

**L'INNOVAZIONE TECNOLOGICA
(FARMACI E DEVICES):
COSA STA CAMBIANDO
NEL REAL WORLD**

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

11 NOVEMBRE 2019

**HIGHWAY DIABETES
IL PAZIENTE AL CENTRO?**

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

DISCLOSURES

Nell'arco degli ultimi tre anni dichiaro di aver ricevuto onorari per conferenze, collaborazioni scientifiche, lavori di ricerca clinica e documentale dalle seguenti Aziende:

- ***Lilly Italia Spa***
- ***Novo Nordisk Italia SpA***
- ***Johnson & Johnson SpA***
- ***Boehringer Ingelheim SpA***
- ***Artsana SpA***
- ***Takeda SpA***
- ***Bayer SA***
- ***Sanofi SpA***
- ***Astra Zeneca SpA***
- ***MSD Italia SpA***

Se oggi sono qui in qualità di relatore è perché la SID ha contribuito alla mia formazione culturale, scientifica, clinica.

AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti
- Farmaci innovativi per il DMT2
- Le nuove Linee Guida
- Spunti di riflessione
- Conclusioni

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

11 NOVEMBRE 2019

HIGHWAY DIABETES

IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

AGENDA

- I rischi del diabete

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

11 NOVEMBRE 2019

HIGHWAY DIABETES

IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento



**International
Diabetes
Federation**



world diabetes day
14 November

[ABOUT WDD](#)

[GET INVOLVED](#)

[RESOURCES](#)

ABOUT WORLD DIABETES DAY

14 NOVEMBER

Find out more about World Diabetes Day

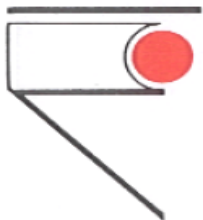
TEMA:

PROTEGGI LA TUA FAMIGLIA



ASSOCIAZIONE
DIABETICI
BERGAMASCHI - ONLUS

Sezione Bassa Bergamasca c/o Ospedale di Treviglio (BG)
Tel. 0363 /424385 Fax 0363/424447 - C.F. 95000930164



L'A.D.B. sez. Bassa Bergamasca
Vi invita allo spettacolo:

"Microalbuminuria in Musica"

Con il gruppo musicale

**PERFECT
STRANGERS**

TNT – Piazza Garibaldi – Treviglio
Sabato 16 Novembre 2019
Ore 20.30

Con il patrocinio di

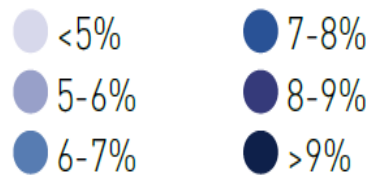


Città di TREVIGLIO
Assessorato alla Cultura

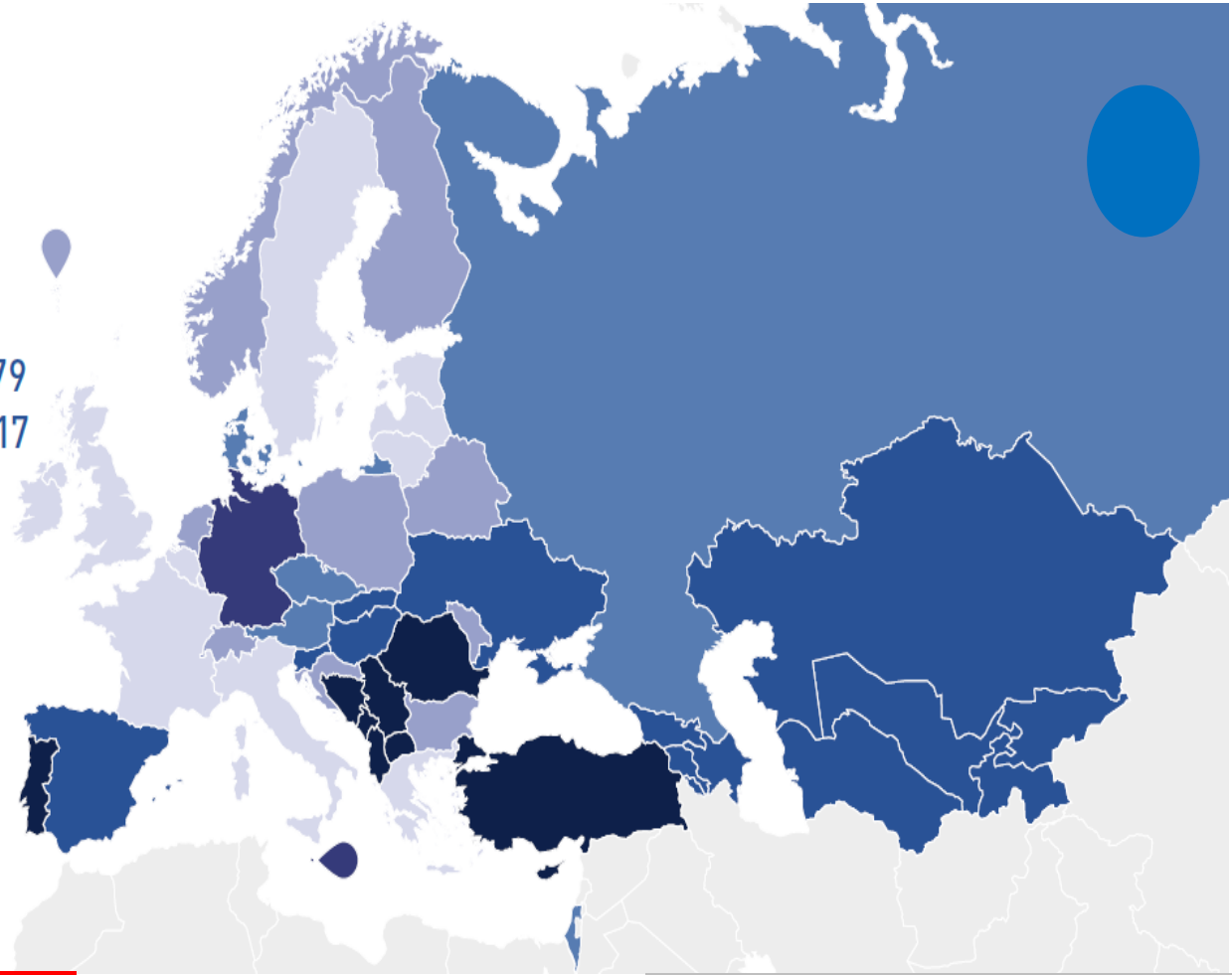
Ingresso gratuito,
l'invito è aperto a tutti !!

FREQUENZA DEL DIABETE IN EUROPA (20-79 ANNI) NEL 2017

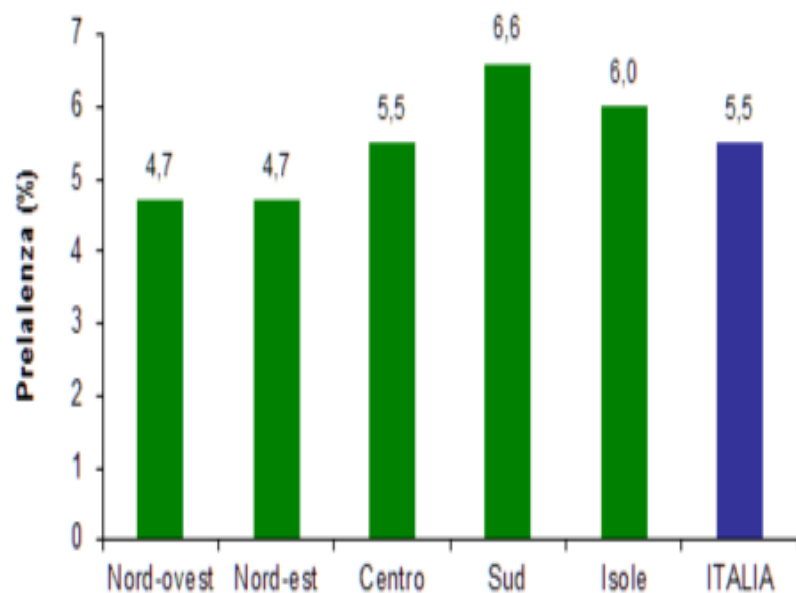
Map 4.2.1 Prevalence (%)
estimates* of diabetes (20-79
years) in Europe Region, 2017



*Comparative prevalence



IL DIABETE IN ITALIA E LE SUE COMORBIDITA'



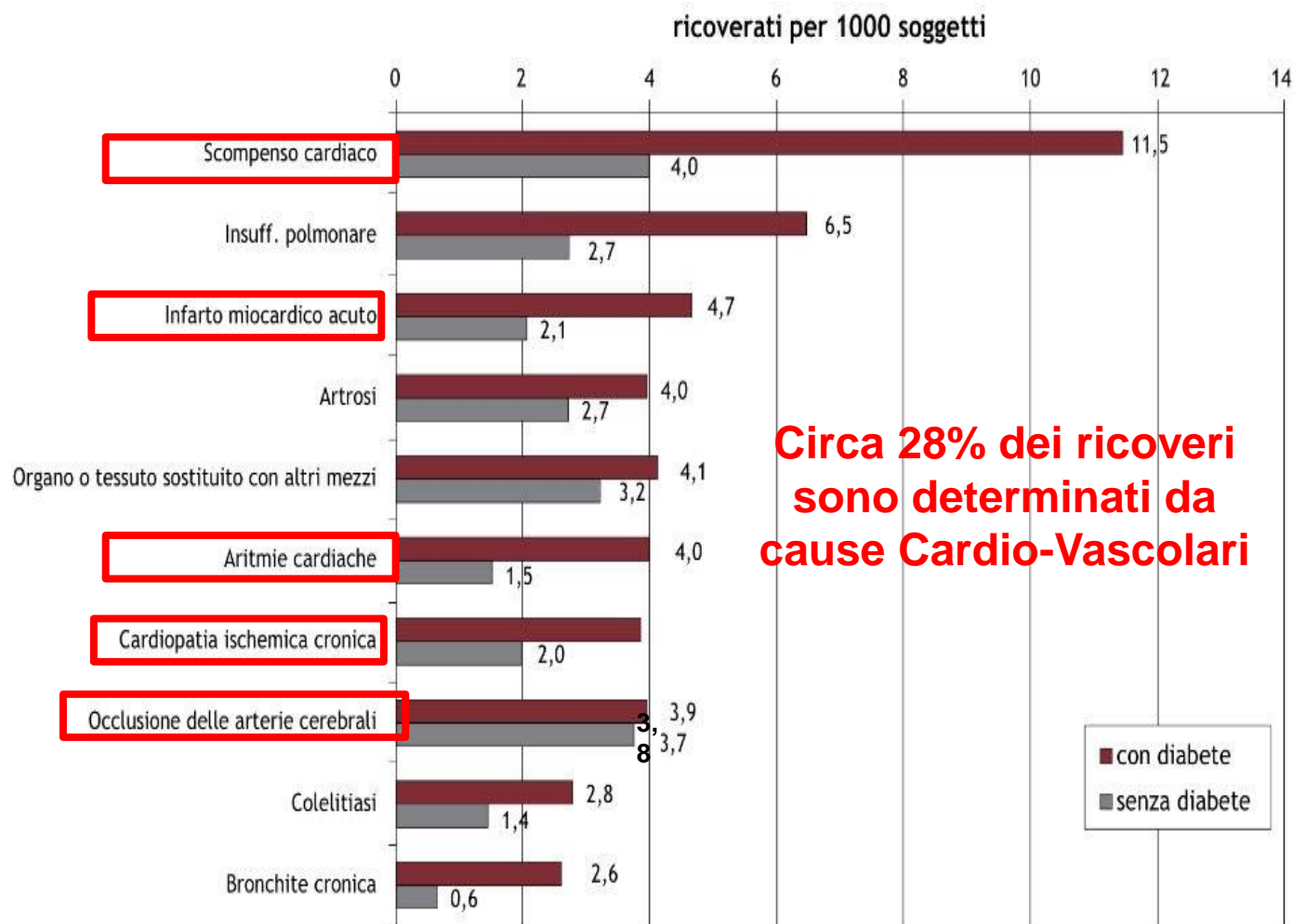
Fonte ISTAT 2014, elaborazione ISS



Fonte: ISTAT 2015, Associazione Ricerca & Diabete SID, Italian Diabetes & Obesity Barometer Report 2017

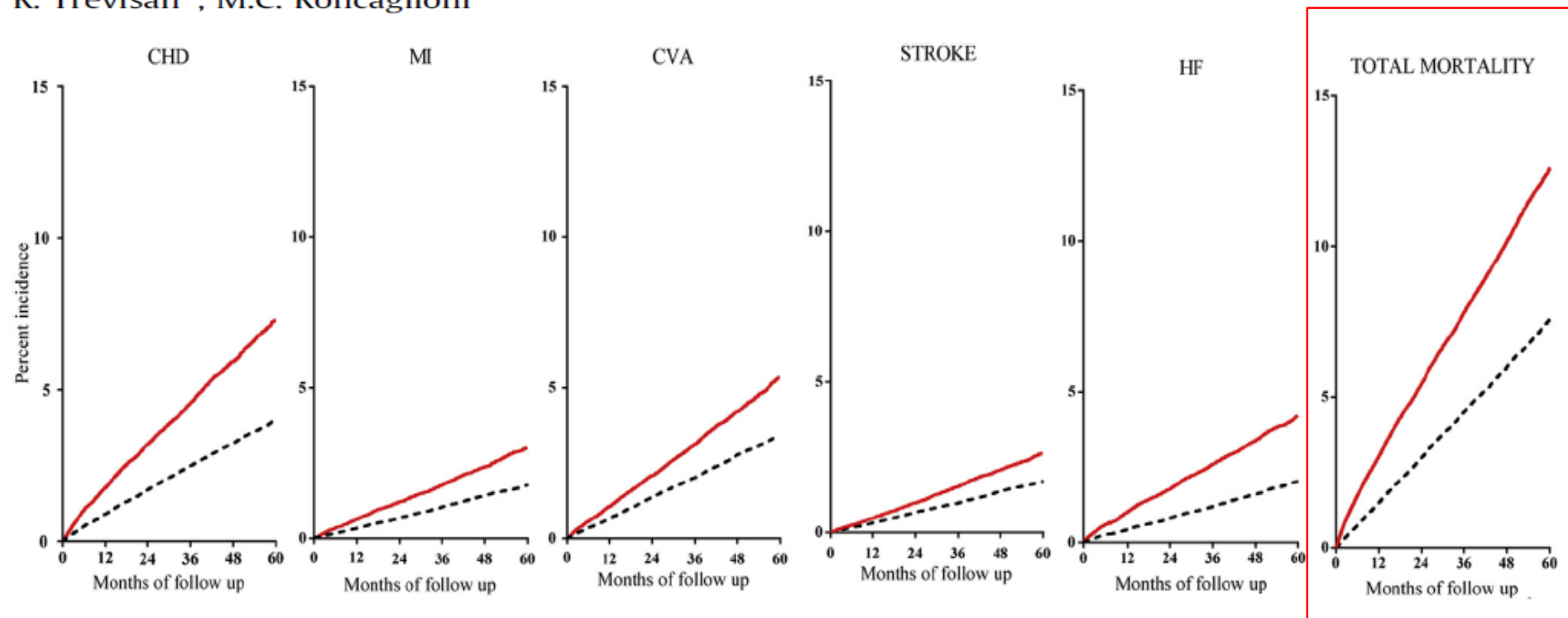


PRIME 10 CAUSE DI RICOVERO ORDINARIO NEI DIABETICI



Elevated risk of death and major cardiovascular events in subjects with newly diagnosed diabetes: Findings from an administrative database

L. Monesi ^a, M. Tettamanti ^b, L. Cortesi ^a, M. Baviera ^a, I. Marzona ^a, F. Avanzini ^a, G. Monesi ^c, A. Nobili ^d, E. Riva ^b, I. Fortino ^e, A. Bortolotti ^e, G. Fontana ^e, L. Merlino ^e, R. Trevisan ^f, M.C. Roncaglioni ^{a,*}



Incidenza %

p (Long-rank test) <0.001 for all comparisons

— Patients with newly diagnosed diabetes

----- Subjects without diabetes

AGENDA

- I rischi del diabete
- Tecnologie per il DMT1

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

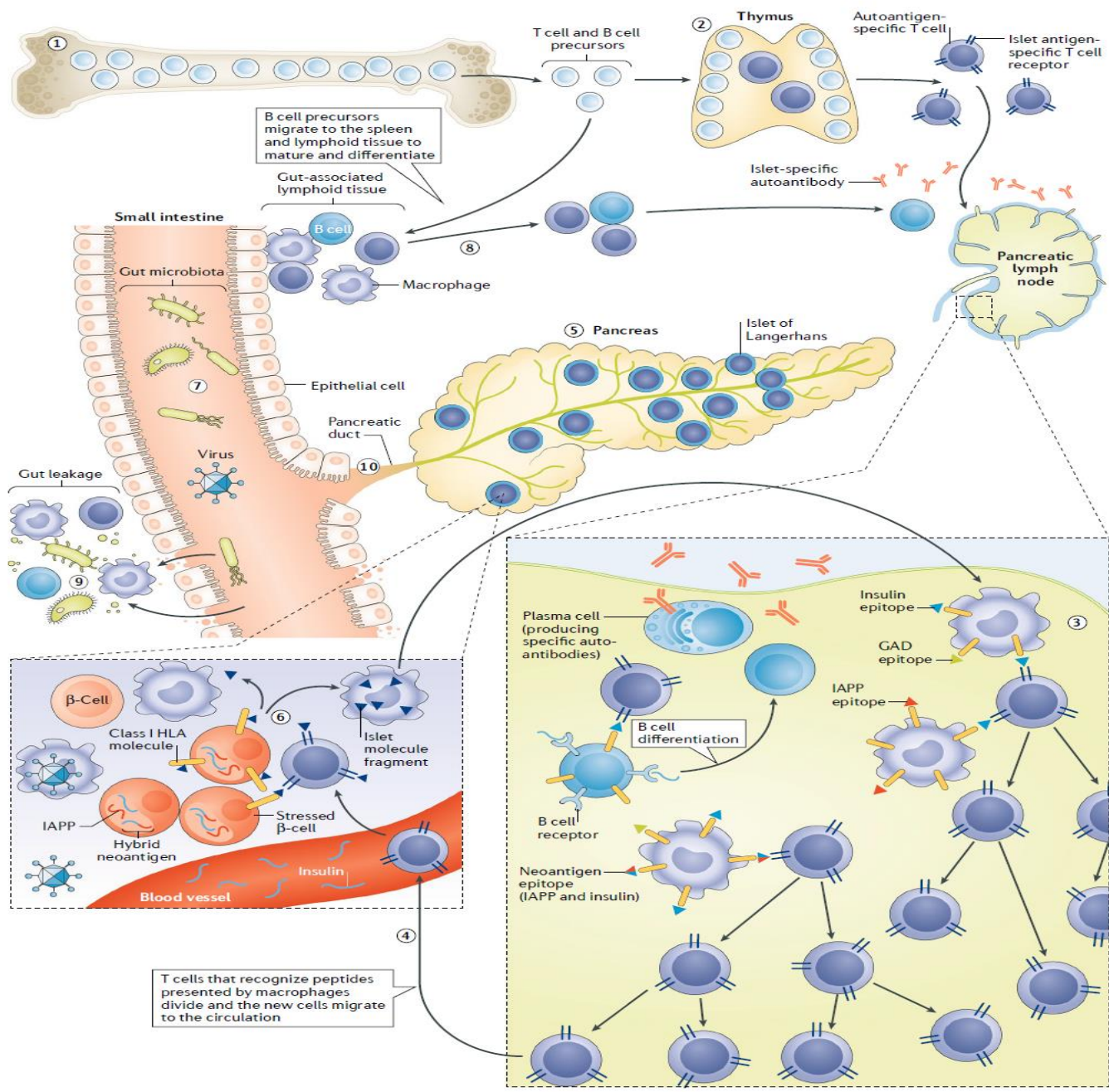
Via Fabio Filzi, 22

11 NOVEMBRE 2019

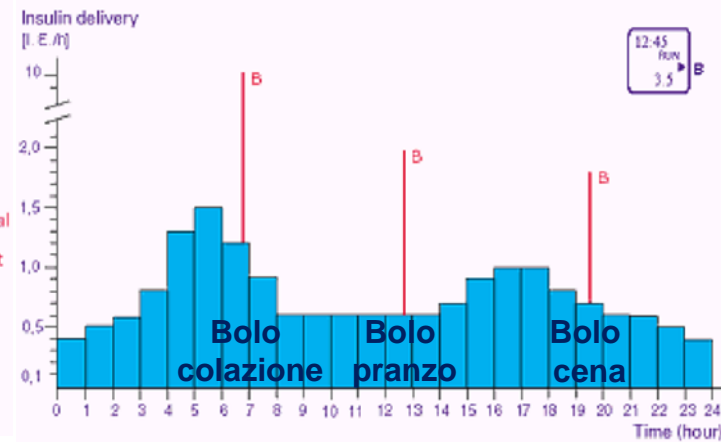
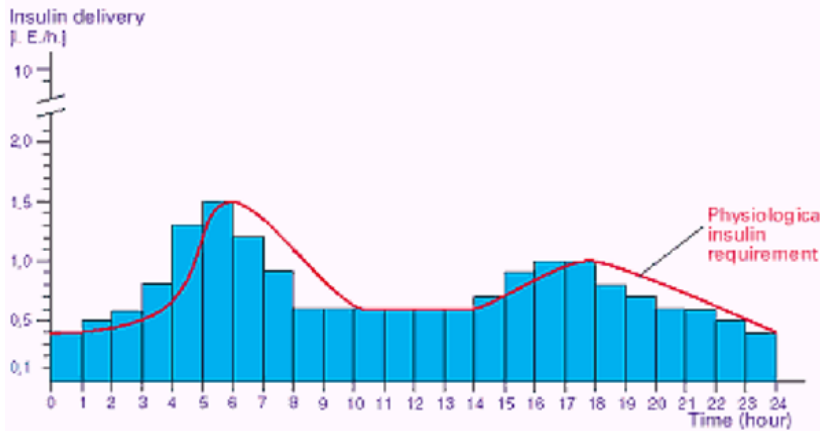
HIGHWAY DIABETES

IL PAZIENTE AL CENTRO?

2019 MOTORE 
SANITÀ 
Gestire il Cambiamento



La terapia con microinfusore



Con Catetere sale
(insulina rapida o ultrarapida)

Boli prandiali

Opzioni diverse

Con Sensori integrati

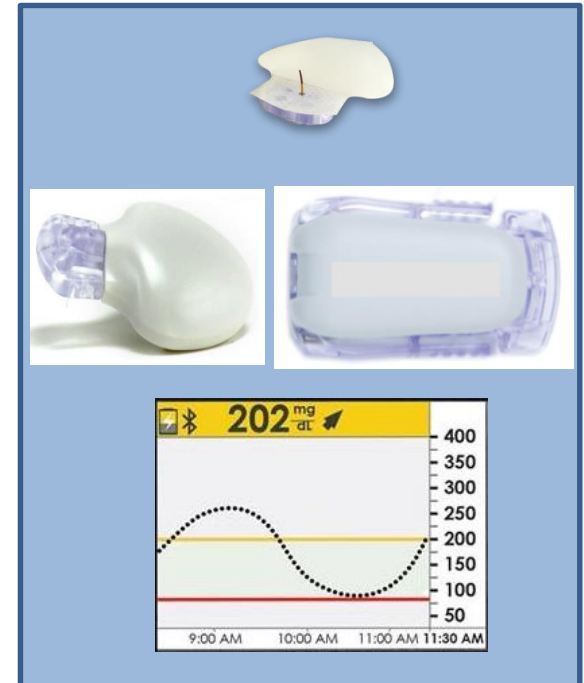
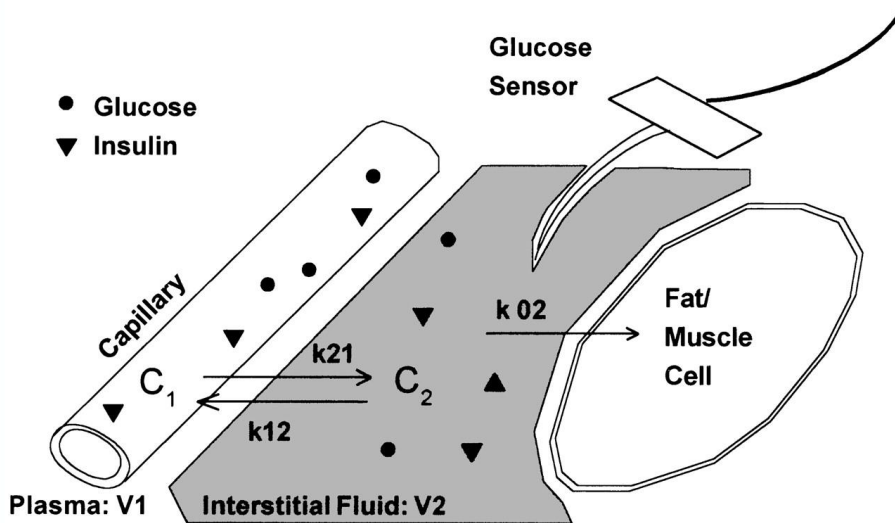
Calcolatore di bolo

Insulina residua attiva

Patch pump

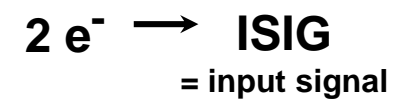
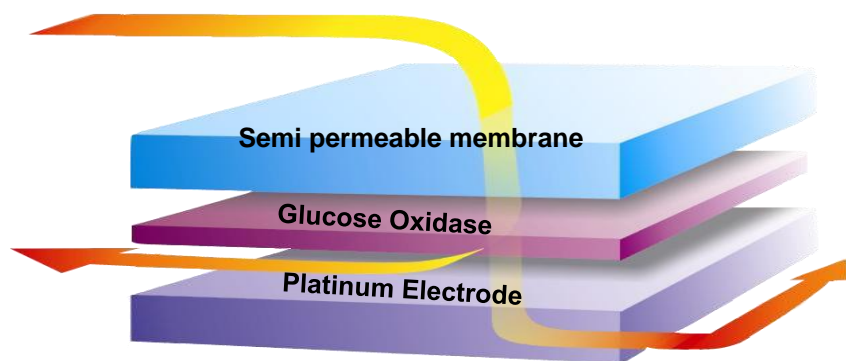


CGM (monitoraggio in continuo del glucosio) Sistemi elettrochimici transcutanei



Glucose

Gluconic Acid



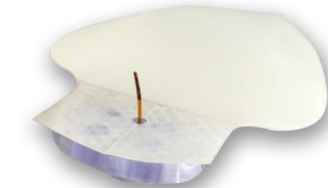
CGM (monitoraggio in continuo del glucosio) Sistemi elettrochimici transcutanei

Sono costituiti da tre componenti:

un sensore, cioè un elettrodo enzimatico aghiforme impiantato nel tessuto sottocutaneo, che misura la glicemia 288 volte al giorno (ogni 5' per 7-10 giorni)

un trasmettitore collegato al sensore, che invia via wireless i dati campionati al ricevitore

un ricevitore sul cui display viene visualizzato il valore della glicemia aggiornato ogni 5 minuti



CGM

Sistemi impiantabili

Sono costituiti da:

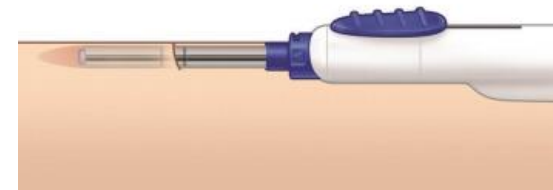
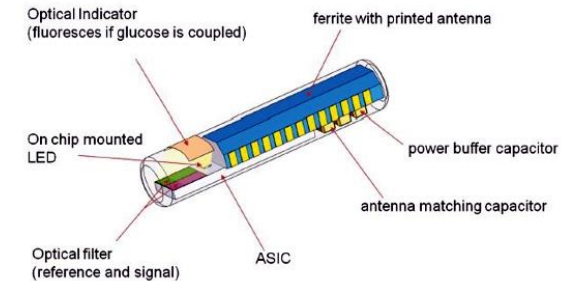
un sensore completamente inserito nel sottocute della parte superiore del braccio



un trasmettitore rimovibile, ricaricabile



Una App dedicata per smartphone



Flash Glucose Monitoring System



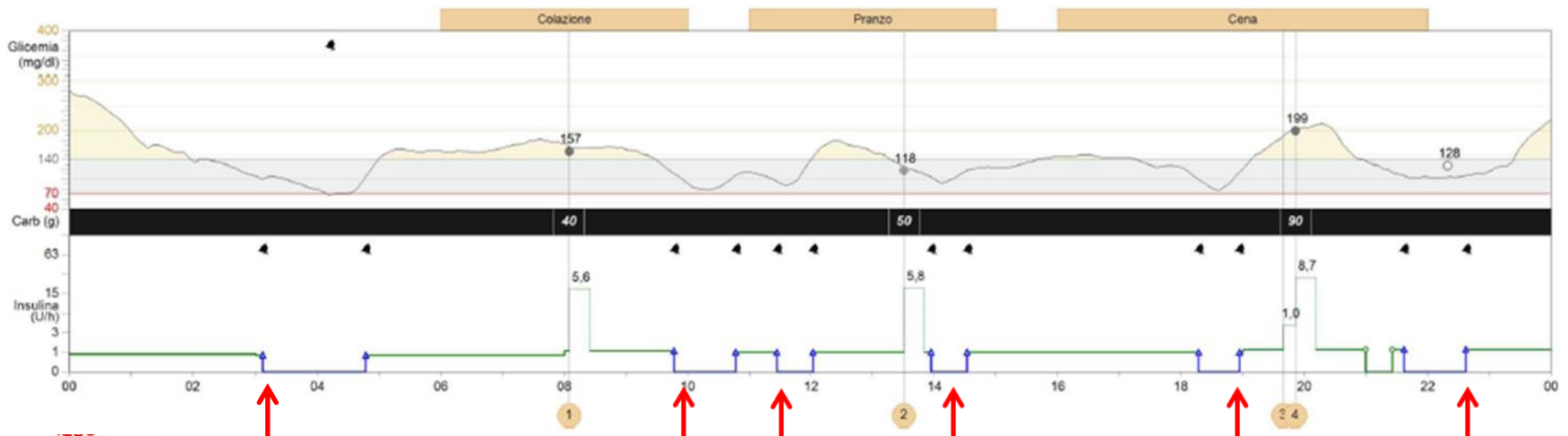
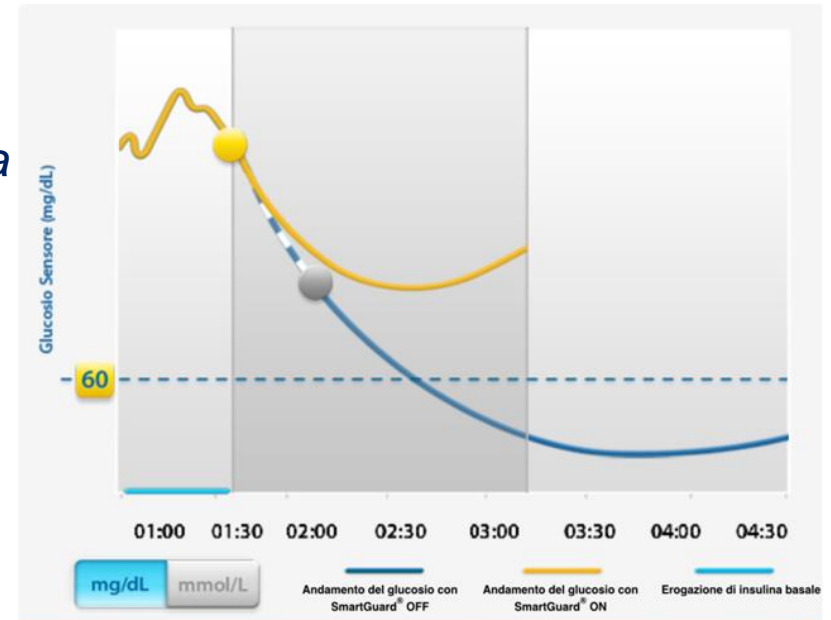
- Sensore precalibrato (non necessita di calibrazione)
- Durata 14 giorni
- Monitor: lettore specifico o App su smartphone
- Lettura della glicemia mediante scansione: near-field communication (NFC)
- Non disponibili allarmi per ipoglicemia o iperglicemia

Predictive Low Glucose Suspend (PLGS)

L'erogazione di insulina basale è sospesa automaticamente se:

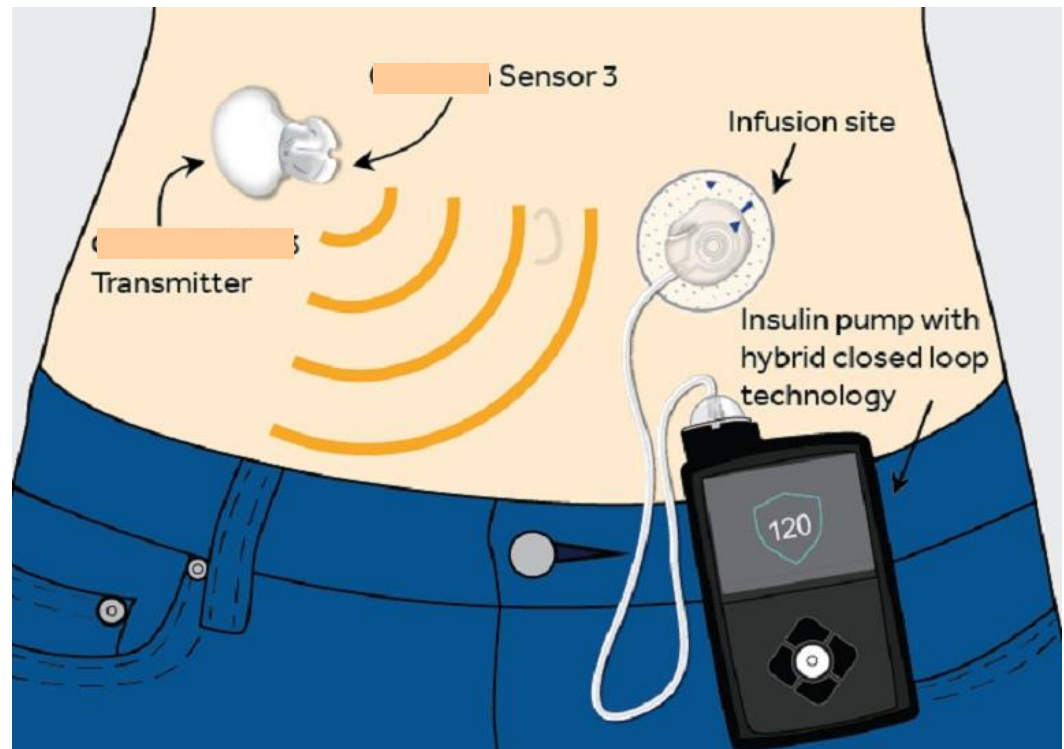
in base al trend glicemico è previsto che la glicemia arrivi a meno di 20 mg/dl dalla soglia ipoglicemia entro 30 minuti

La sospensione dell'infusione di insulina dura almeno 30 minuti



SISTEMA IBRIDO AD ANSA CHIUSA

- **Pompa insulinica**
- **CGM: sensore**
- **Algoritmo**



AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

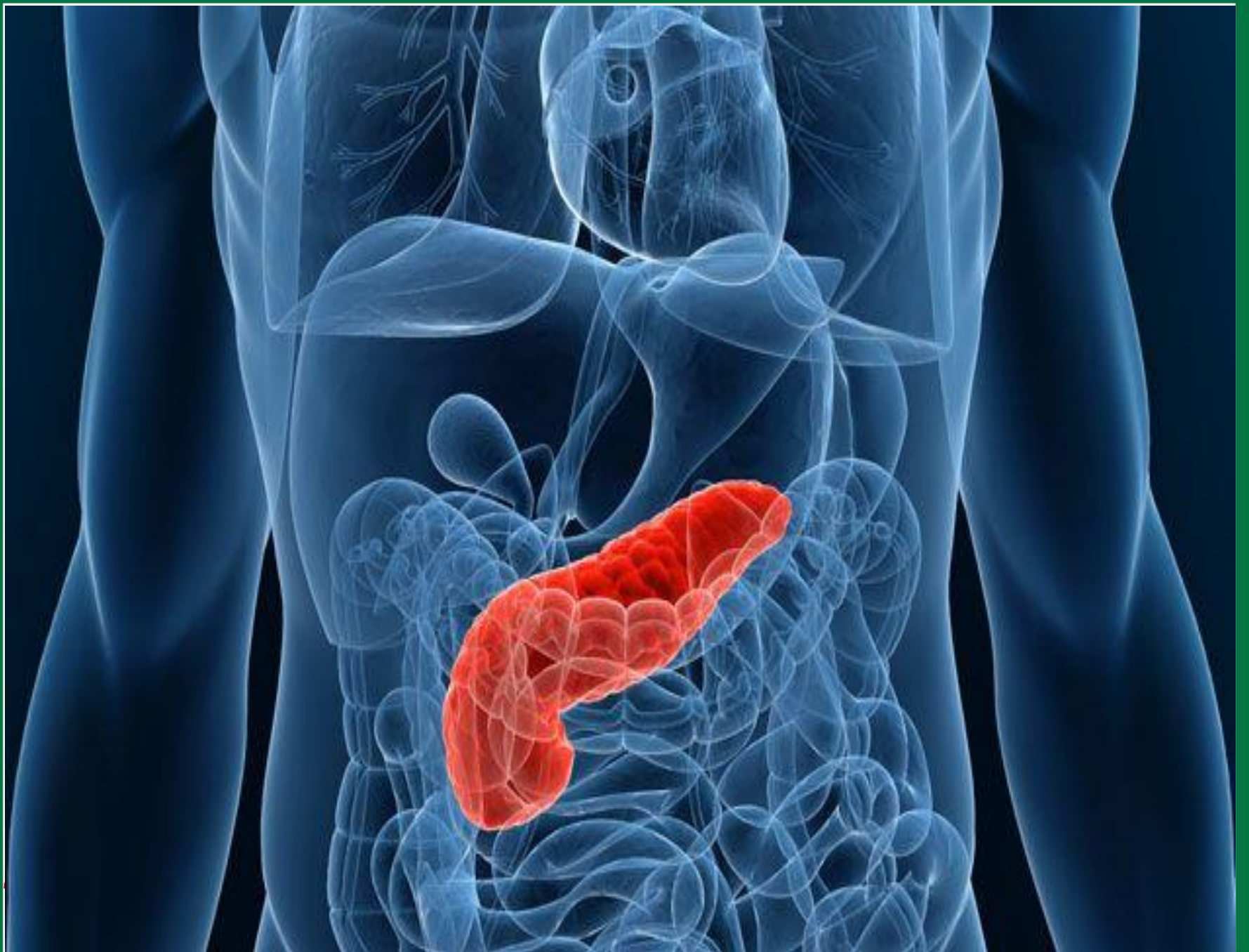
Via Fabio Filzi, 22

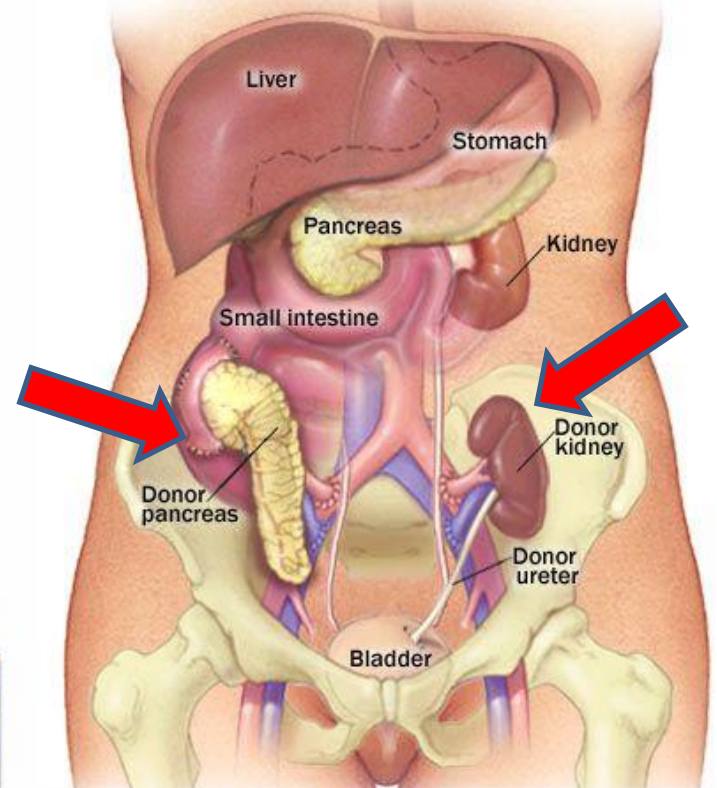
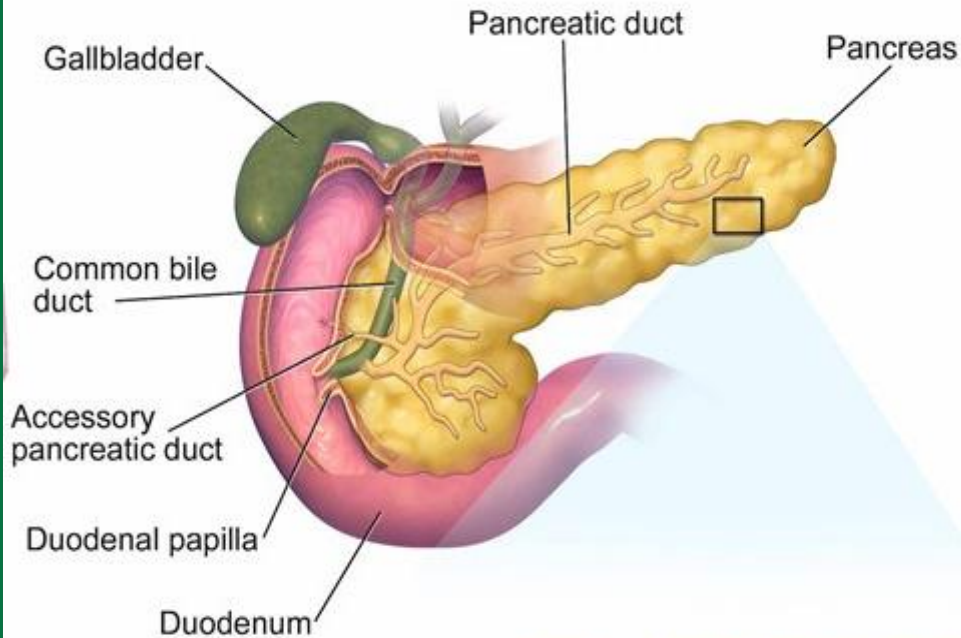
11 NOVEMBRE 2019

HIGHWAY DIABETES

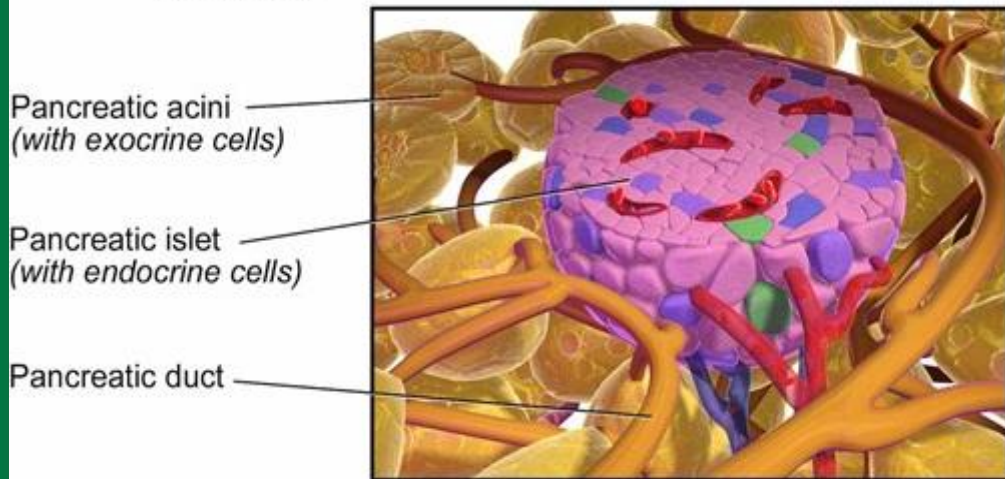
IL PAZIENTE AL CENTRO?

2019 MOTORE
SANITÀ
Gestire il Cambiamento



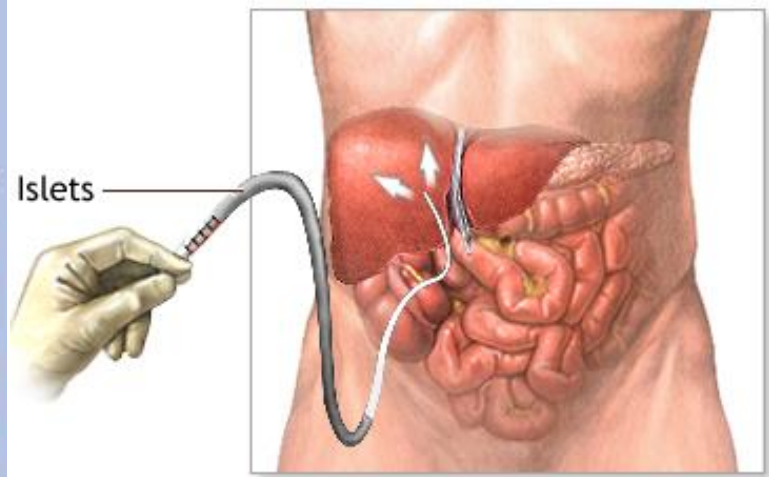
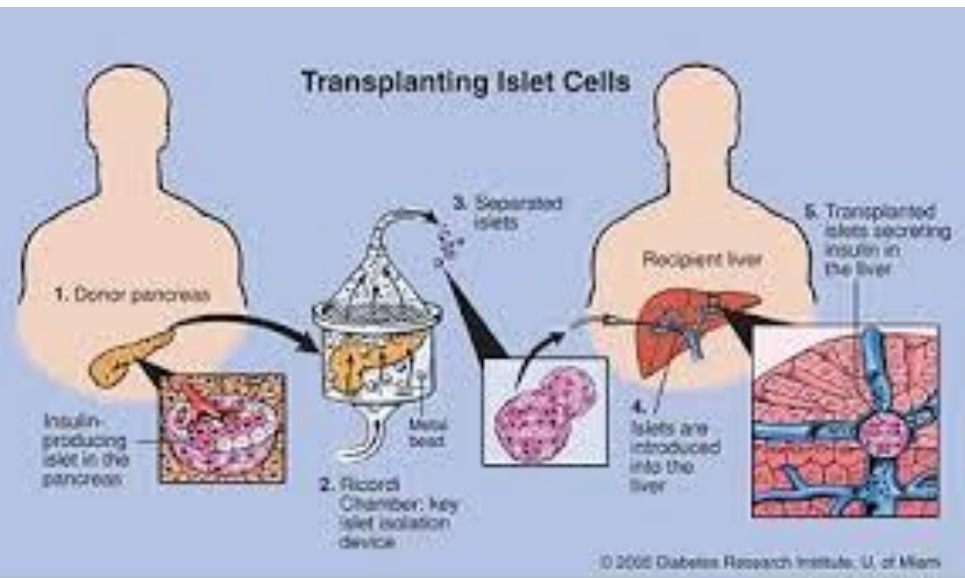
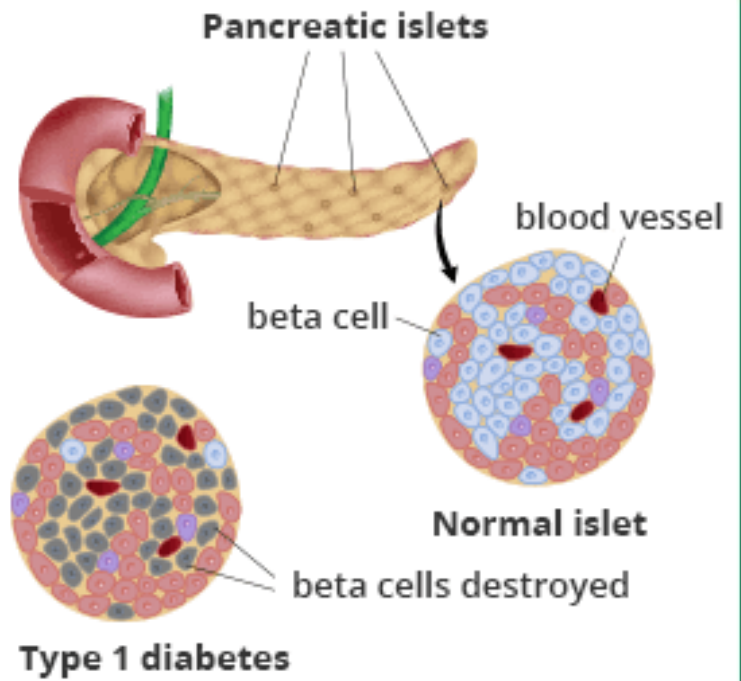
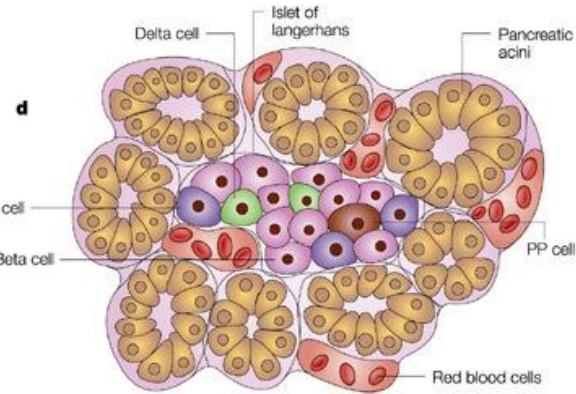
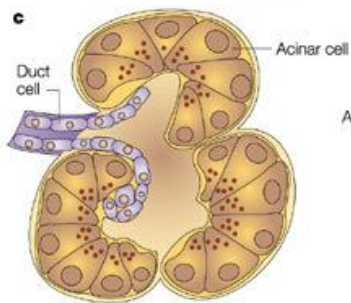
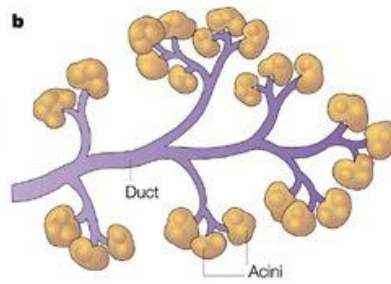
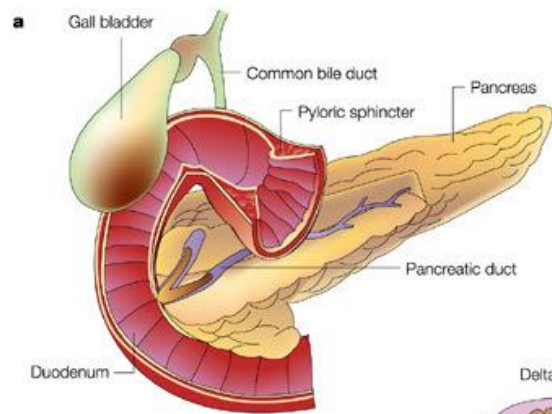


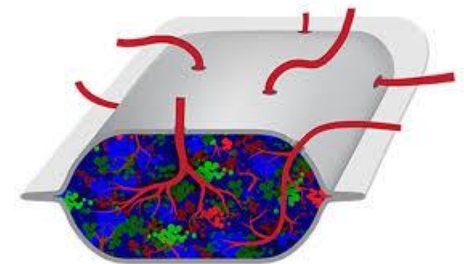
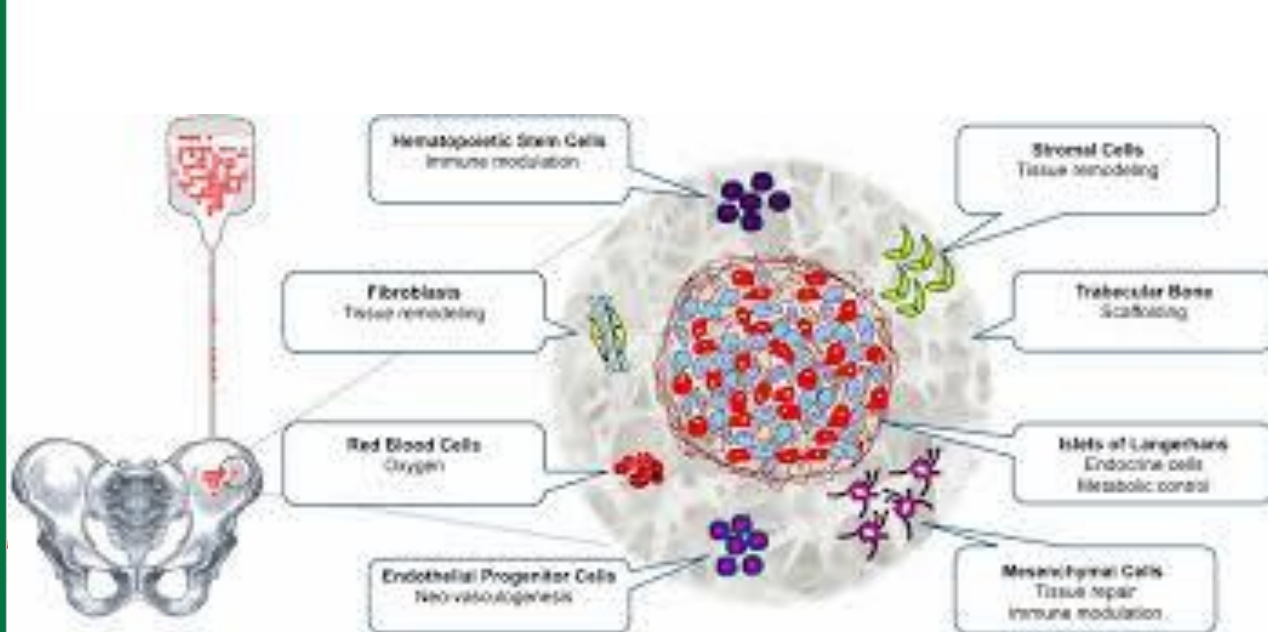
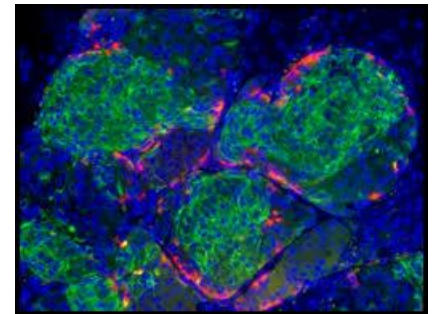
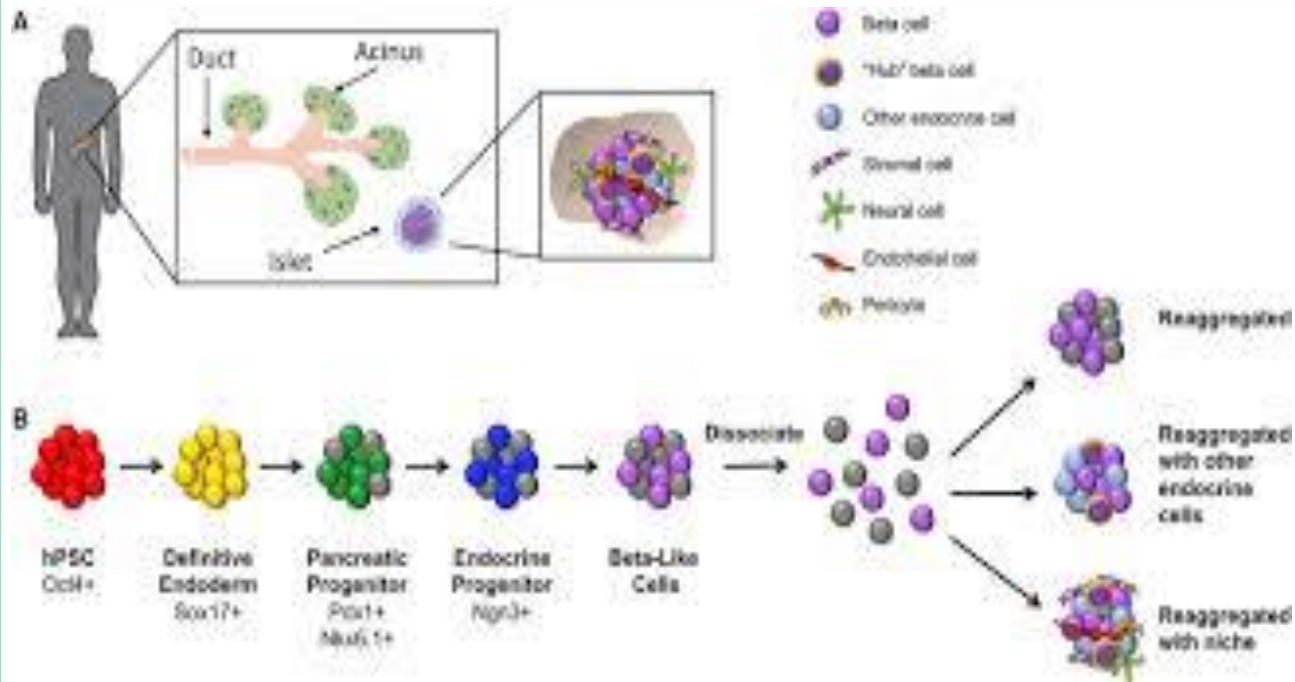
© Mayo Foundation for Medical Education and Research. All rights reserved.



Pancreatic Tissue







AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti
- Farmaci innovativi per il DMT2

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

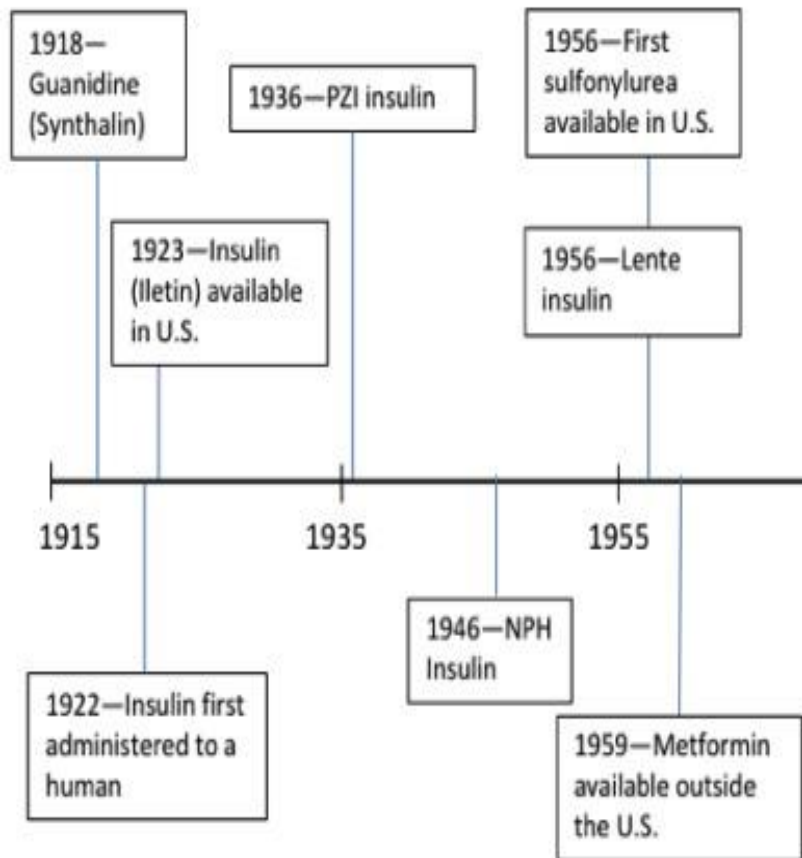
11 NOVEMBRE 2019

HIGHWAY DIABETES

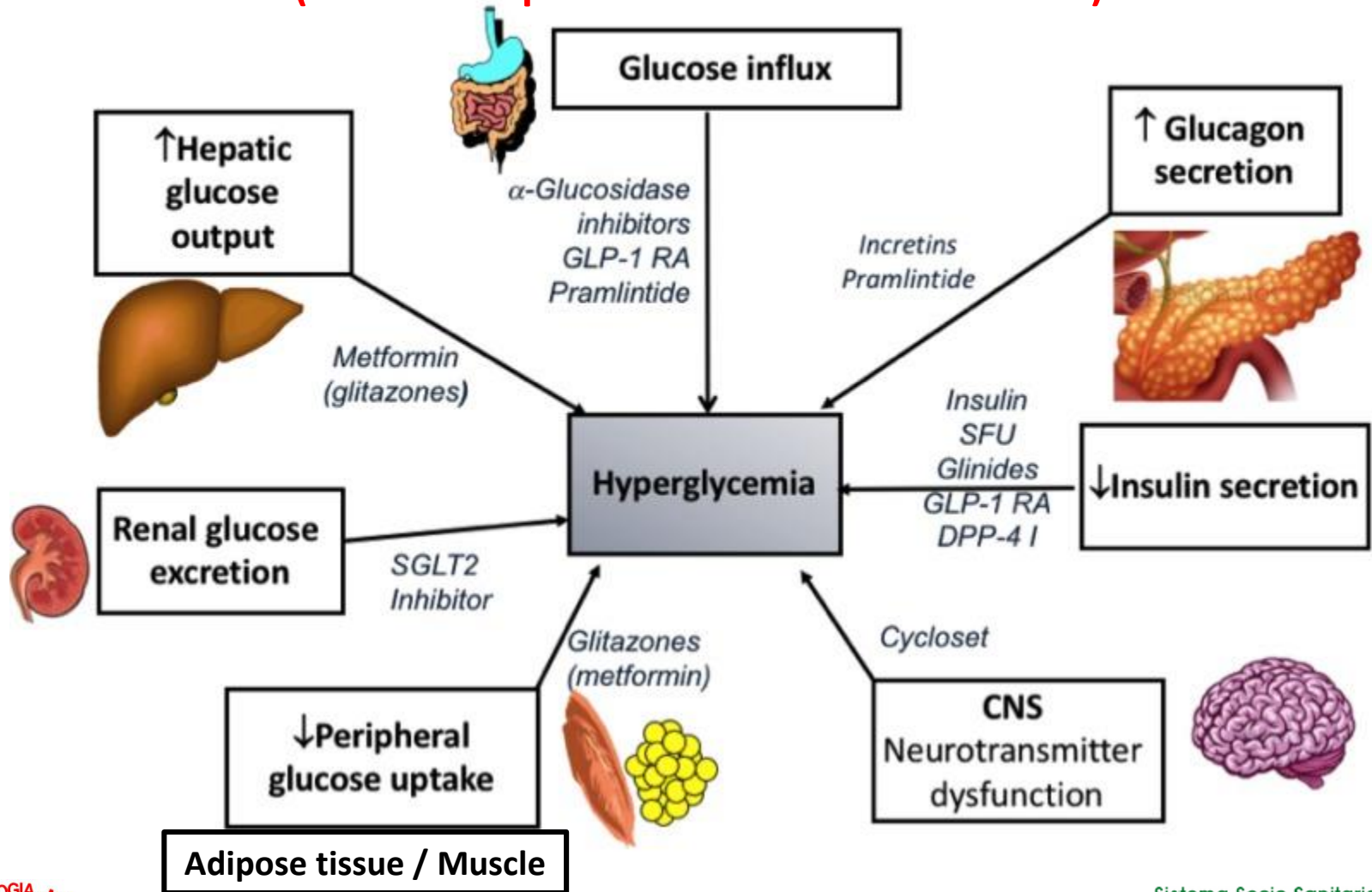
IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

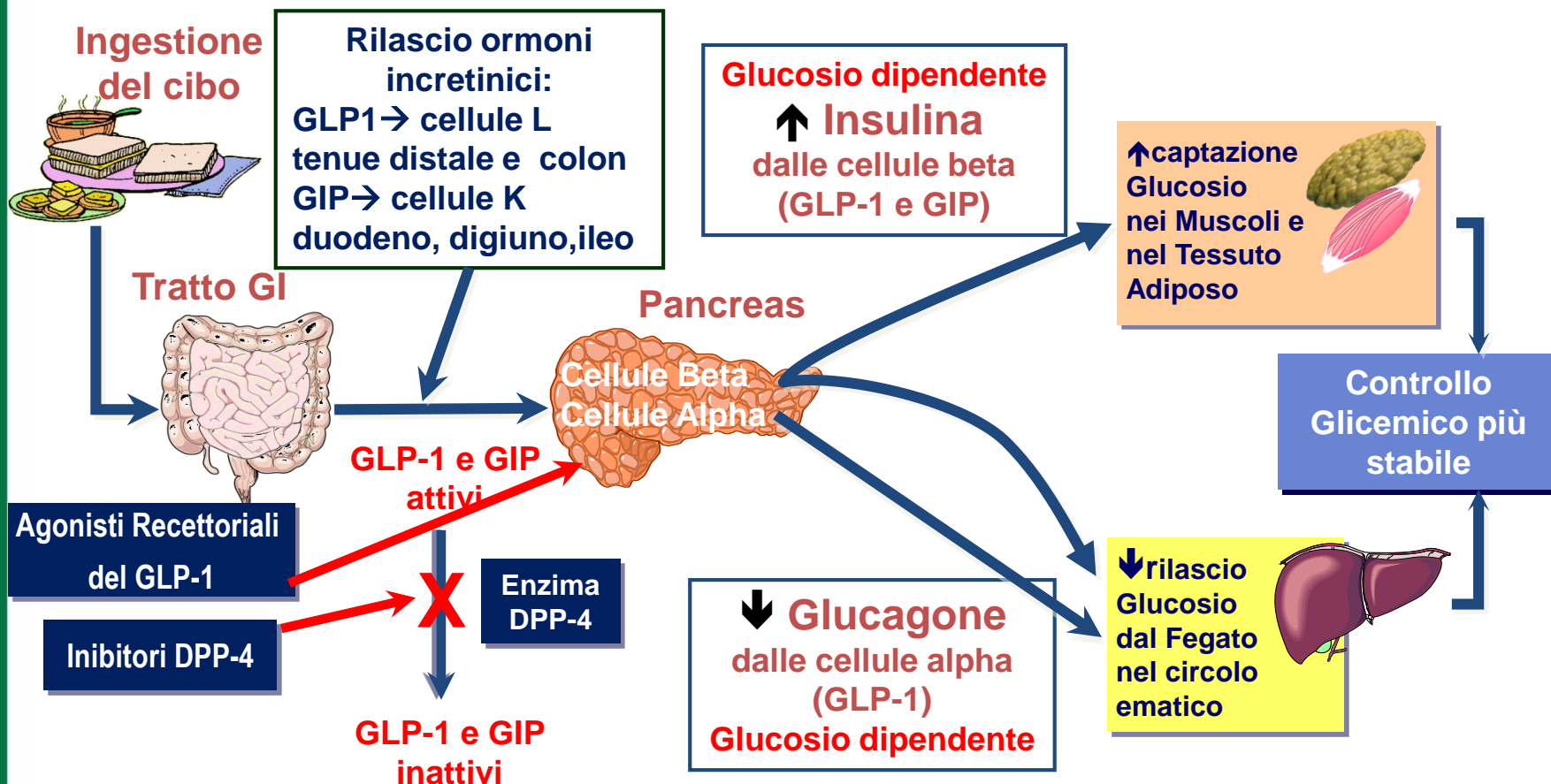
Storia dei Farmaci per il Diabete



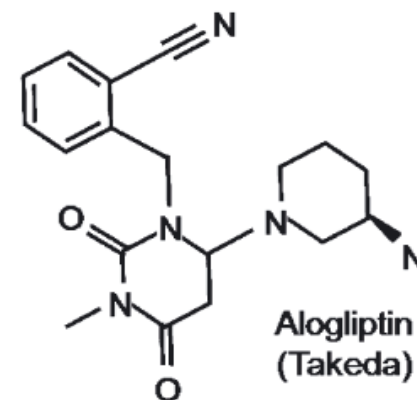
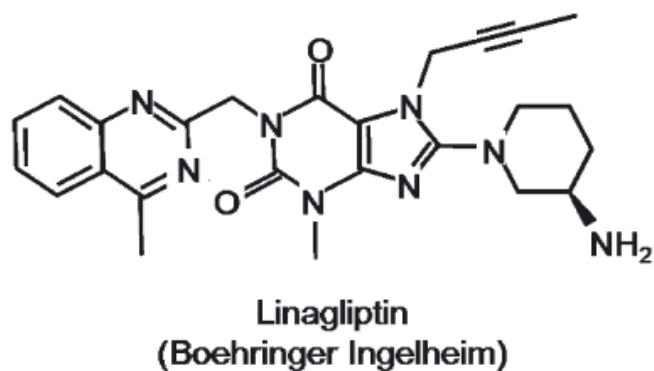
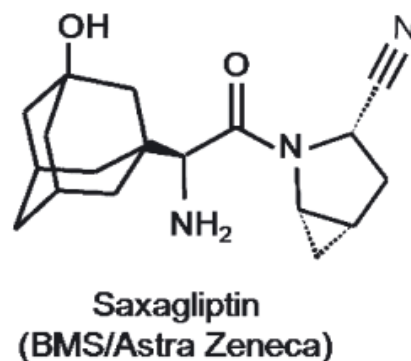
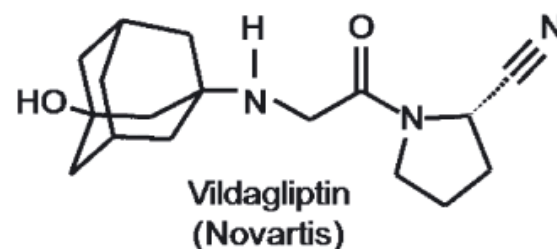
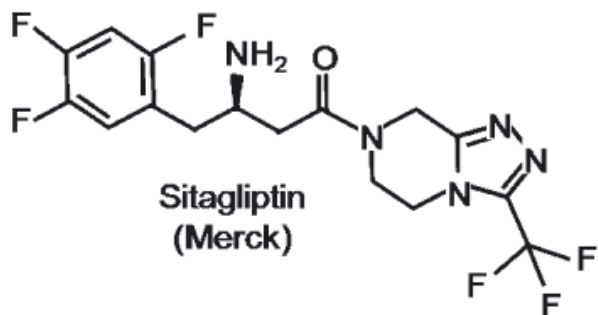
Gli organi coinvolti nella causa del Diabete tipo 2 (e i Farmaci per normalizzare la situazione)



Ruolo dell'inibizione/by-pass dell'enzima DPP-4 nel migliorare il controllo glicemico



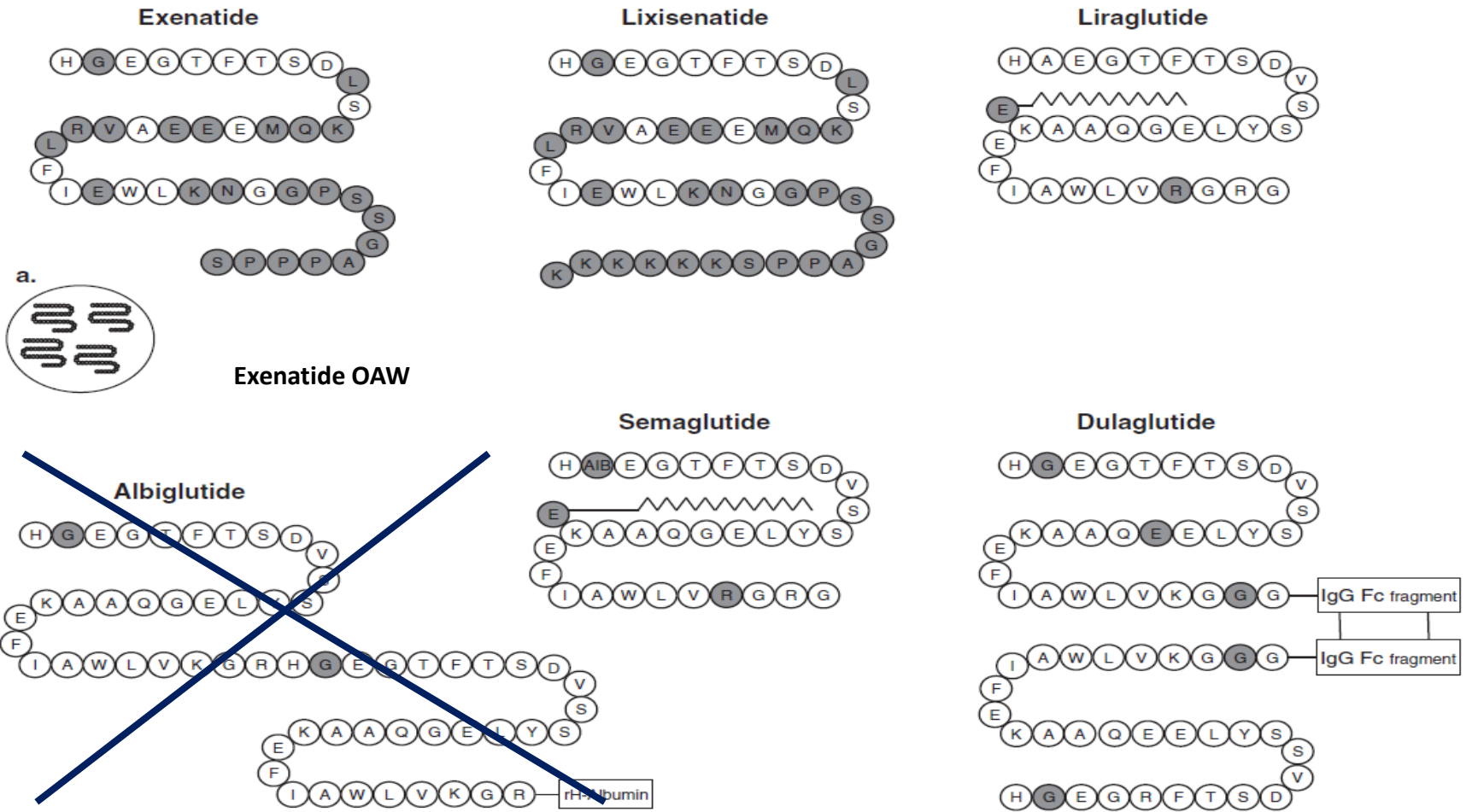
Dipeptidyl peptidase-4 inhibitors in the treatment of type 2 diabetes: a comparative review



Review Article

Glucagon-like peptide-1 receptor agonists for the treatment of type 2 diabetes: Differences and similarities

Asger Lund ^{a,b}, Filip K. Knop ^{a,b}, Tina Vilsbøll ^{a,*}

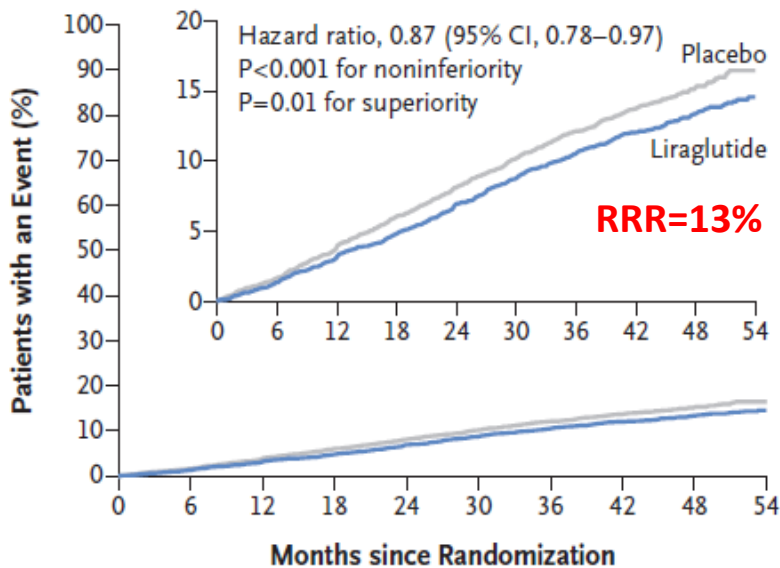


Liraglutide and Cardiovascular Outcomes in Type 2 Diabetes

Casistica: 9.340 persone con DMT2 ed elevato rischio cardiovascolare

End point primario: mortalità cardiovascolare, infarto miocardio, stroke

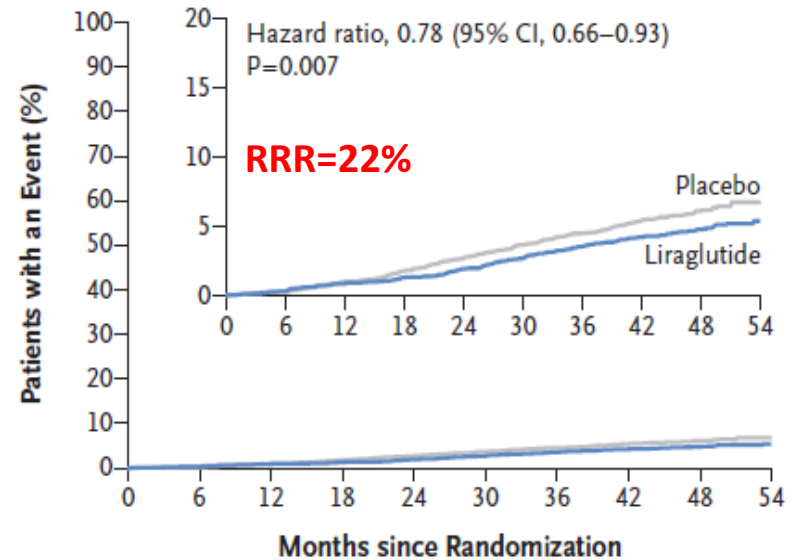
A Primary Outcome



No. at Risk

Liraglutide	4668	4593	4496	4400	4280	4172	4072	3982	1562	424
Placebo	4672	4588	4473	4352	4237	4123	4010	3914	1543	407

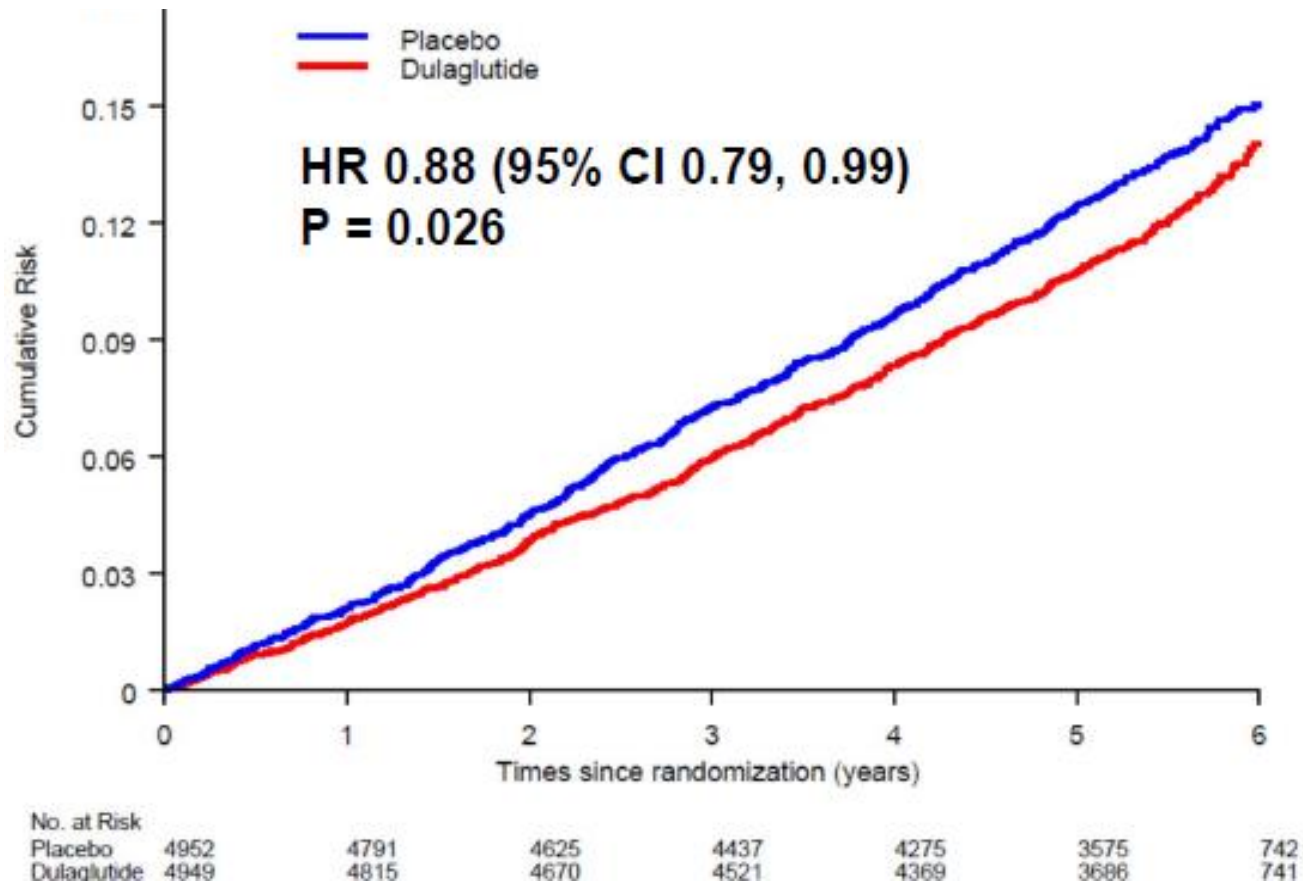
B Death from Cardiovascular Causes



No. at Risk

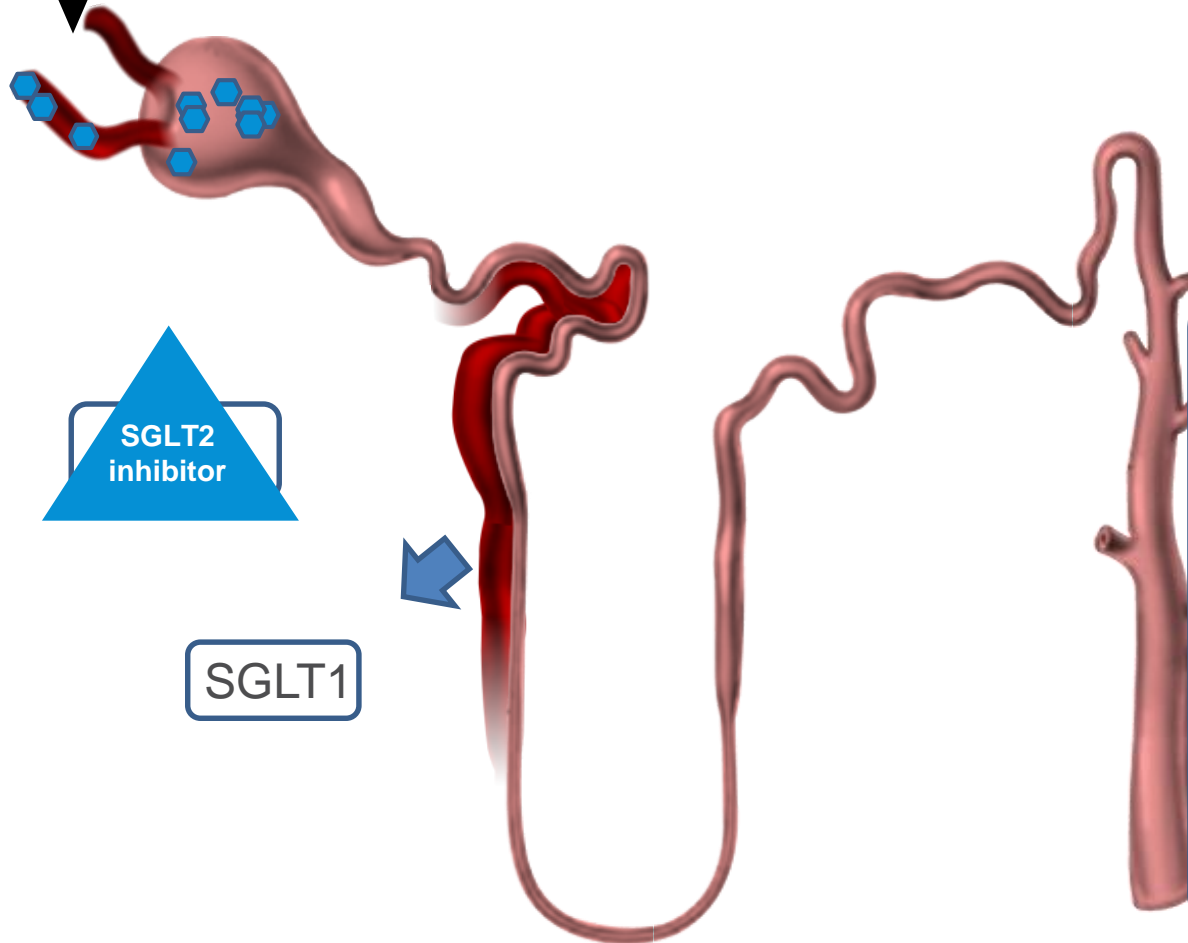
Liraglutide	4668	4641	4599	4558	4505	4445	4382	4322	1723	484
Placebo	4672	4648	4601	4546	4479	4407	4338	4267	1709	465

Dulaglutide and cardiovascular outcomes in type 2 diabetes (REWIND): a double-blind, randomised placebo-controlled trial (settled for superiority).



Escrezione Urinaria di Glucosio mediante inibizione di SGLT2¹

Filtered glucose
load > 180 g/day



SGLT2 inhibitors
reduce glucose
re-absorption
in the proximal
tubule, leading to
urinary glucose
excretion* and
osmotic diuresis

ORIGINAL ARTICLE

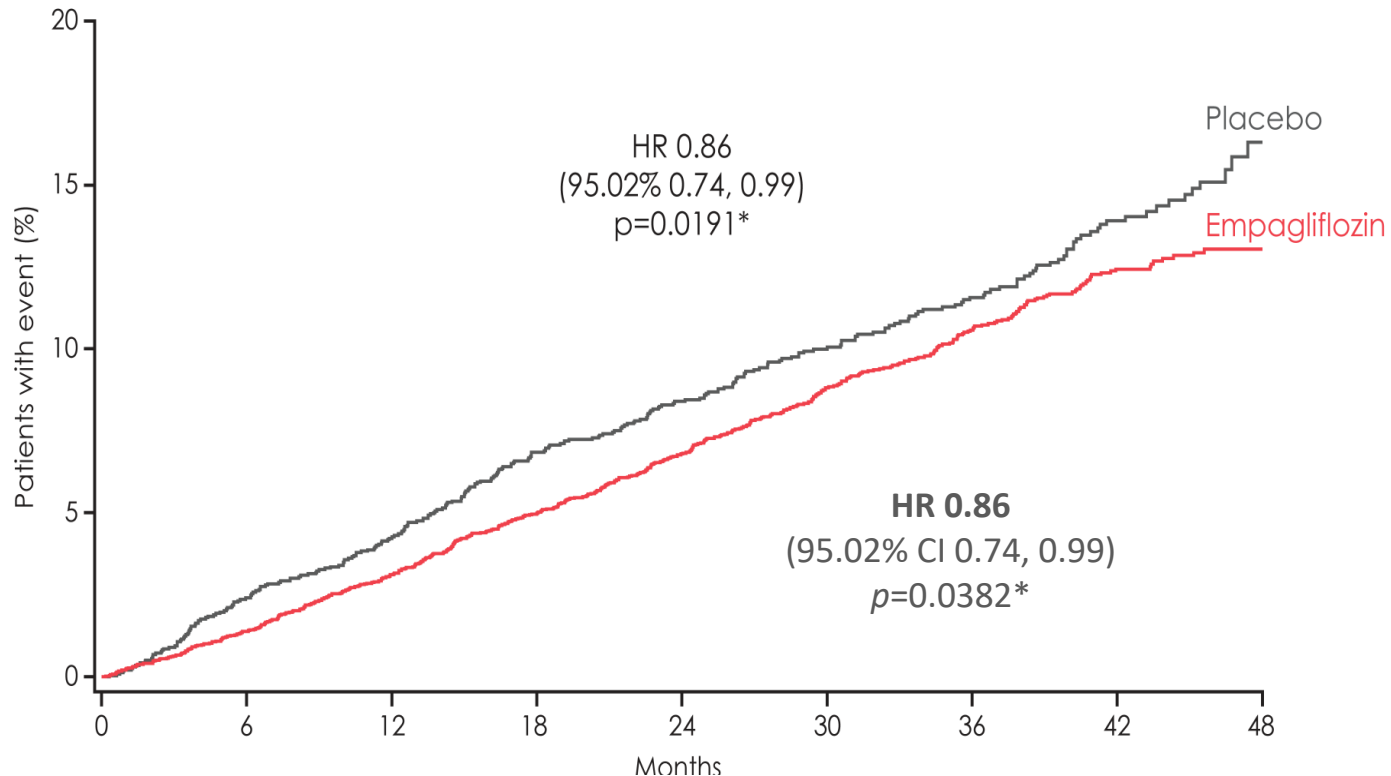
Empagliflozin, Cardiovascular Outcomes, and Mortality in Type 2 Diabetes

Bernard Zinman, M.D., Christoph Wanner, M.D., John M. Lachin, Sc.D.,
David Fitchett, M.D., Erich Bluhmki, Ph.D., Stefan Hantel, Ph.D.,
Michaela Mattheus, Dipl. Biomath., Theresa Devins, Dr.P.H.,
Odd Erik Johansen, M.D., Ph.D., Hans J. Woerle, M.D., Uli C. Broedl, M.D.,
and Silvio E. Inzucchi, M.D., for the EMPA-REG OUTCOME Investigators

**Soggetti adulti con diabete tipo 2 e malattia cardiovascolare pre-esistente
(Precedente infarto, malattia coronarica, ictus,
angina instabile o arteriopatia periferica)**

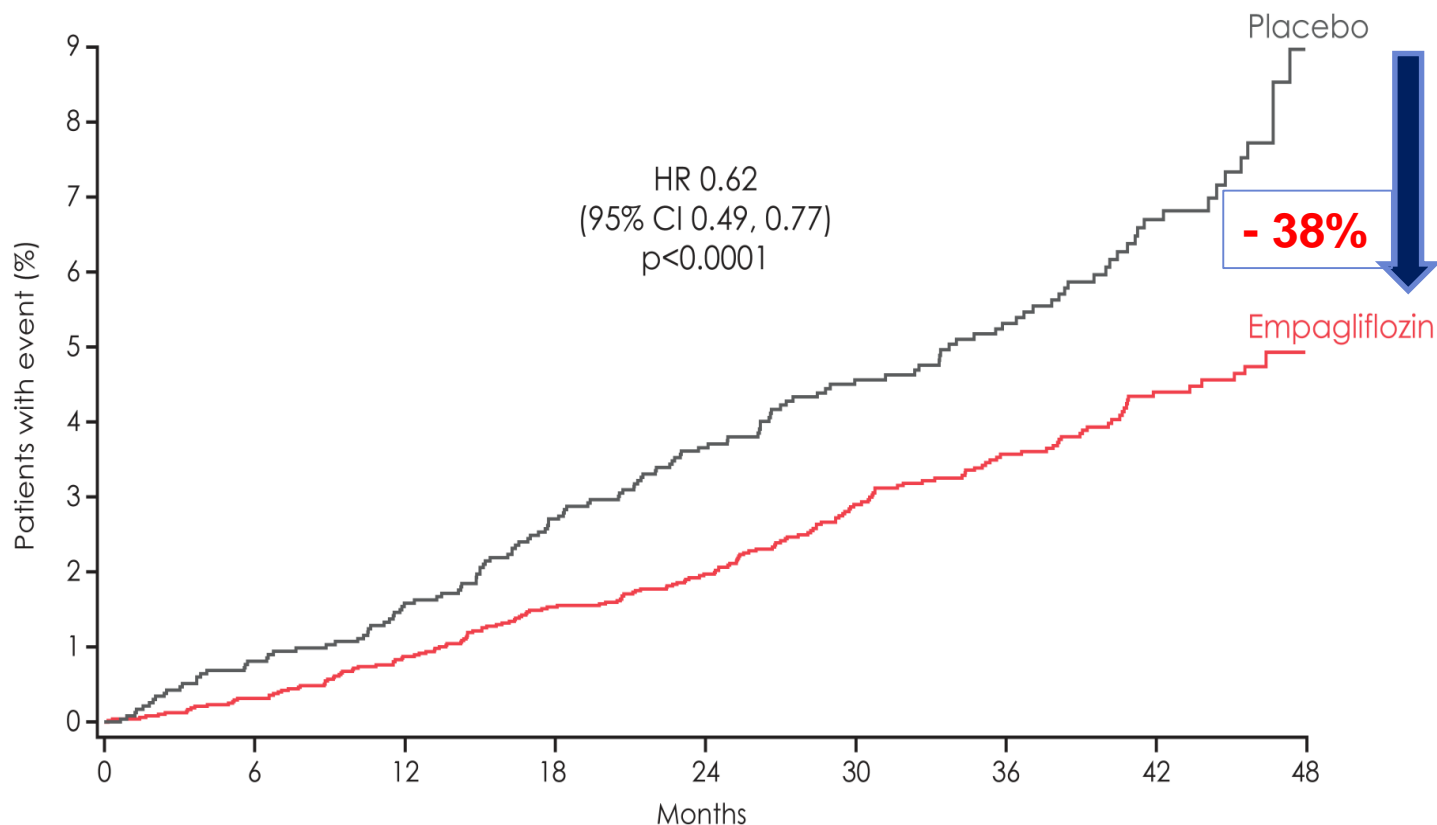
Risultato principale: MACE

MACE, Major Adverse Cardiovascular Event; HR, hazard ratio.



No. of patients	0	6	12	18	24	30	36	42	48
Empagliflozin	4687	4580	4455	4328	3851	2821	2359	1534	370
Placebo	2333	2256	2194	2112	1875	1380	1161	741	166

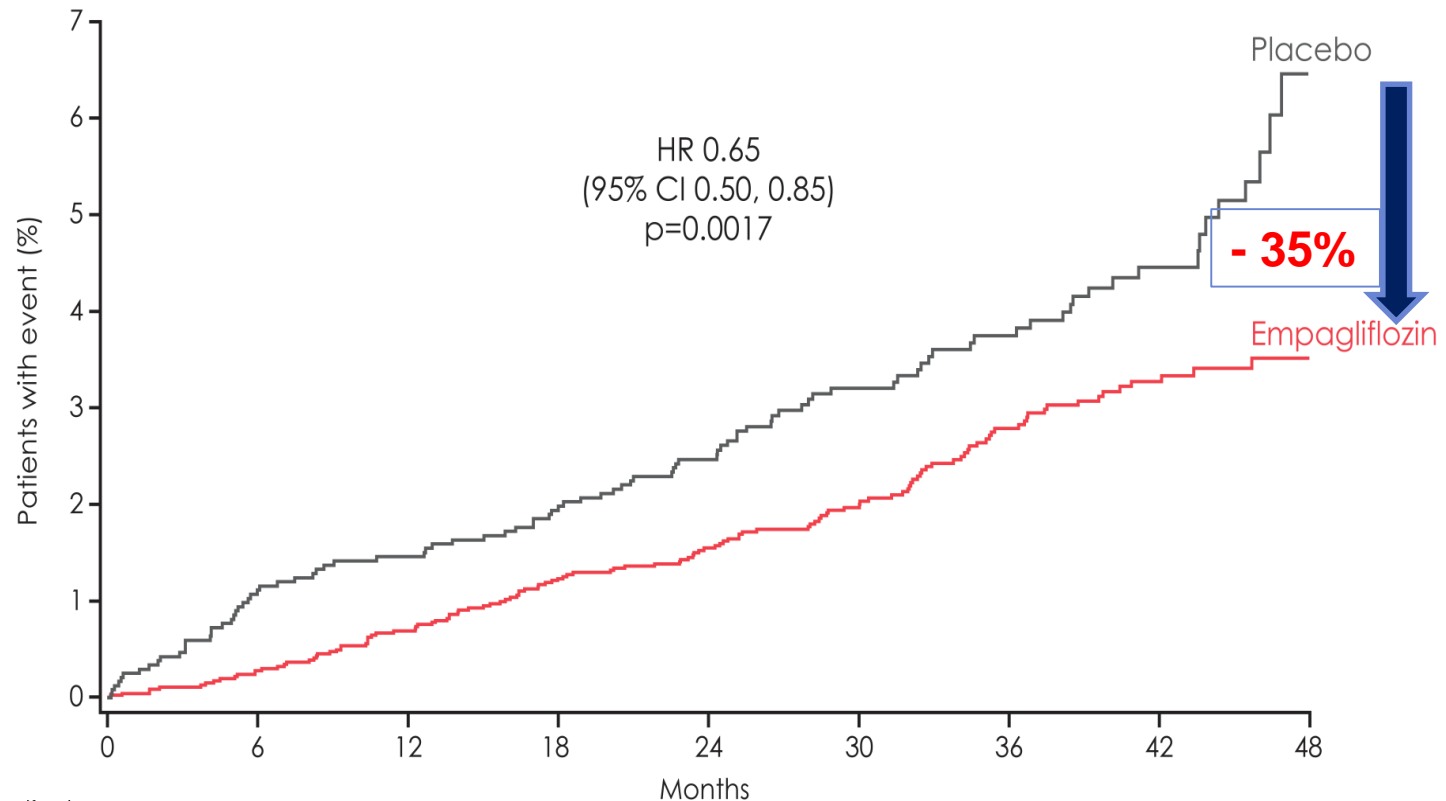
Morte per cause CV



No. of patients

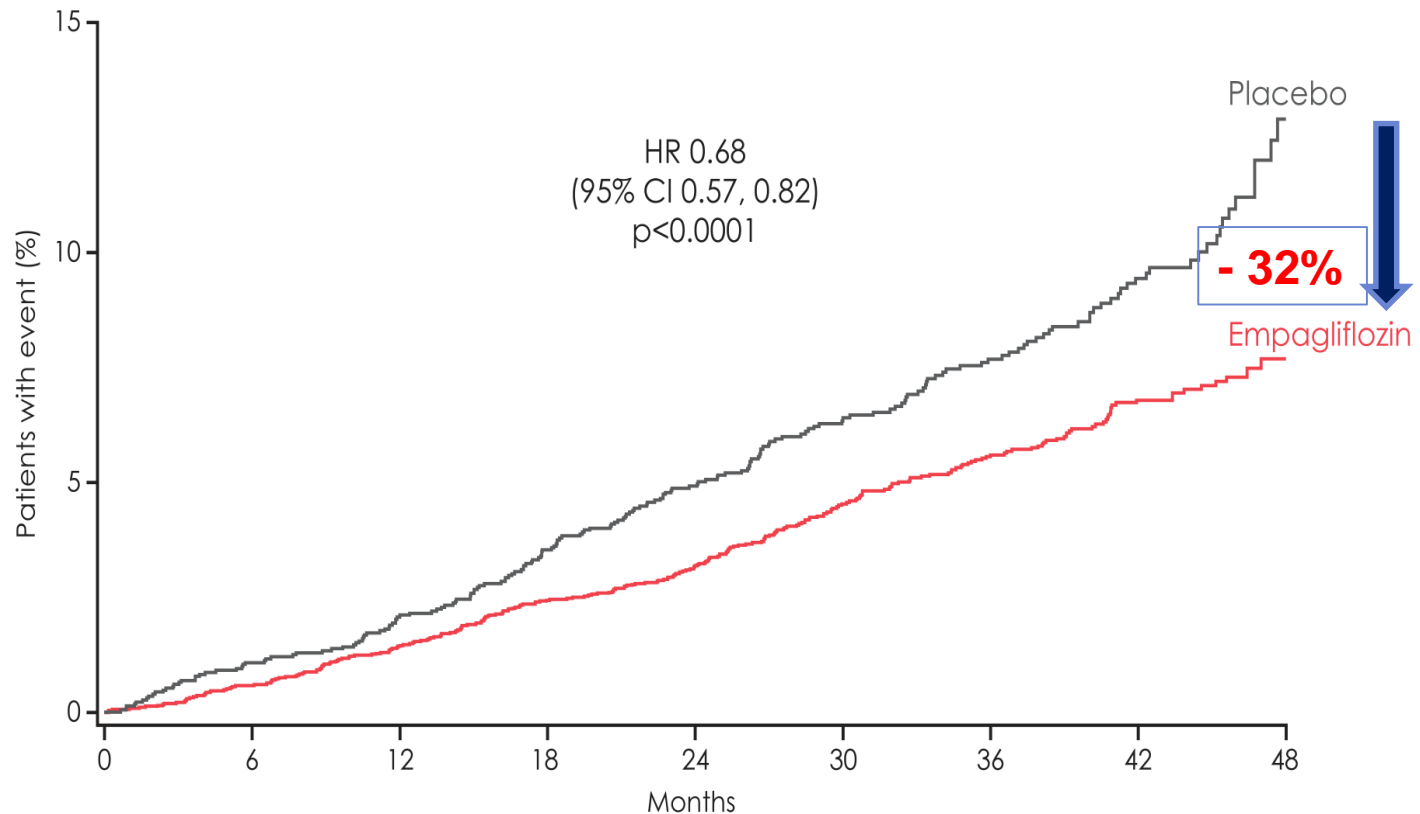
Empagliflozin	4687	4651	4608	4556	4128	3079	2617	1722	414
Placebo	2333	2303	2280	2243	2012	1503	1281	825	177

Ospedalizzazione per scompenso cardiaco



No. of patients	0	6	12	18	24	30	36	42	48
Empagliflozin	4687	4614	4523	4427	3988	2950	2487	1634	395
Placebo	2333	2271	2226	2173	1932	1424	1202	775	168

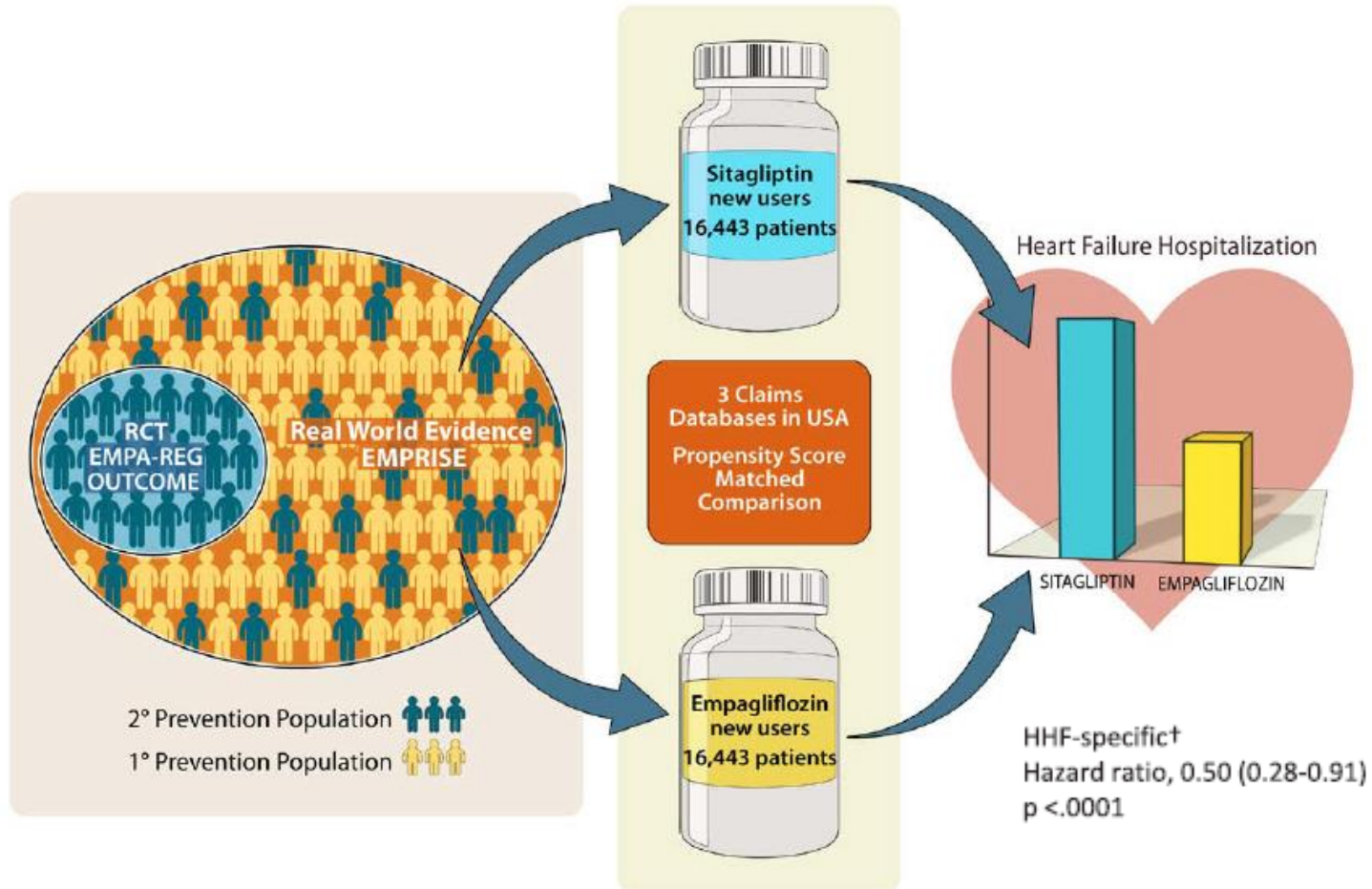
Mortalità per tutte le cause



No. of patients									
Empagliflozin	4687	4651	4608	4556	4128	3079	2617	1722	414
Placebo	2333	2303	2280	2243	2012	1503	1281	825	177

Empagliflozin and Heart Failure

What Can We Learn From EMPRISE?



AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti
- Farmaci innovativi per il DMT2
- Le nuove Linee Guida

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

11 NOVEMBRE 2019

HIGHWAY DIABETES

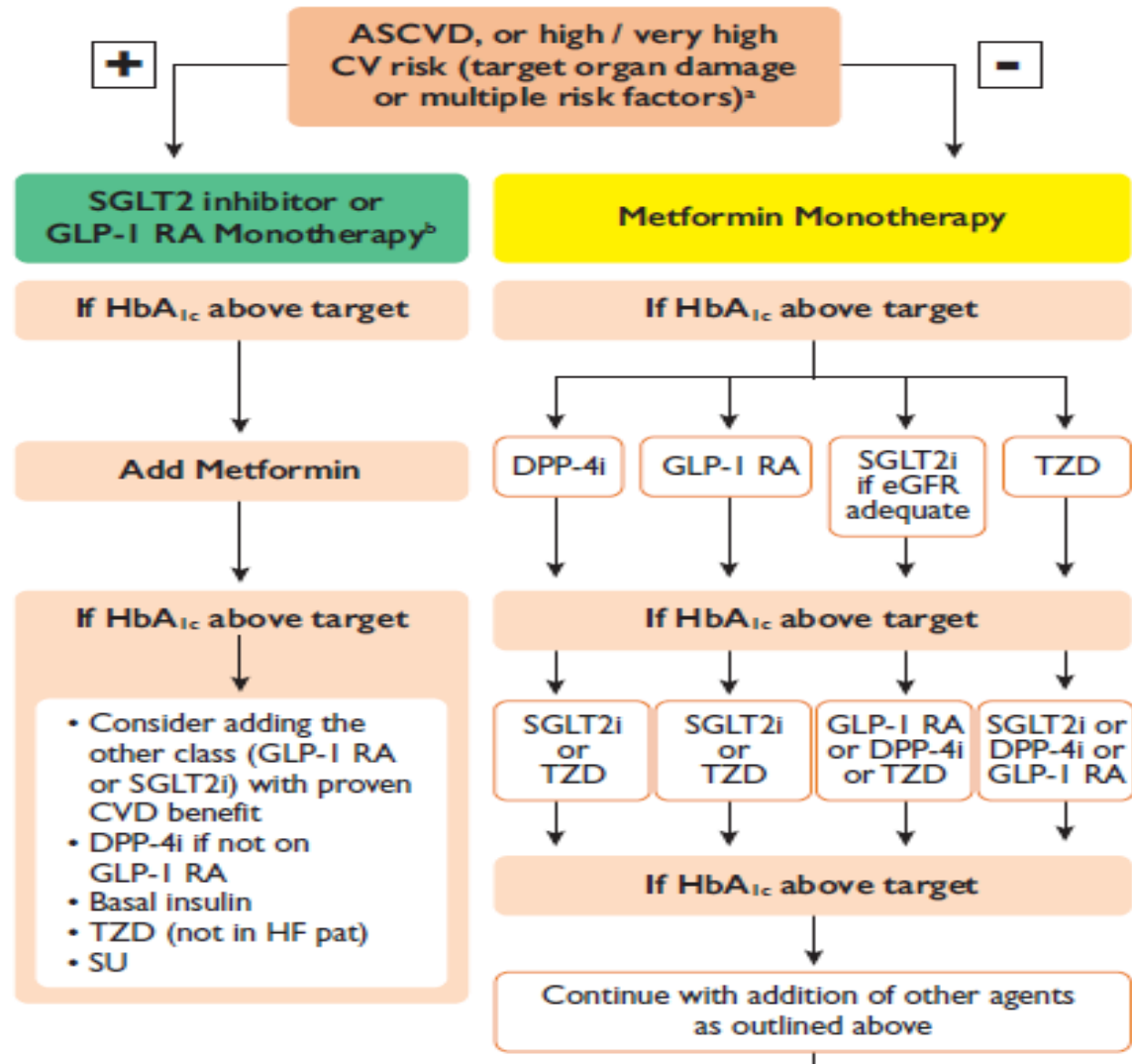
IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD

The Task Force for diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and the European Association for the Study of Diabetes (EASD)

A Type 2 DM - Drug naïve patients



ESC
European Society
of Cardiology

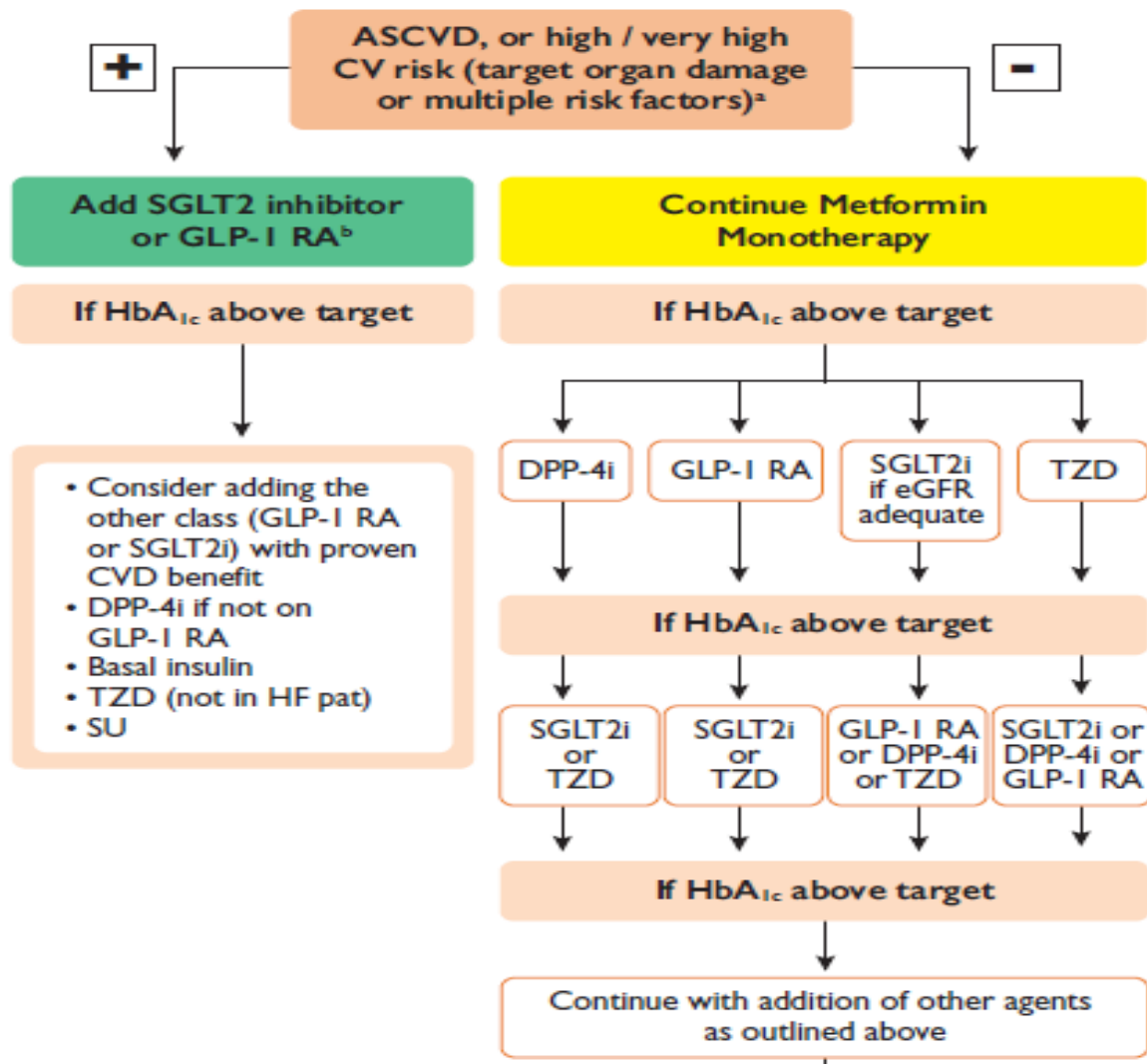
European Heart Journal (2019) 00, 1–69

doi:10.1093/eurheartj/ehz486

2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD

The Task Force for diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and the European Association for the Study of Diabetes (EASD)

B Type 2 DM - On metformin



ESC

European Society of Cardiology

European Heart Journal (2019) 00, 1–69

doi:10.1093/eurheartj/ehz486

AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti
- Farmaci innovativi per il DMT2
- Le nuove Linee Guida
- Spunti di riflessione

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

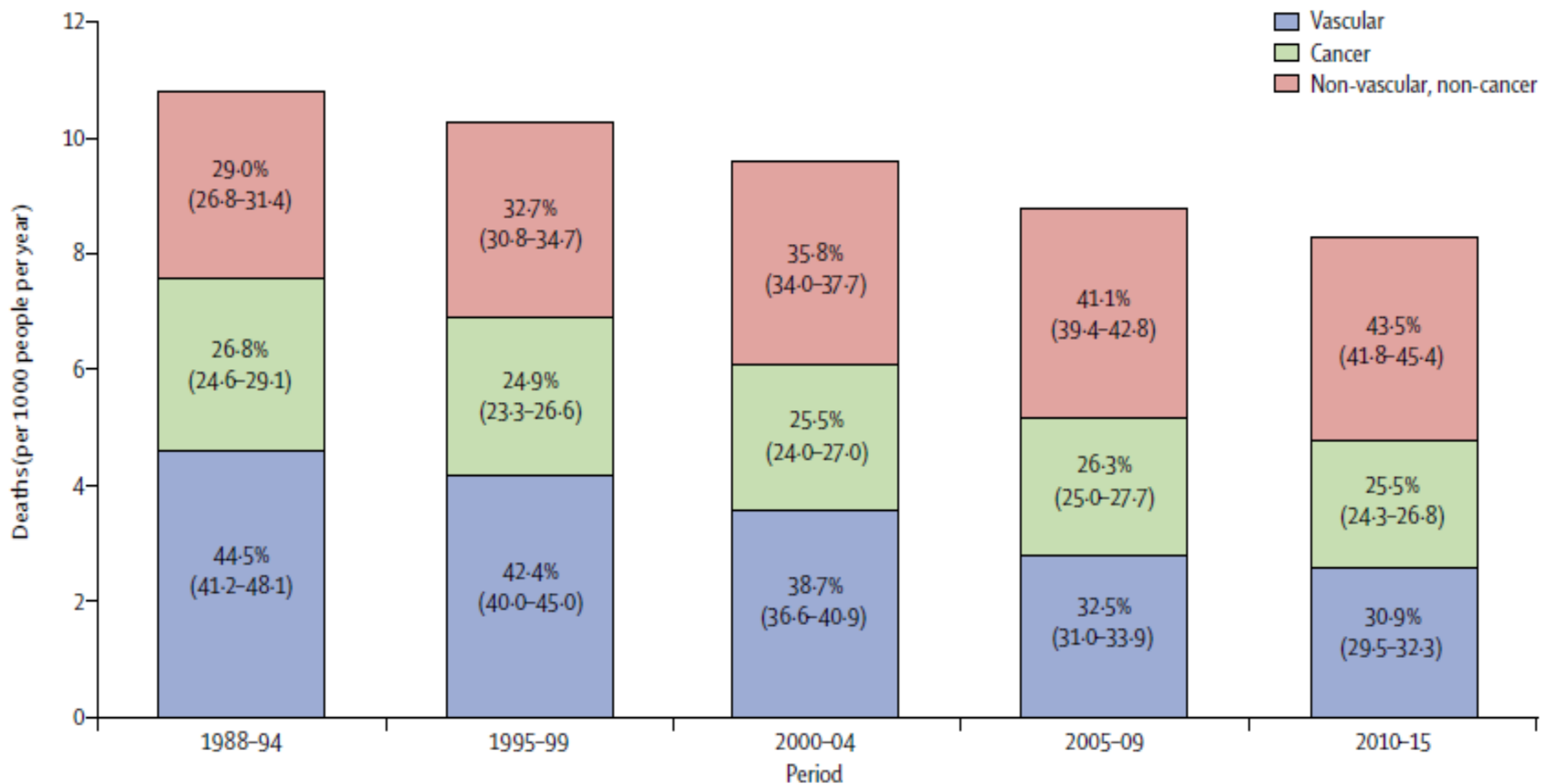
11 NOVEMBRE 2019

HIGHWAY DIABETES

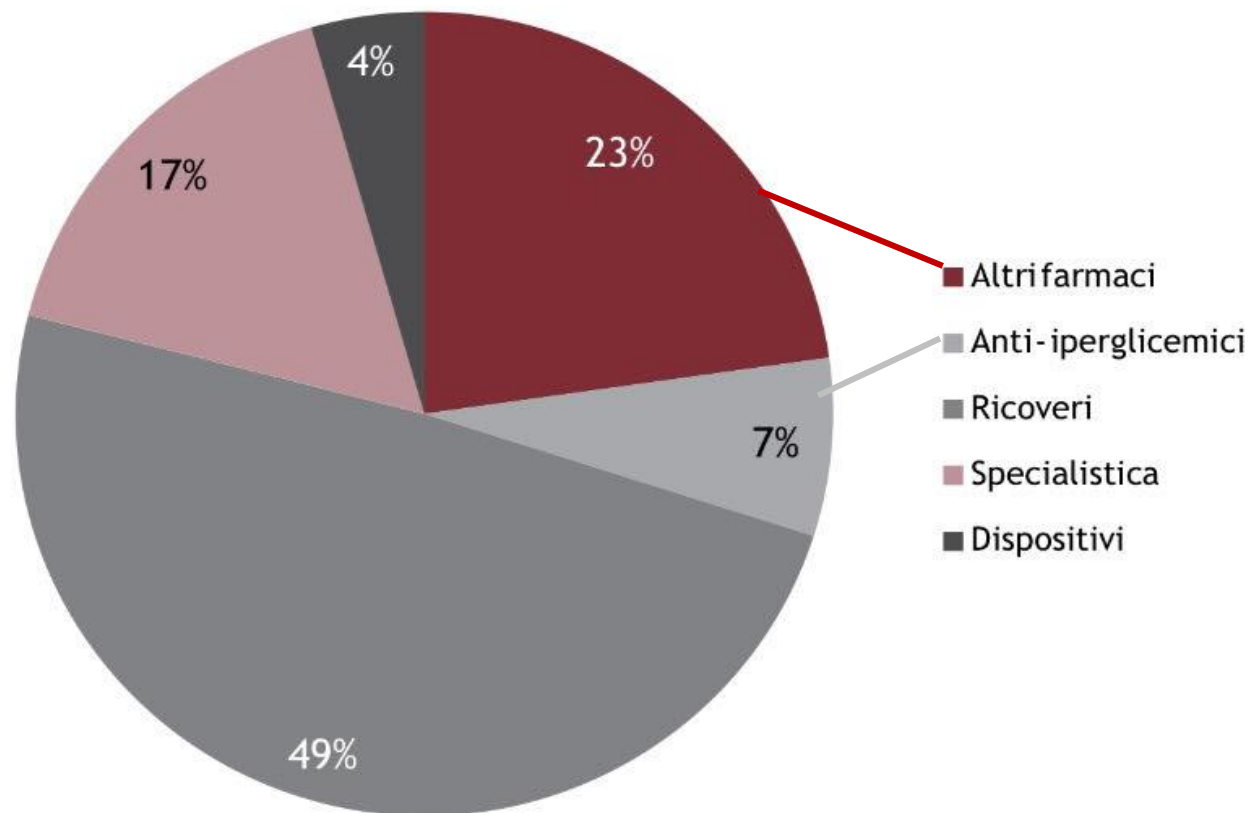
IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

DECESSI CAUSATI DA MALATTIE CV, CANCRO O ALTRE CONDIZIONI IN PAZIENTI DIABETICI NEGLI USA (1988 – 2015)



COMPOSIZIONE PERCENTUALE DELLA SPESA PER IL DIABETE



Precision medicine in the management of type 2 diabetes

Anna L Gloyn, Daniel J Drucker

Panel: Evolving clinical considerations underlying personalised medicine recommendations for intensification of therapy after metformin in people with type 2 diabetes*

Clinical characteristics influencing selection of glucose-lowering drugs

Older age, fragility

DPP-4 inhibitors, age-specific treatment goals

Severe or recurrent hypoglycaemia

DPP-4 inhibitors, SGLT2 inhibitors, GLP-1 receptor agonists, modern insulins

Poor, variable, or suboptimal compliance

Once-weekly GLP-1 receptor agonists

Obesity

Bariatric surgery, GLP-1 receptor agonists, SGLT2 inhibitors

High HbA_{1c}, failure of oral antidiabetes drugs

Bariatric surgery, insulin, GLP-1 receptor agonists

Considerations based on non-glycaemic actions of glucose-lowering therapies and the reduction in rates of complications associated with diabetes

Non-alcoholic fatty liver disease, non-alcoholic steatohepatitis

Thiazolidinediones, GLP-1 receptor agonists

Heart failure

SGLT2 inhibitors

Coronary artery disease

GLP-1 receptor agonists

Stroke

Thiazolidinediones, GLP-1 receptor agonists

Chronic kidney disease

SGLT2 inhibitors

Catalog stats

Last data release on
2019-07-30

4085 publications
95875 SNPs
149855 associations

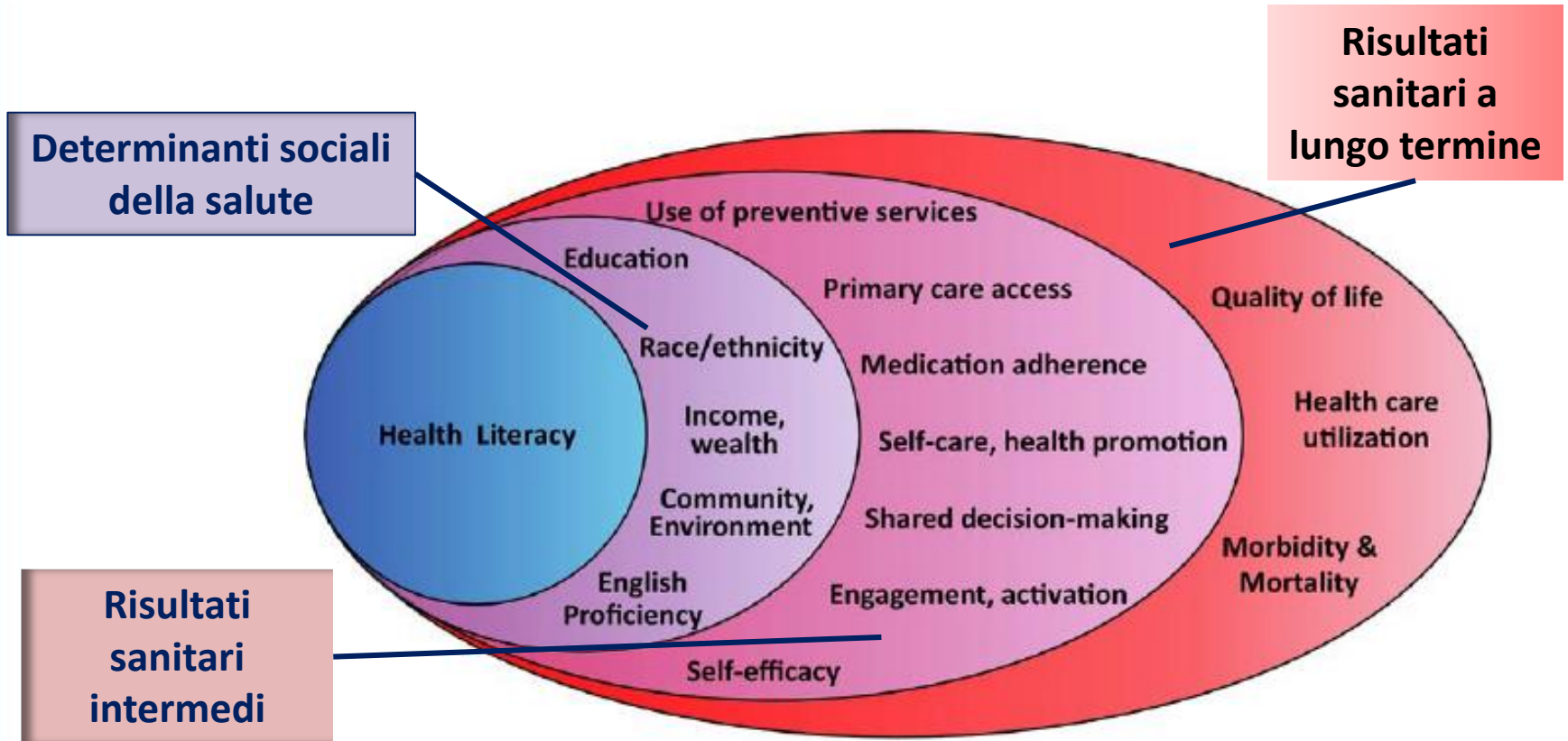
SNP-trait
associations for
"diabetes mellitus"
on the diagram:
310



AHA SCIENTIFIC STATEMENT

Health Literacy and Cardiovascular Disease: Fundamental Relevance to Primary and Secondary Prevention

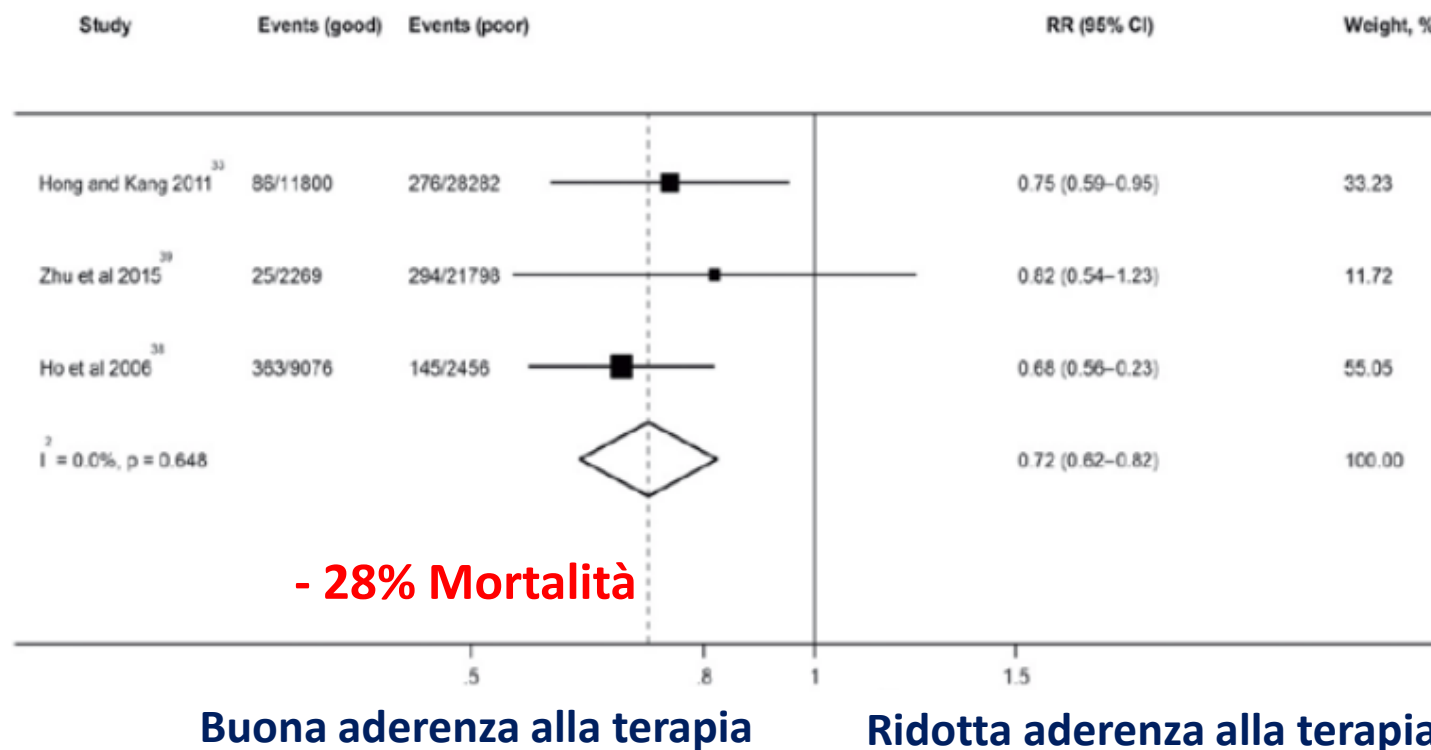
A Scientific Statement From the American Heart Association



Adherence to anti-diabetic treatment and all-cause death

A meta-analysis

Khunti K et al - NEJM 2017; 40: 1588



AGENDA

- I rischi del diabete
- Tecnologie per il DMT1
- Trapianti
- Farmaci innovativi per il DMT2
- Le nuove Linee Guida
- Spunti di riflessione
- Conclusioni

L'INNOVAZIONE TECNOLOGICA (FARMACI E DEVICES): COSA STA CAMBIANDO NEL REAL WORLD

Antonio Carlo Bossi

MILANO

PALAZZO PIRELLI

SALA PIRELLI

Via Fabio Filzi, 22

11 NOVEMBRE 2019

HIGHWAY DIABETES

IL PAZIENTE AL CENTRO?

2019 **MOTORE** 
SANITÀ 
Gestire il Cambiamento

POWER IS NOTHING WITHOUT CONTROL



**...SAREMO IN GRADO DI OFFRIRE AI DIABETICI
NUOVI FARMACI E NUOVI DEVICES...
SENZA DIABETOLOGI ?!?**

*In a world that is increasingly stressful
and less predictable,
more economically challenging
and politically less governable,
Medicine is still about looking after the
individual who seeks care.*

*When health care is measured
by a “medical loss ratio”,
and the percentage of **spending on health care**
is considered a “loss”,
then we are really lost.*