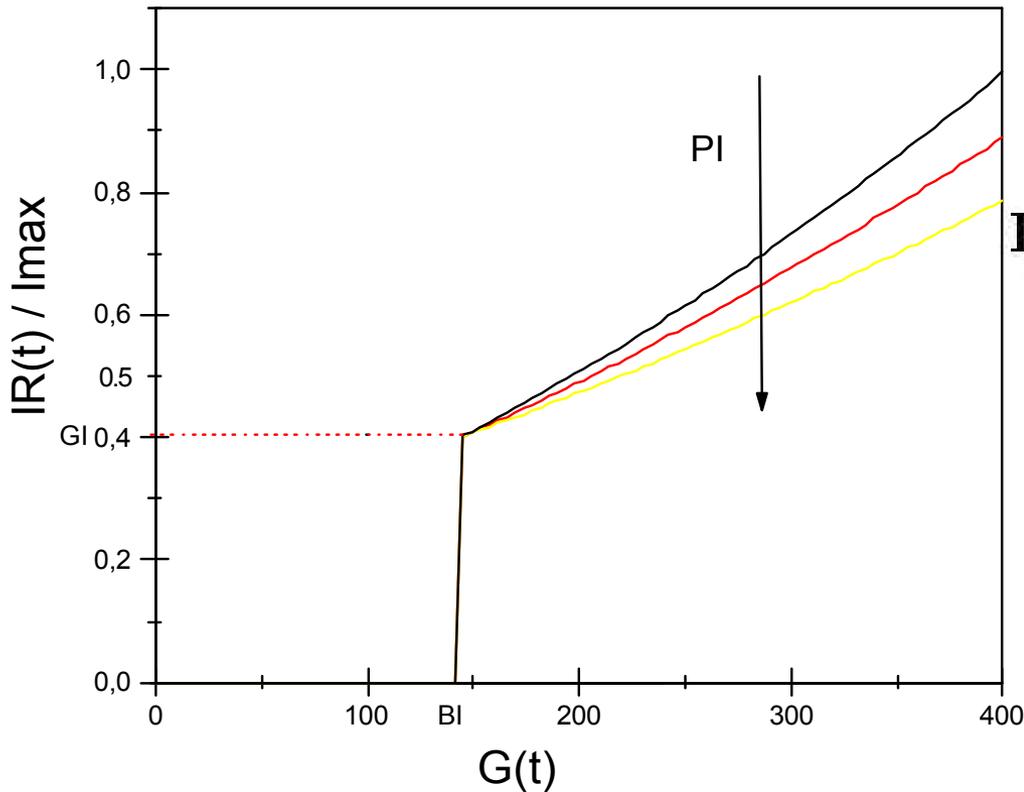
$$IR(t) = \frac{I_{max}}{2} \left[ 1 + \tanh \frac{GP(t) - GI}{PI} \right]$$

$$DR(t) = \frac{D_{max}}{2} \left[ 1 + \tanh \frac{GP(t) - GD}{PD} \right]$$

Figura 19: caratteristica di controllo del pancreas di Albisser



# Algoritmo di Clemens: il Biostator



Controllo statico

$$IR(t) = RI \left[ 1 + \frac{G(t) - BI}{QI} \right]^2$$

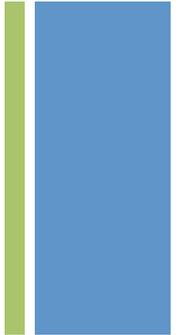
Controllo dinamico

$$IR(t) = K \frac{dG}{dt}$$

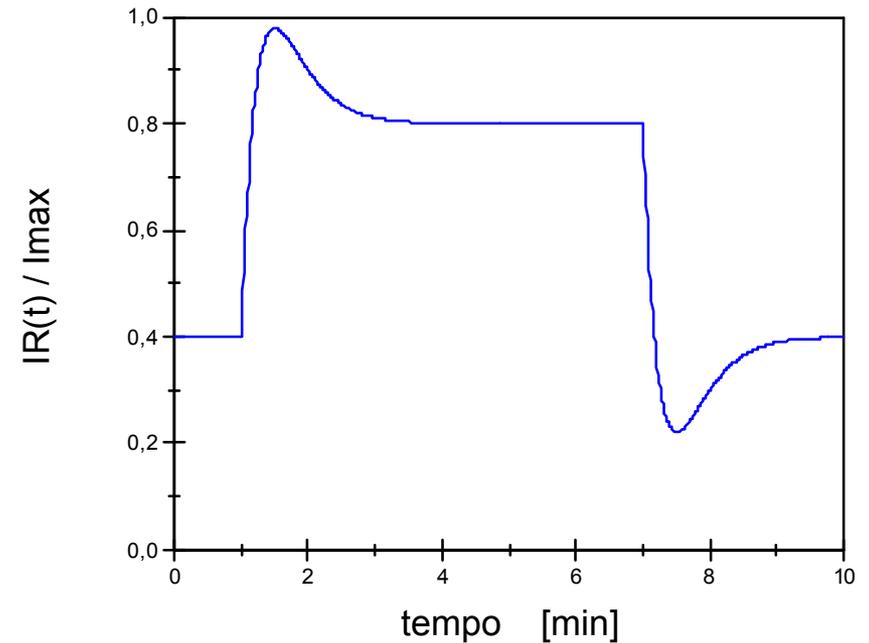
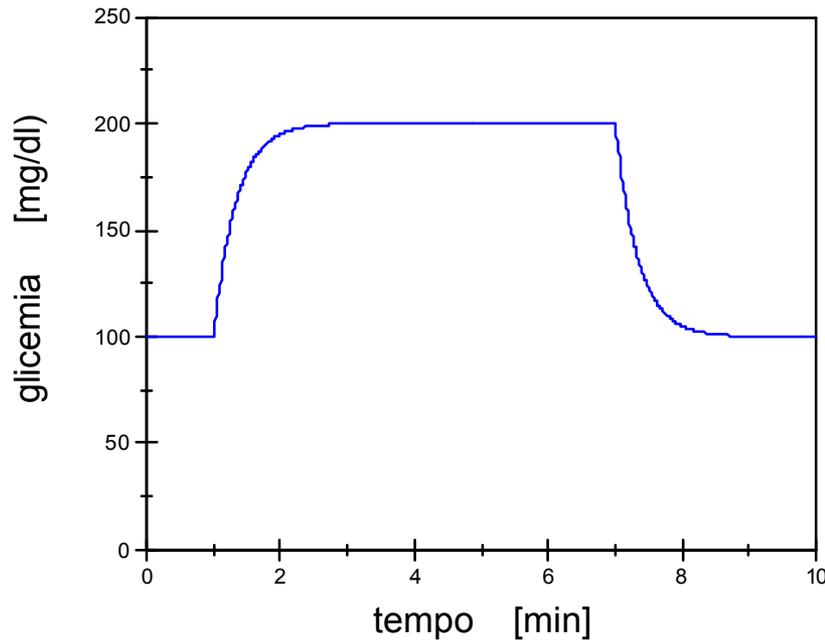
Figura 20: Caratteristica statica del Biostator



# Algoritmo di controllo di Fisher



$$IR(t) = a_0 + a_1(G-BI) + a_2 (dG/dt)$$



**Figura 21: risposta dell'algoritmo di Fisher a uno stimolo**



# Metodi adattivi

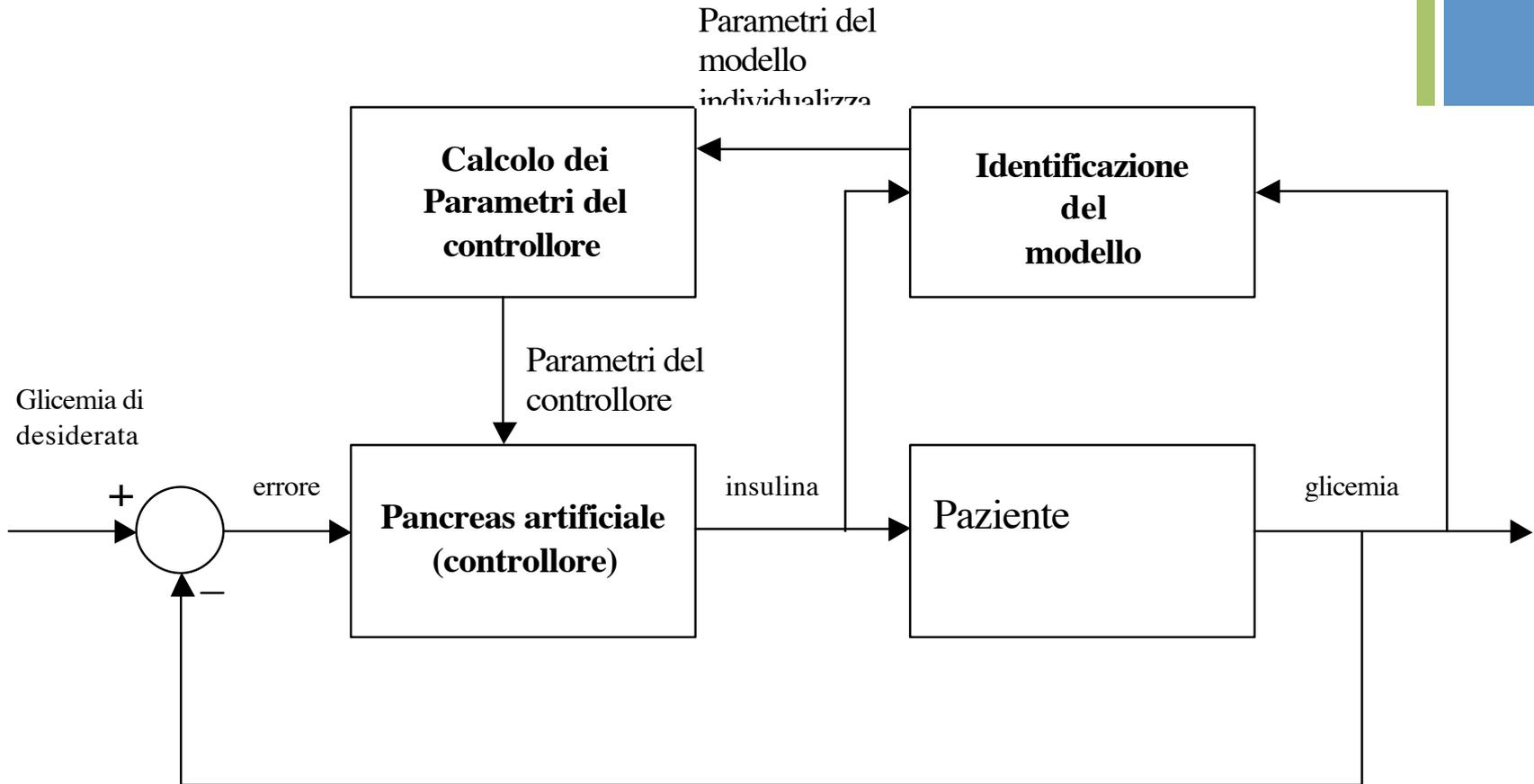
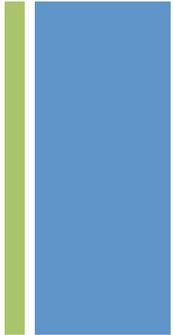
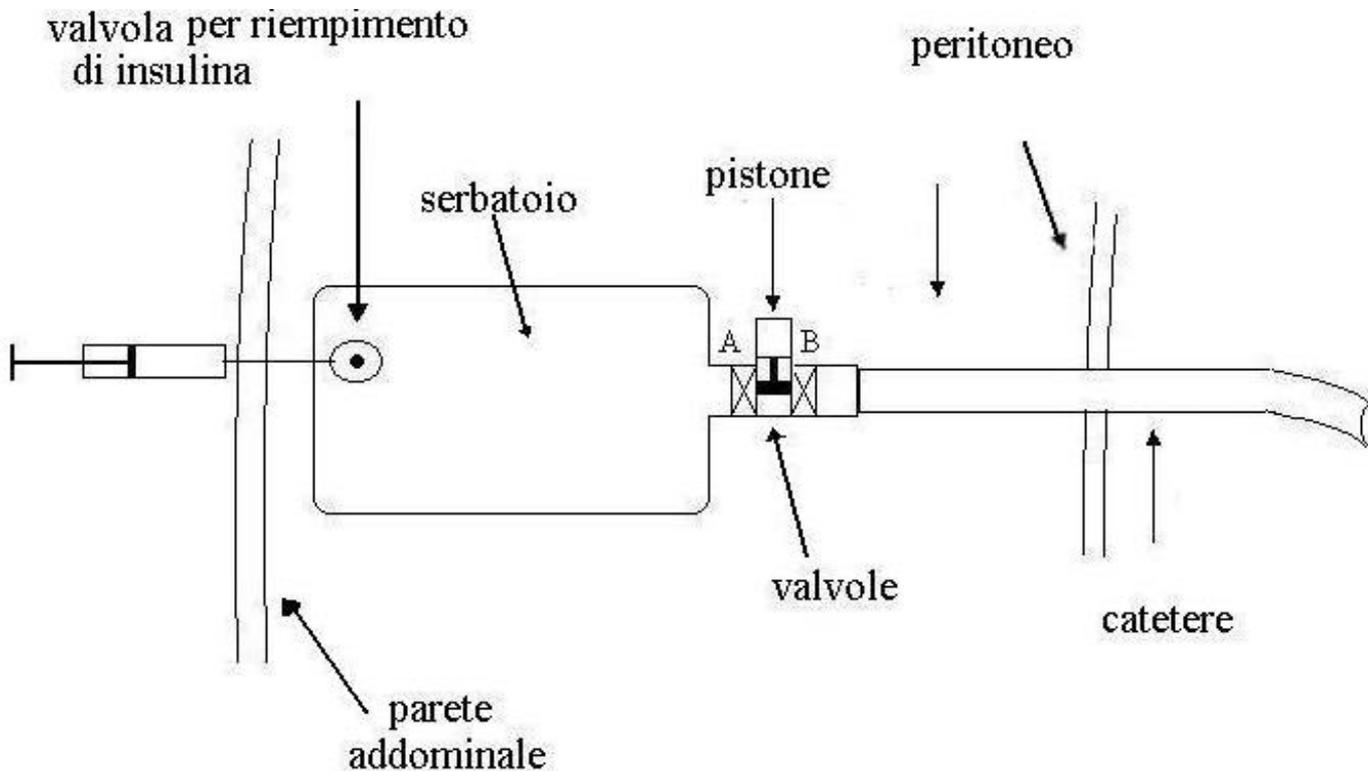
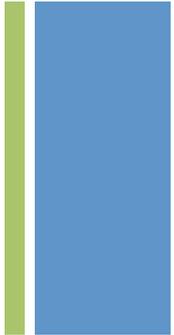


Figura 21: schema di un controllo adattivo self-tuning



# Pompa impiantabile di insulina



**Figura 22:** schema di una pompa impiantabile per insulina