


# NUOVE OPPORTUNITA' TERAPEUTICHE PER IL GRANDE ANZIANO DIABETICO

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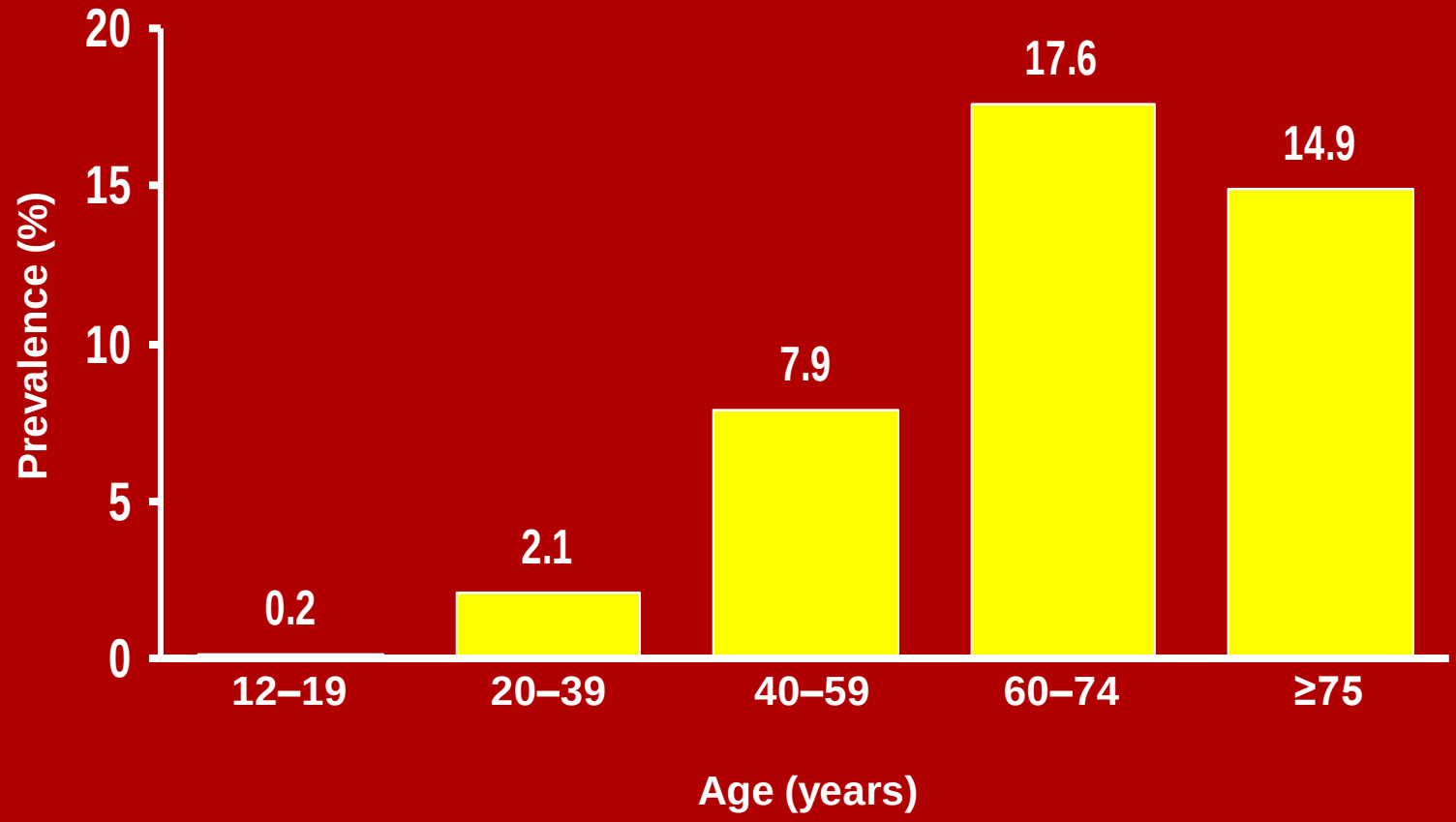
# Prevalence of diabetes and IGT in Northern Italy (The Cremona Study): age as a risk factor

| Age | Total diabetes (% patients) | | IGT (% patients) | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| 45–54 years | 6.0 | 4.4 | 5.1 | 3.7 |
| 55–64 years | 13.1 | 9.5 | 5.6 | 7.2 |
| 65–74 years | 14.7 | 15.4 | 9.5 | 11.1 |
| ≥75 years | 12.6 | 20.8 | 20.0 | 18.9 |
| ≥45 years | 11.0 | 11.3 | 7.7 | 8.9 |

IGT=impaired glucose tolerance; T2DM=type 2 diabetes mellitus.

Garancini MP, et al. *Diabetologia.* 1995; 38:306–313.

# High prevalence of T2DM in the elderly population in the US (NHANES)




NHANES=National Health and Nutrition Examination Survey; T2DM=type 2 diabetes mellitus.

Cowie CC, et al. *Diabetes Care.* 2009;32:287–294.

# Insulin sensitivity and ageing

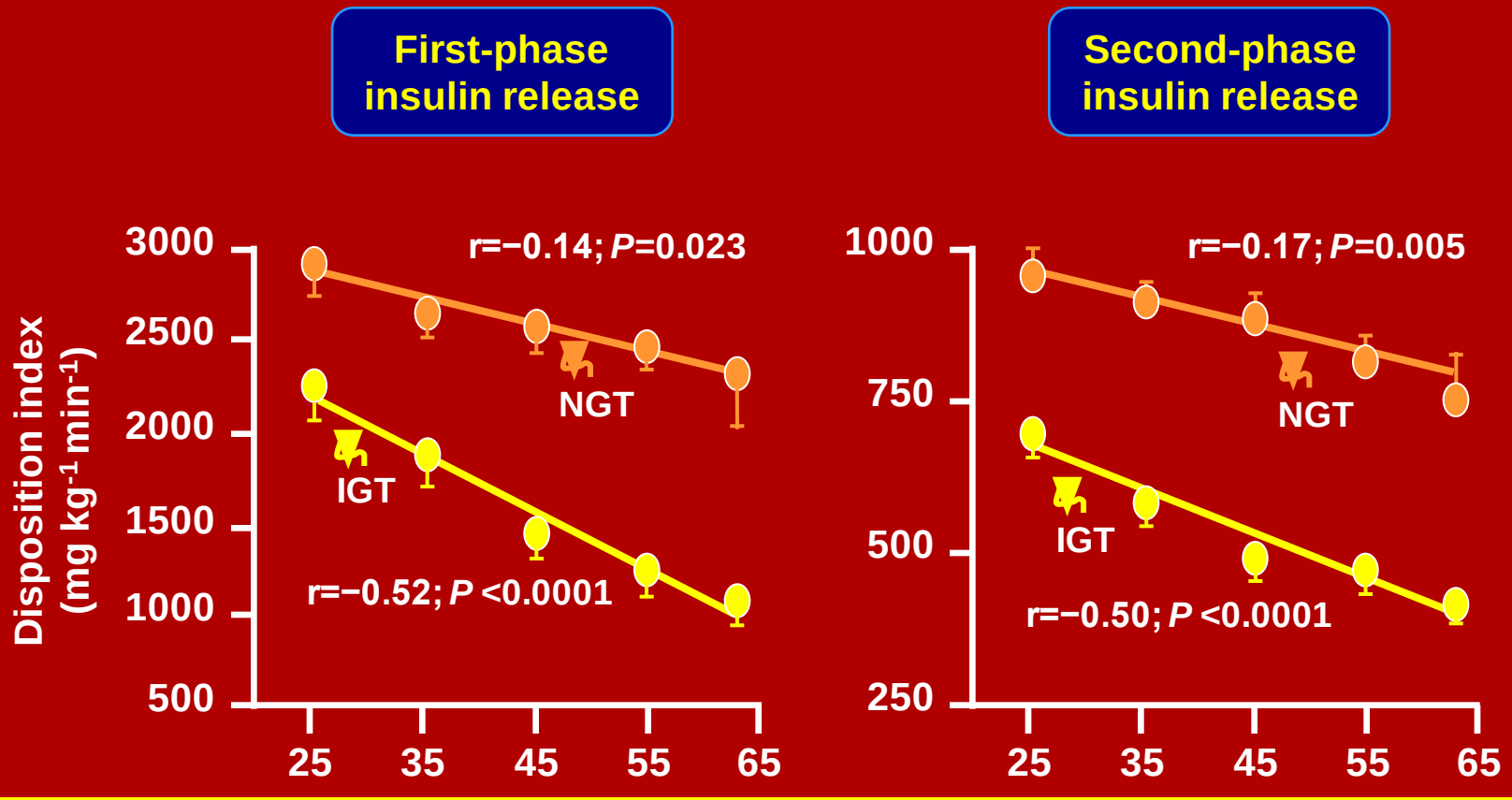
| | NGT | IGT |
|---|---|---|
| Insulin sensitivity (HOMA) | 0.76 ± 0.04 | 0.53 ± 0.03 |
| Correlation with age | NO (*P*=0.08) | NO (*P*=0.69) |
| Insulin sensitivity (clamp, $mL.mg.kg^{-1}.min^{-1}.\mu U^{-1}$) | 16.9 ± 0.8 | 14.0 ± 0.8 |
| Correlation with age | NO (*P*=0.83) | NO (*P*=0.20)[a] |

[a]Adjusted for body mass index.

HOMA=Homeostatic Model Assessment; IGT=impaired glucose tolerance; NGT=normal glucose tolerance.

Szoke E, et al. *Diabetes Care.* 2008;31:539–543.

# β-cell function and ageing




People with IGT had greater decreases as a function of age of both first and second-phase insulin release than people with NGT and that first phase decreased to a greater extent than second phase

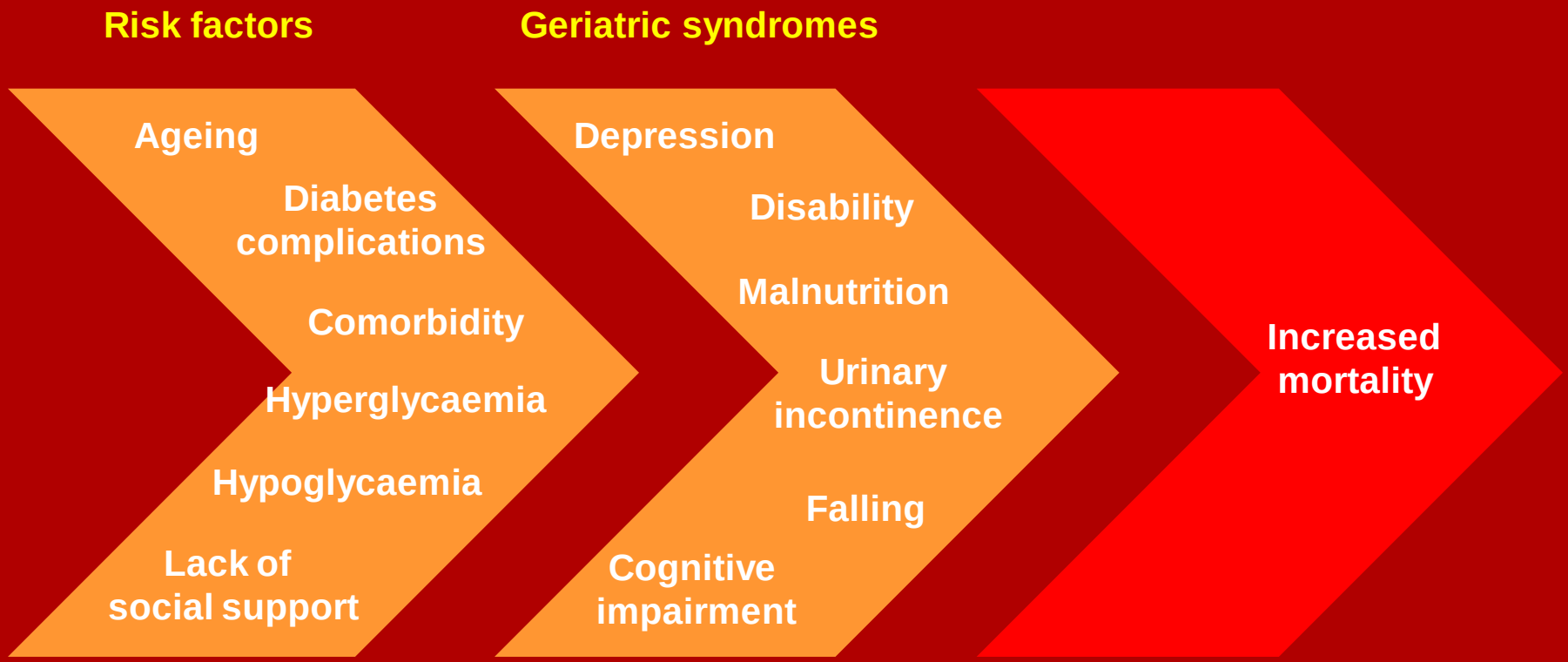
# Pathophysiology of glucose metabolism and diabetes with ageing

- T2DM prevalence increases with age, being a highly prevalent disease in elderly individuals
- Insulin secretion (both first and second phase) normally decreases with ageing
- In contrast, ageing per se has no effect on insulin sensitivity

T2DM=type 2 diabetes mellitus.

Gong Z, Muzundar RH. *Int J Endocrinol.* 2012;2012:320482.

# The management of T2DM in the elderly is challenging due to increased incidence of geriatric syndromes

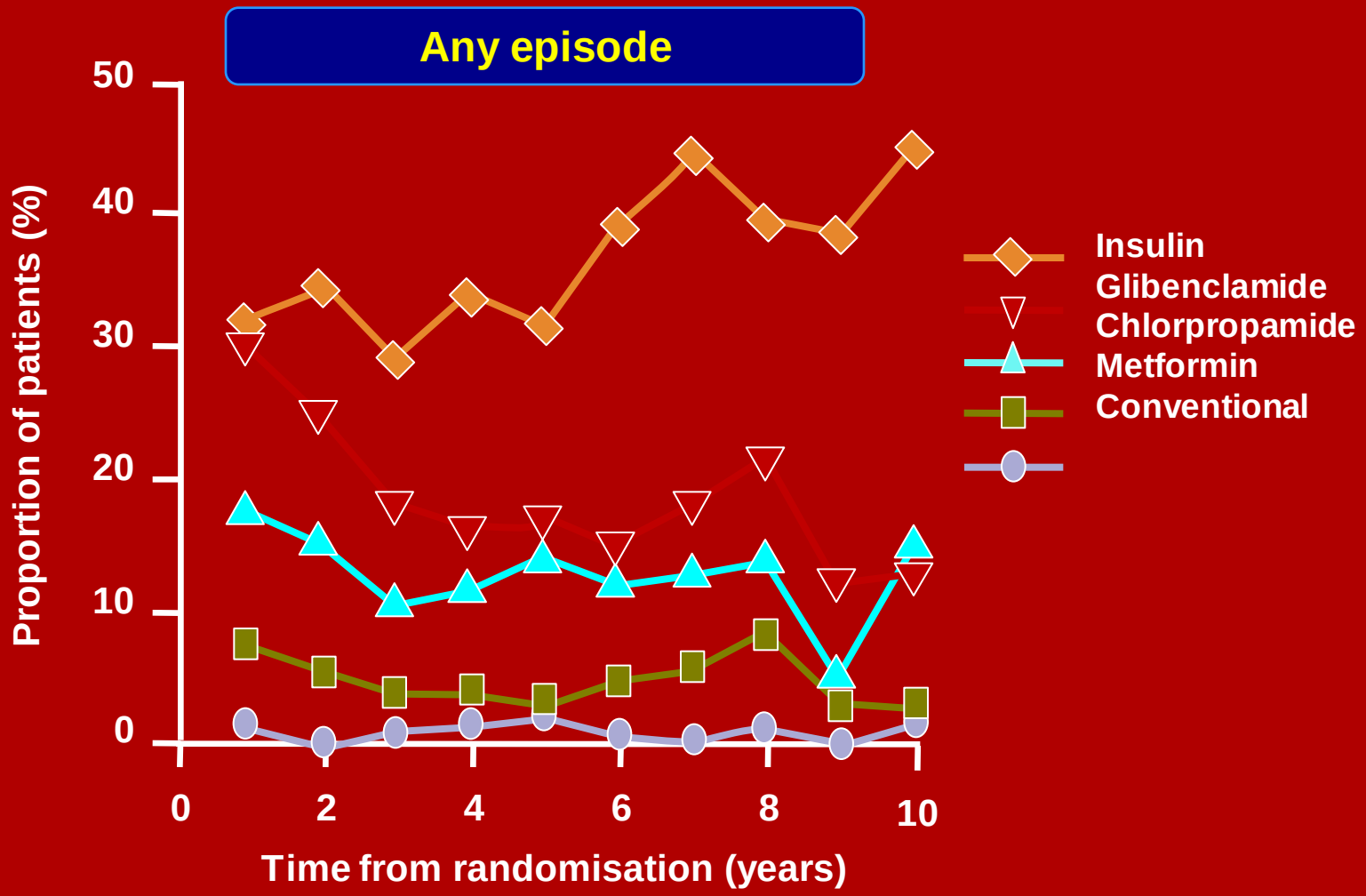



## Focus on hypoglycaemia

T2DM=type 2 diabetes mellitus.

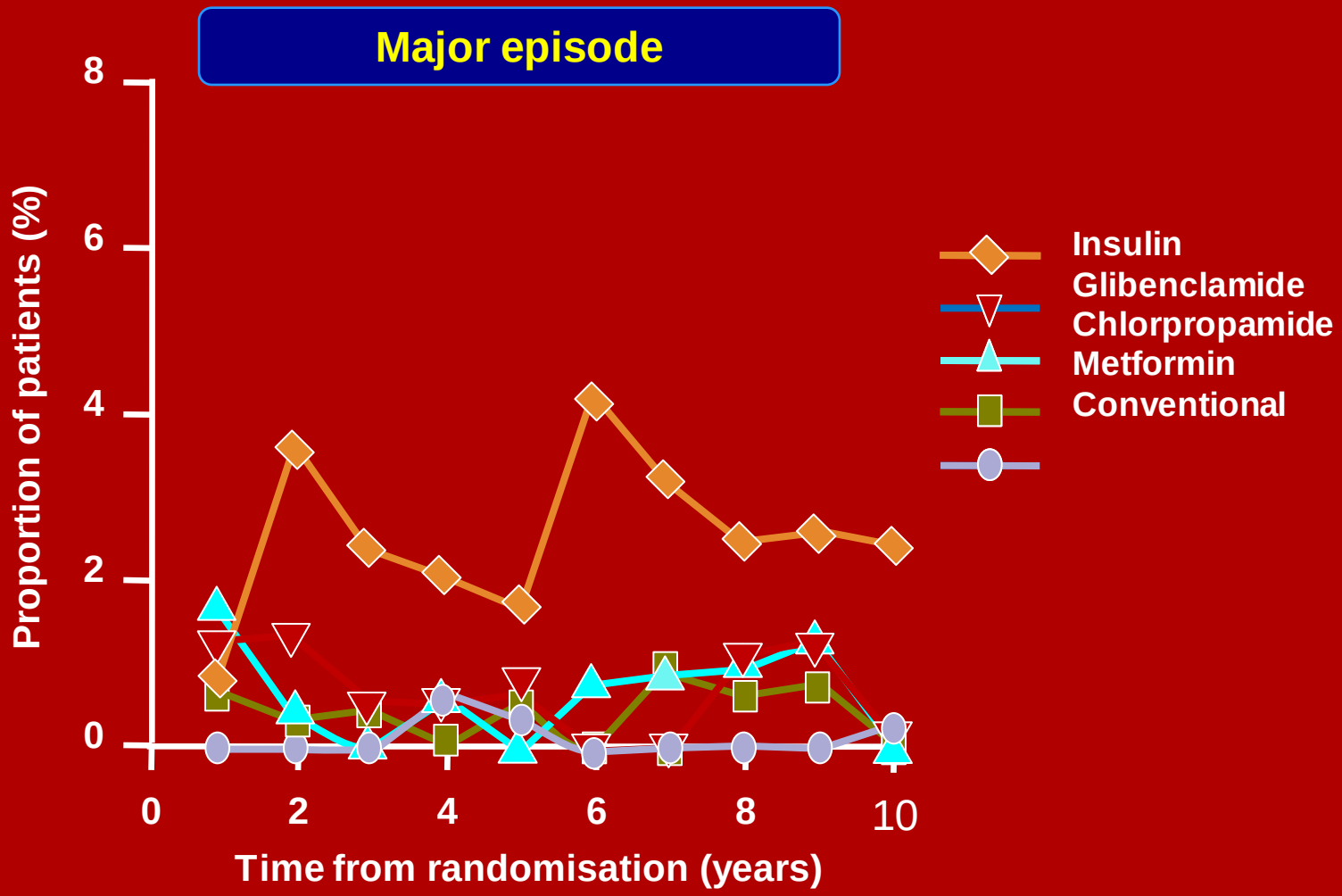
Araki A, Ito H. *Geriatr Gerontol Int.* 2009;9:105–114.

# Hypoglycaemic episodes per annum



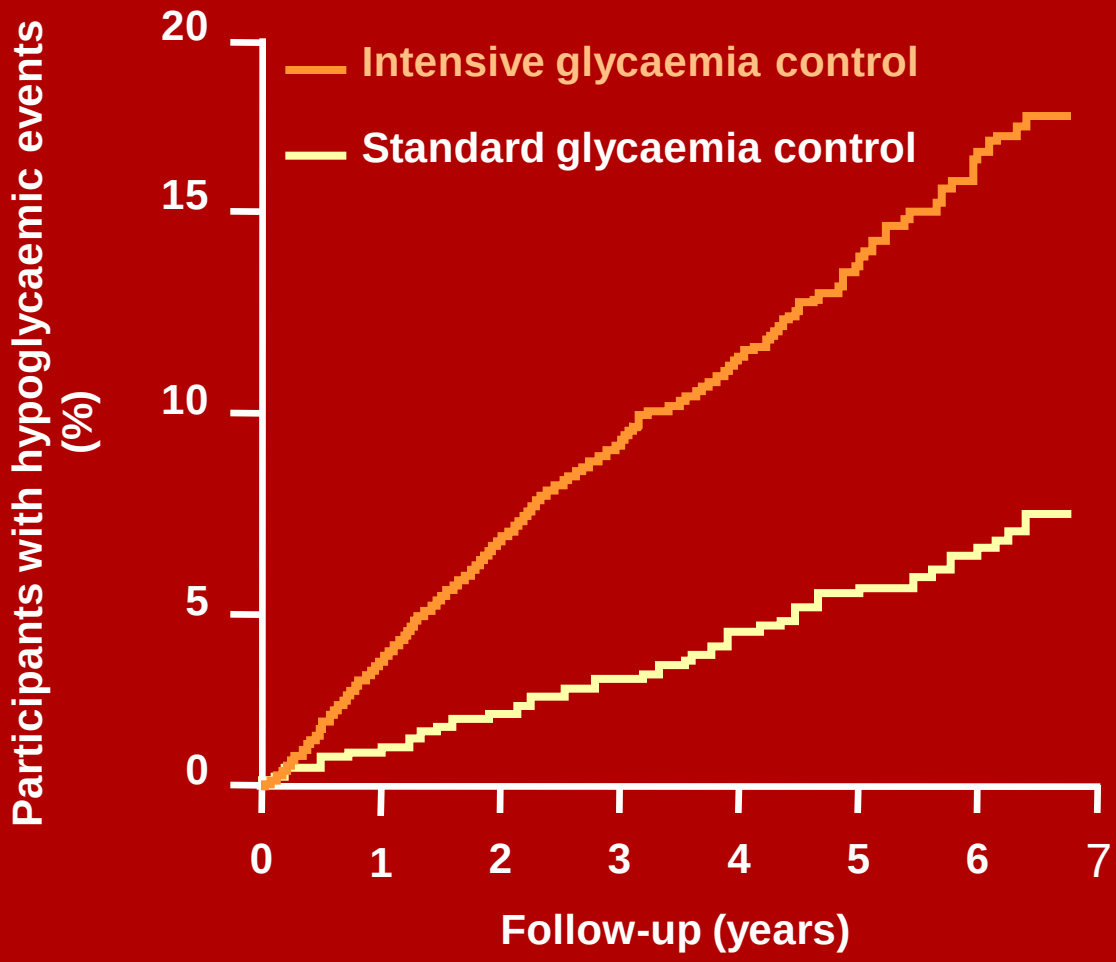

UKPDS Group. *Lancet.* 1998;352:854–865.

# Hypoglycaemic episodes per annum




UKPDS Group. *Lancet.* 1998;352:854–865.

# Hypoglycaemia in the ACCORD study




**The annual incidence of hypoglycaemia was 3.14% in the intensive treatment group and 1.03% in the standard glycaemia group[1]**

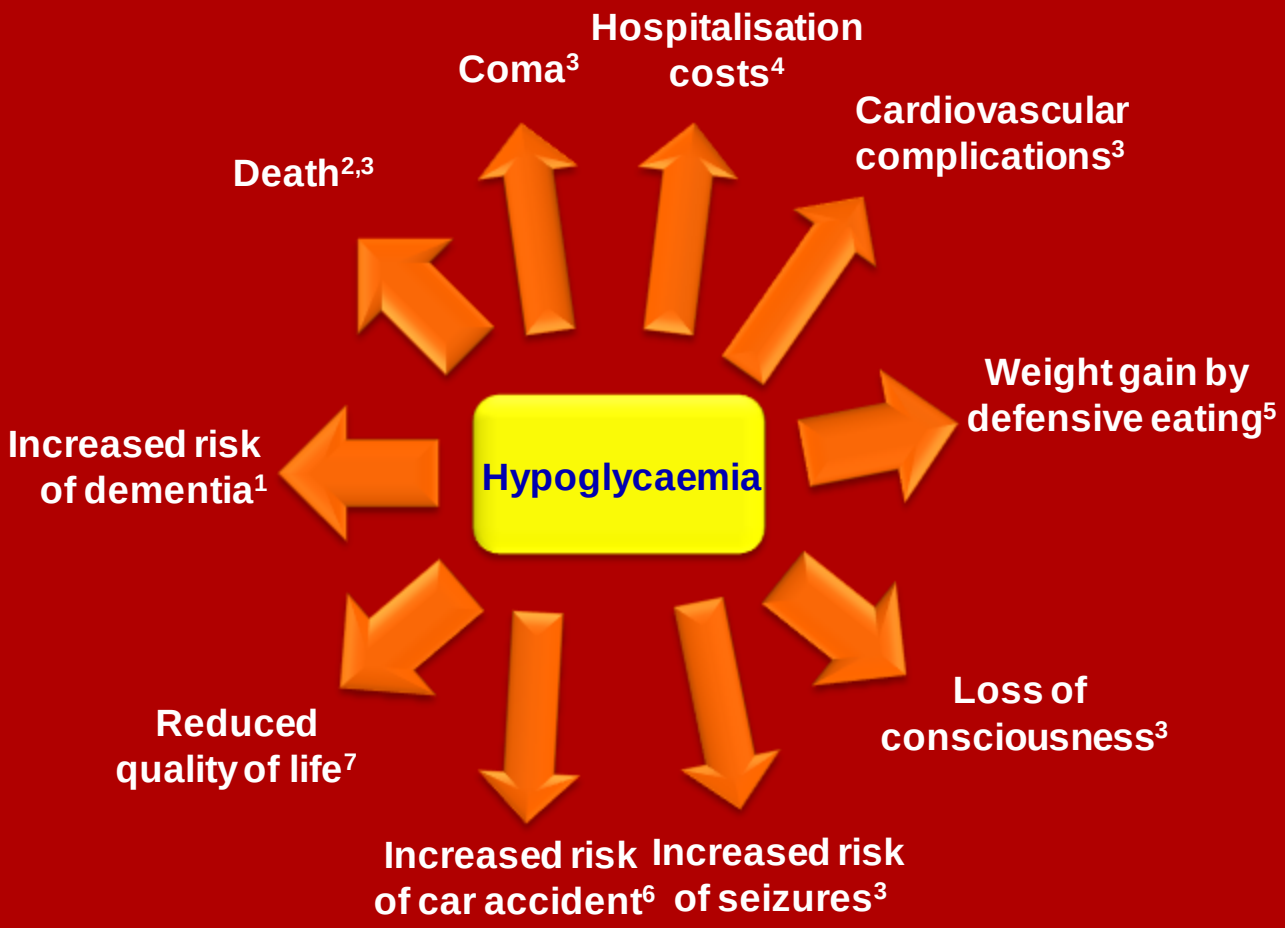
**Symptomatic, severe hypoglycaemia was associated with an increased risk of death within each study arm[2]**

**Older participants were at increased risk for severe hypoglycaemia[1]**

**ACCORD=Action to Control Cardiovascular Risk in Diabetes.**

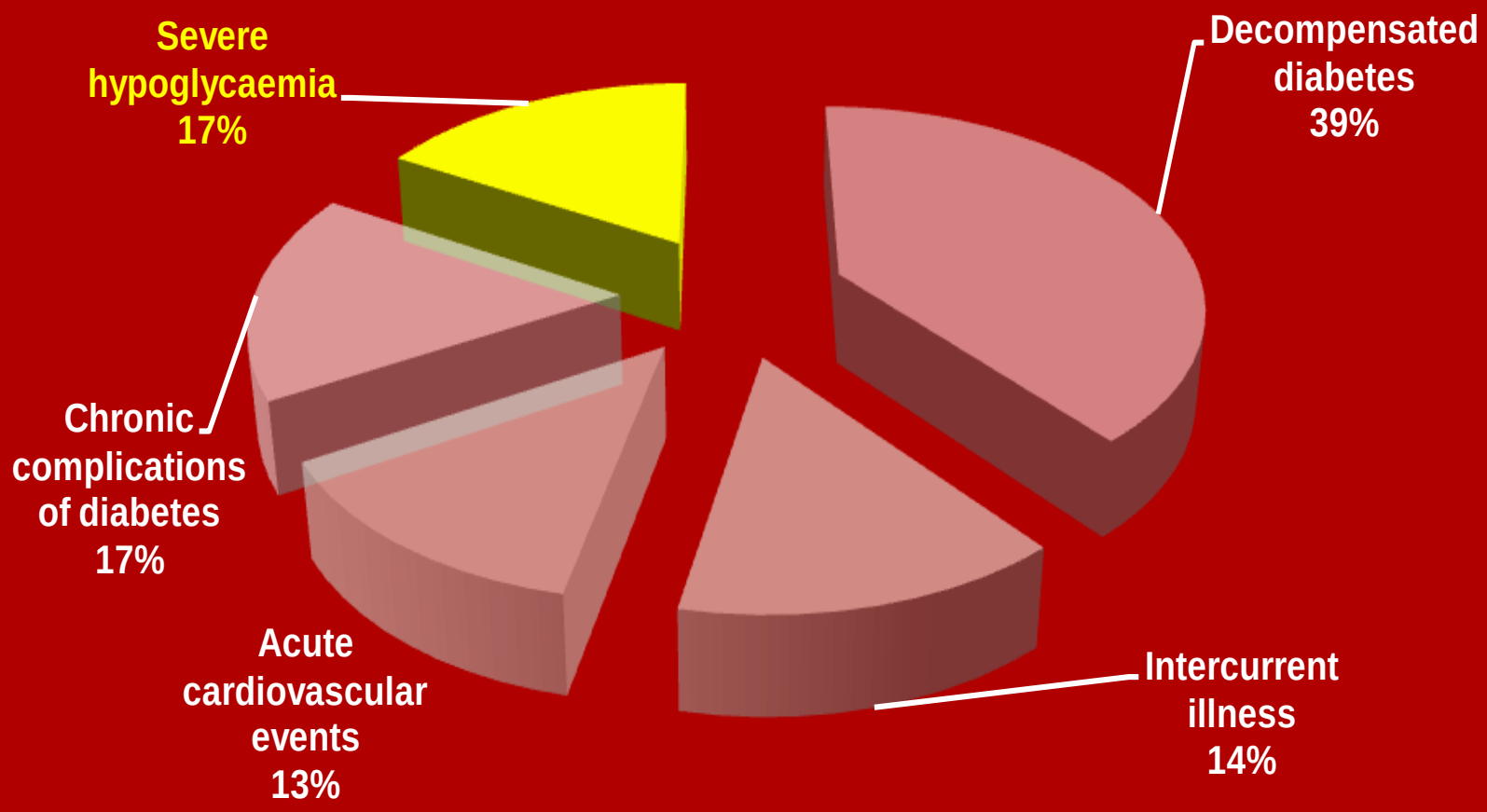
[1]Miller ME, et al. *BMJ.* 2010;340:b5444; [2]Bonds DE, et al. *BMJ.* 2010;340;b4909.

# The possible consequences of hypoglycaemia




[1]Whitmer RA, et al. *JAMA.* 2009;301:1565–1572; [2]Bonds DE, et al. *BMJ.* 2010;340:b4909;
[3]Barnett AH. *Curr Med Res Opin.* 2010;26:1333–1342; [4]Jönsson L, et al. *Value Health.* 2006;9:193–198;
[5]Foley JE, Jordan J. *Vasc Health Risk Manag.* 2010;6:541–548; [6]Begg IS, et al. *Can J Diabetes.* 2003;27:128–140;
[7]McEwan P, et al. *Diabetes Obes Metab.* 2010;12:431–436.

# Severe hypoglycaemia accounts for almost 20% of all hospitalisations for T2DM in the elderly




T2DM=type 2 diabetes mellitus.

Greco D, et al. *Exp Clin Endocrinol Diabetes.* 2010;118:215–219;
Greco D, Angileri G. *Diabetes Nutr Metab.* 2004;17:23–26.

# Hypoglycaemia is a major challenge in the treatment of diabetes

## Patient risk factors[1]

- Advanced age
- Recent hospitalisation
- Intercurrent illness
- Chronic liver, renal or cardiovascular disease
- Endocrine deficiency (thyroid, adrenal, pituitary)
- Loss of normal counter-regulation
- Hypoglycaemic unawareness

## Lifestyle risk factors[1]

- Poor nutrition or fasting
- Prolonged physical exercise
- Alcohol (ethanol)

## Drug risk factors[2]

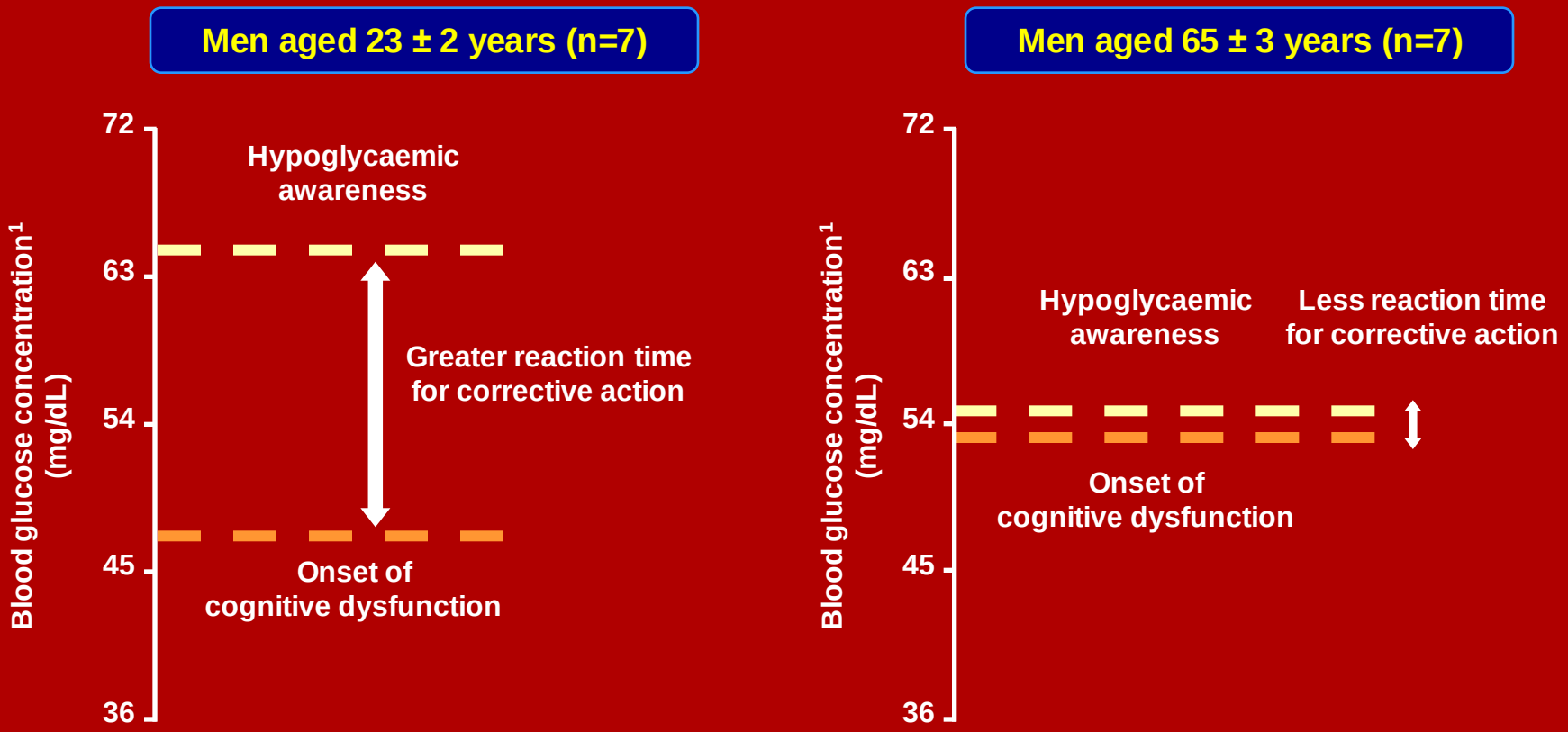
- Use of SU and / or insulin
- Drug interactions with SUs

The primary cause of hypoglycaemia in T2DM is diabetes medication, in particular SUs and insulin[2]

SU=sulfonylurea.

[1]Chelliah A, Burge MR. *Drugs Aging.* 2004;21:511–530; [2]Amiel SA, et al. *Diabet Med.* 2008;25:245–254;

# Thresholds for hypoglycaemia symptoms vary with age[a,1,2]




**With increasing age, potential reaction time between awareness and onset of symptoms is decreased, contributing to an increased risk of asymptomatic hypoglycaemia and greater susceptibility to cognitive impairment[a,1,2]**

[a]Based on data in non-diabetic patients with no family history of diabetes.

[1]Zammitt NN, et al. *Diabetes Care.* 2005;28:2948–2961;
[2]Matyka K, et al. *Diabetes Care.* 1997;20:135–141.

# New therapeutic opportunities in older adults with diabetes:

# focus on DPP4 inhibitors

# Concern about hypoglycaemia is a major factor limiting intensive control of blood sugar: New therapeutic opportunities

**Incretin-based therapies (eg DPP-4) act in a glucose-sensitive manner[1] and have a lower risk of hypoglycaemia compared with SUs[2]**

**DPP4-i efficacy and safety established in elderly patients aged ≥75 years[3]**

**Low risk of hypoglycaemic events associated with DPP4-i therapy in patients aged ≥75 years[3]**

DPP-4=dipeptidyl peptidase-4; SU=sulfonylurea.

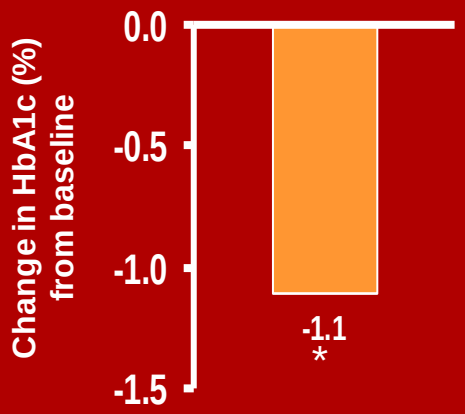
[1]Stonehouse A, et al. *Curr Diabetes Rev.* 2008;4:101–109;
[2]Matthews DR, et al. *Diabetes Obes Metab.* 2010;12:780–789;
[3]Schweizer A, et al. *Diabetes Obes Metab.* 2011;13:55–64.

# Vildagliptin plus metformin: a 1.1% reduction in HbA1c in the very elderly with a low risk of hypoglycaemia and with weight neutrality

**Pooled analysis (24 weeks) of three add-on therapy studies in patients aged ≥75 years[1]**

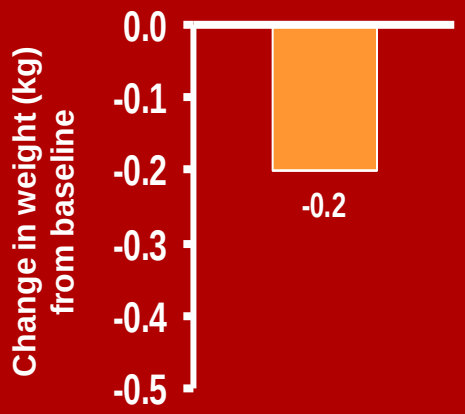
## HbA1c

n=25
BL (%)=8.5




## Body weight

n=25
BL (kg)=82.8




## Hypoglycaemia[2]

| n | 31 |
|---|---|
| Any events, n (%) | 0 |
| Severe events, n (%) | 0 |

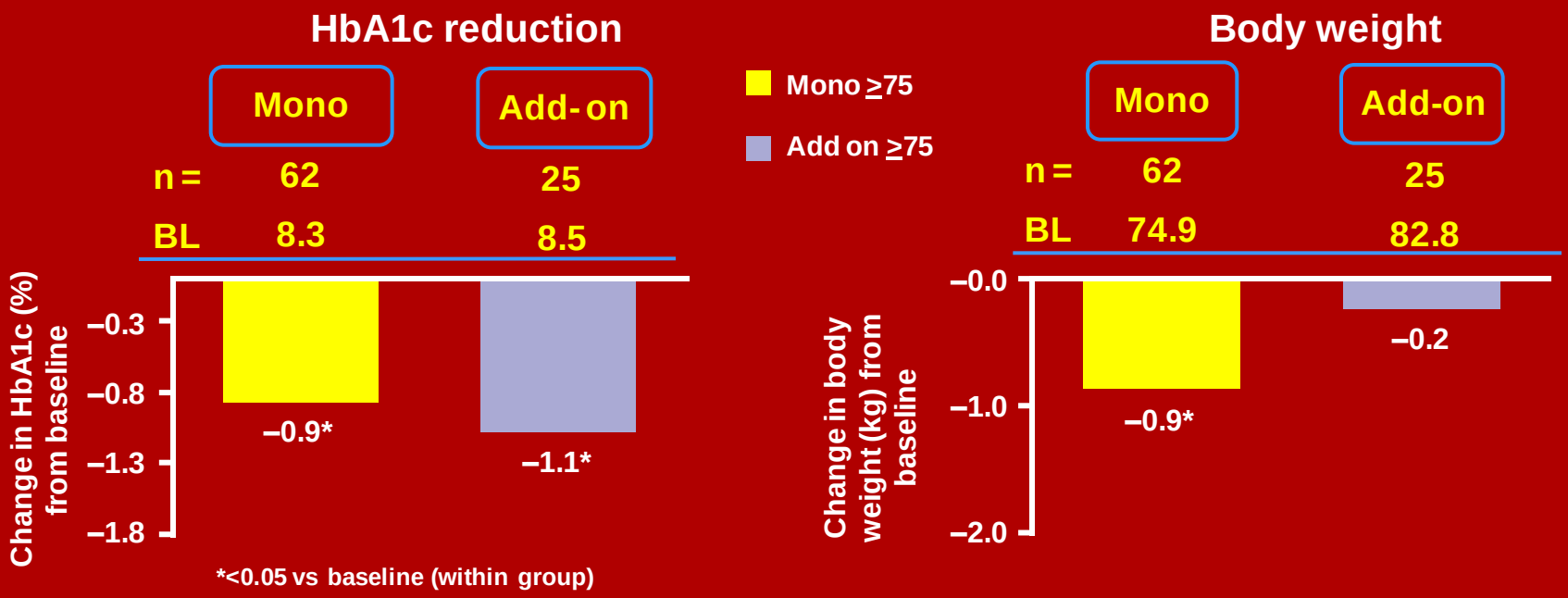
[1]Efficacy analyses included studies with vildagliptin 50 mg bid that were randomised, double-blind, controlled, parallel groups, ≥24 weeks long and with patients aged ≥75 years. Seven monotherapy studies (pooled monotherapy efficacy population) and three add-on therapy to metformin studies (pooled add-on therapy to metformin efficacy population) were pooled; data shown are from the pooled add-on therapy to metformin efficacy population; [2]Up to 24-week add-on therapy to metformin (excluding open-label) safety population (n=31 for patients aged ≥75 years;). Overall AEs, drug-related AEs and SAEs were all reported with a lower frequency in elderly patients receiving vildagliptin (133.9, 14.5 and 8.8 events per 100 SYE, respectively) than in elderly patients receiving comparators (200.6, 21.8 and 16.5 events per 100 SYE, respectively), and the incidence of discontinuations due to AEs was similar in the two treatment groups (7.2 vs 7.5 events per 100 SYE, respectively).

*$P$ <0.05 vs baseline (within group); AE=adverse event; bid=twice daily; BL=baseline; HbA1c=haemoglobin A1c; SAE=serious adverse events; SYE=subject-year exposure.

Schweizer A, et al. *Diabetes Obes Metab.* 2011;13:55–64.

# Very elderly patients (≥ 75 yrs old) pooled analysis: change in HbA1c and body weight, and hypoglycemic events after 24 weeks treatment

Pooled analysis at 24 weeks; 50 mg twice daily




| Hypoglycemic events | Mono | Add-on |
|---|---|---|
| Any events | 0.0 | 0.0 |
| Severe events | 0.0 | 0.0 |

Schweizer A *et al*. Diabetes Obes Metab 2011;3:55–64

# Vildagliptin in the very elderly: lower frequency of AEs, SAEs and drug-related AEs than comparators (pooled analysis)

| | Age <75 years | | Age ≥75 years | |
|---|---|---|---|---|
| | Vilda 50 mg bid n=5984 | Comparators[a] n=6041 | Vilda 50 mg bid n=132 | Comparators[a] n=169 |
| Any AEs SYE-adj<br>n (%) | 147.9<br>4139 (69.2) | 177.3<br>4174 (69.1) | 133.9<br>86 (65.2) | 200.6<br>114 (67.5) |
| Drug-related AEs SYE-adj<br>n (%) | 14.9<br>943 (15.8) | 26.0<br>1325 (21.9) | 14.5<br>18 (13.6) | 21.8<br>24 (14.2) |
| SAEs SYE-adj<br>n (%) | 7.8<br>533 (8.9) | 8.9<br>538 (8.9) | 8.8<br>12 (9.1) | 16.5<br>19 (11.2) |
| Discontinuation due to AEs SYE-adj<br>n (%) | 4.7<br>337 (5.6) | 6.1<br>391 (6.5) | 7.2<br>10 (7.6) | 7.5<br>9 (5.3) |
| Deaths SYE-adj<br>n (%) | 0.3<br>24 (0.4) | 0.3<br>21 (0.3) | 0<br>0 | 1.7<br>2 (1.2) |

AE=adverse event; bid=twice daily; SAE=serious adverse event; SYE=subject-year exposure; vilda=vildagliptin.
Pooled data from 35 Phase II and III studies (open-label studies were excluded).
[a]Comparator group includes active comparator or placebo.

Schweizer A, et al. *Diabetes Obes Metab.* 2011;13:55–64.

# DPP4-inhibitors vs conventional oral antidiabetics as add-on therapy to metformin in elderly T2D patients: The HYPOCRAS study

## A large real-life population trial in elderly population

**AIM:**

A prospective observational study to compare DPP4-inhibitors (DPP4-i) with conventional oral antidiabetic drugs (COAD) in the real-life treatment of elderly patients with T2DM uncontrolled on metformin alone.

**METHODS:**

Two treatment cohorts (DPP4-i and COAD, constituted on the basis of the GP decision of add-on therapy at the 1st visit) were compared after 6months. The primary objective was to assess the incidence of hypoglycaemic episodes in relationship with glycaemic control assessed by HbA(1c) level.

Penfornis A. *Diabetes Metab.* 2012, Sep 17. pii: S1262-3636(12)00121-8

# The HYPOCRAS study

## Safety and efficacy of second OAD added on to metformin at 6 months

| | DPP-4 inhibitor N=931 | OOAD N=257 | SU/ Glinide N=163 | p-value DPP-4 inhibitor vs OOAD |
|---|---|---|---|---|
| At least 1 episode of hypoglycaemia | 6.4% | 20.1% | 25.9% | <0.001 P |
| At least 1 episode of severe hypoglycaemia | 0.1% | 2.4% | 3.2% | 0.001 F |
| HbA1c, % | 6.9 (0.8) | 7.0 (0.7) | | 0.033 WMW |
| FPG, mg/dL | 126 (28) | 129 (26) | | 0.034 WMW |
| Success of bitherapy HbA1c ≤7% without hypoglycaemia | 59.7% | 45.5% | 41.4% | <0.001 P |
| HbA1c categories | | | | |
| 6.5%–7% | 58.1% | 48.9% | | |
| 7%–7.5% | 22.6% | 26.1% | | |
| 7.5%–8% | 9.0% | 17.0% | | |
| ≥8% | 10.3% | 8.0% | | |
| Treatment discontinued | 1.6% | 6.6% | 6.7% | <0.001 P |

Values are mean (SD) unless otherwise specified.
P, Pearson Chi² test; F, Fisher; WMW, Wilcoxon-Mann-Whitney; DPP-4, dipeptidyl peptidase-4; FPG, fasting plasma glucose; OOAD, other oral anti-diabetic drug; SU, sulphonylurea

**CONCLUSION:**

This large cohort study of elderly T2DM patients in France shows that the incidence of hypoglycaemia was three times higher in patients prescribed a COAD versus a DPP4-i after 6months while both treatments induced satisfactory glycaemic control.

Penfornis A. *Diabetes Metab.* 2012, Sep 17. pii: S1262-3636(12)00121-8

# Safety of vildagliptin vs placebo in patients with T2DM and moderate or severe RENAL impairment

The overall safety and tolerability of vildagliptin 50 mg qd in patients with moderate or severe RI was generally similar to placebo.
There was a trend towards a lower incidence of any AE with vildagliptin than with placebo in both moderate (67.5 vs. 72.9%) and severe (72.6 vs. 74.2%) RI.

| Event category | Moderate RI [n (%)] | | Severe RI [n (%)] | |
|---|---|---|---|---|
| | Vildagliptin 50 mg qd (n = 163) | Placebo (n = 129) | Vildagliptin 50 mg qd (n = 124) | Placebo (n = 97) |

Vildagliptin added to ongoing antidiabetic therapy had a safety profile similar to placebo.
Further, relative to placebo, vildagliptin elicited a statistically and clinically significant decrease in A1C in patients with moderate or severe RI.

Lukashevich V. *Diabetes, Obesity and Metabolism* 2011, 13: 947–954.

# Elderly patients are likely to be taking several medications: vildagliptin has a low potential for drug–drug interactions

**Vildagliptin has a low potential for drug–drug interactions[1]**

**Vildagliptin is not metabolised by the cytochrome P450 pathway[1]; this is important for patients on concomitant medications**

**Studies in healthy volunteers showed vildagliptin had no clinically relevant pharmacokinetic interactions with digoxin (Pgp substrate), warfarin (CYP2C9 substrate), amlodipine, ramipril, valsartan or simvastatin[1]**

# Summary

- High prevalence of T2DM in the elderly and very elderly[1]
- Management of T2DM in the elderly is particularly challenging because of comorbidities, SU drug interactions and heterogeneity (healthy and fragile individuals)[2]
- Hypoglycaemic episodes in the elderly can precipitate serious events such as falls and hip fractures and severely reduce quality of life[2]
- Severe hypoglycaemic episodes are common in the elderly[3]
- Need to have appropriate therapeutic options for the treatment of T2DM in elderly patients

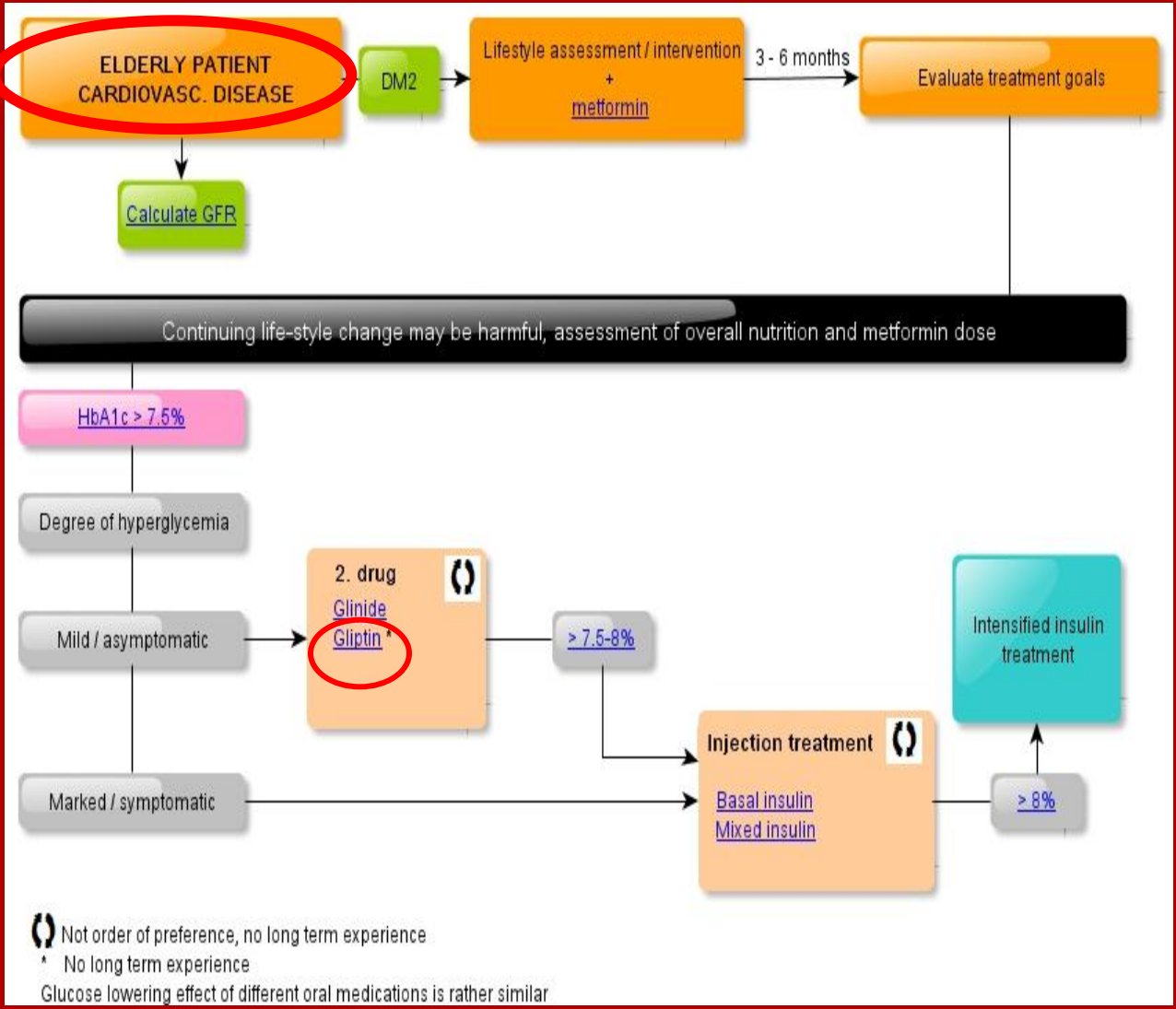
**SU=sulfonylurea; T2DM=type 2 diabetes mellitus.**

**[1]Cowie CC, et al. *Diabetes Care.* 2009;32:287–294;**
**[2]*Geriatr Gerontol Int.* 2009;9:105–114;**
**[3]Chelliah A, et al. *Drugs Aging.* 2004;21:511–530.**

Grazie!

# Diabetes treatment algorithm in Elderly Patient

## Diabetes Current Care Guideline in Finland




www.terveysportti.fi/xmedia/ccs/varhainen_diabetes_en.html

# Safety of long-term treatment with saxagliptin in patients with T2DM and RENAL impairment

| | Patients, *n* (%) | |
|---|---|---|
| | Saxagliptin 2.5 mg (*n* = 85) | Placebo (*n* = 85) |
| **AEs*** | | |
| Patients reporting ≥ 1 AE | 64 (75.3) | 60 (70.6) |
| Patients reporting ≥ 1 serious AE | 23 (27.1) | 24 (28.2) |
| Discontinuation of study medication owing to AE | 10 (11.8) | 7 (8.2) |
| Discontinuation of study medication owing to serious AE | 6 (7.1) | 6 (7.1) |
| Death | 3 (3.5) | 4 (4.7) |
| **Most common AEs (≥ 5% in either treatment group)†** | | |
| Urinary tract infection | 6 (7.1) | 3 (3.5) |
| Anaemia | 5 (5.9) | 7 (8.2) |

Saxagliptin 2.5 mg providing sustained reductions in HbA1c, especially in patients with moderate or severe renal impairment,
may be a useful option in long-term treatment of patients with T2DM and renal impairment

M. Nowicki. *Int J Clin Pract*, December 2011, 65, 12, 1230–1239

# Meta-analysis of large, incretin-based clinical trials: ***safety***

| Relevant AEs | Number of studies | Risk ratio (95% CI) |
|---|---|---|
| Exenatide | | |
| Hypoglycemia: | | |
| vs placebo | 5 | 2.30 (1.08–4.88) |
| vs insulin | 2 | 1.02 (0.46–2.26) |
| Nausea | 7 | 3.17 (2.16–4.64) |
| Vomiting | 6 | 3.52 (2.64–4.70) |
| Diarrhea | 6 | 2.27 (1.75–2.94) |
| Liraglutide | | |
| Nausea | 2 | 0.89 (0.27–3.01) |
| Vomiting | 2 | 0.62 (0.13–2.91) |
| DPP4 inhibitors | | |
| Hypoglycemia | 20 | 0.97* (0.50–1.86) |
| Nasopharyngitis | 12 | 1.17 (0.96–1.40) |
| Urinary tract infection | 5 | 1.52 (1.04–2.21) |
| Headache | 13 | 1.38 (1.10–1.72) |

*hypoglycemia rates vs placebo
AEs=adverse events; CI=confidence intervals

Amori, et al. JAMA 2007;298:194–206

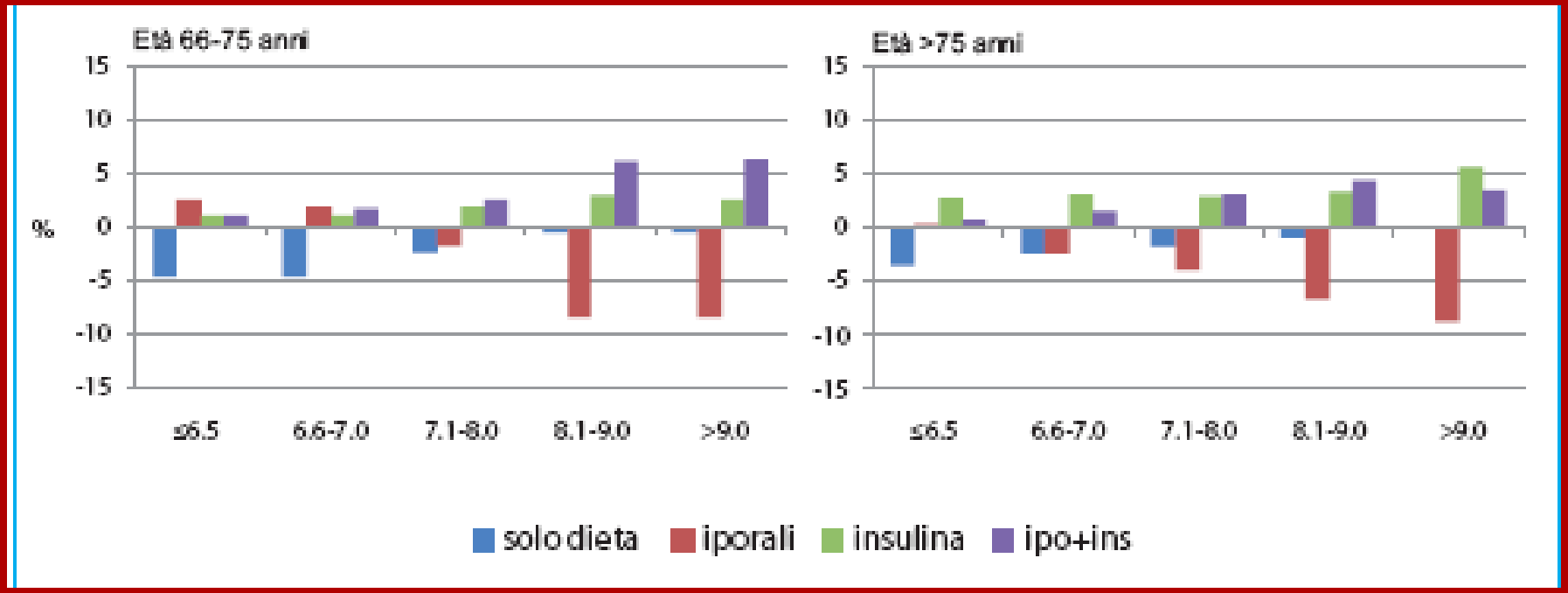
# Glucose-lowering effects, advantages, and disadvantages of various glucose-lowering agents in older adults with type 2 diabetes

| | A1c lowering effect, %* | Advantages | Disadvantages |
|---|---|---|---|
| Metformin | 1.0–2.0 | Proven effectiveness as the first-line therapy<br>Low risk of hypoglycemia<br>Neutral effect on weight<br>Long-term clinical experiences<br>Low cost | Contraindicated when serum creatinine ≥ 1.5 mg/dL in men or ≥ 1.4 mg/dL in women, liver failure, and advanced heart failure<br>GI side effects may cause poor appetite and malnutrition<br>Concerns of vitamin B12 and folate deficiency |
| Sulfonylureas | 1.0–2.0 | Proven glucose-lowering efficacy<br>Long-term clinical experiences<br>Relatively low cost | Frequent hypoglycemia<br>Weight gain |
| Meglitinides | 0.5–1.5 | Rapid onset of action time<br>Flexible dosing for those with irregular eating habits | Hypoglycemia<br>Weight gain<br>Frequent dosing<br>Relatively high cost |
| DPP-4 inhibitors | 0.5–0.8 | Low risk of hypoglycemia<br>Weight neutrality | Limited efficacy; only mild to moderate lowering of A1c by 0.5–0.8%<br>Relatively high cost<br>Limited long-term data |
| Alpha glucosidase inhibitors | 0.5–0.8 | Effectively reduce postprandial glucose<br>No hypoglycemia | Frequent GI side effects<br>Frequent dosing<br>Relatively high cost |
| Thiazolidinediones | 0.5–1.4 | Reduce insulin resistance<br>Durable effects on glycemic control<br>Low risk of hypoglycemia | Weight gain<br>Fluid retention, which may exacerbate underlying heart failure<br>Increased risk of bone fractures<br>Concerns of bladder cancer |
| GLP-1 receptor agonists | 0.5–1.0 | Low risk of hypoglycemia<br>Weight reduction (beneficial in obese patients) | Relatively high cost<br>Need a parenteral injection<br>GI side effects may not be tolerated in some older patients<br>High cost<br>Limited long-term experiences |
| Insulin | 1.5–3.5 | Proven effectiveness<br>No dose limitation | Need a parenteral injection<br>Frequent hypoglycemia<br>Weight gain<br>Need glucose monitoring and adjusting the dose accordingly<br>Require patient's executive functioning |

GI, gastrointestinal; DPP-4, dipeptidyl peptidase-4; GLP-1, glucagon-like peptide-1.
*Expected reduction in Hb A1c when used as a monotherapy.

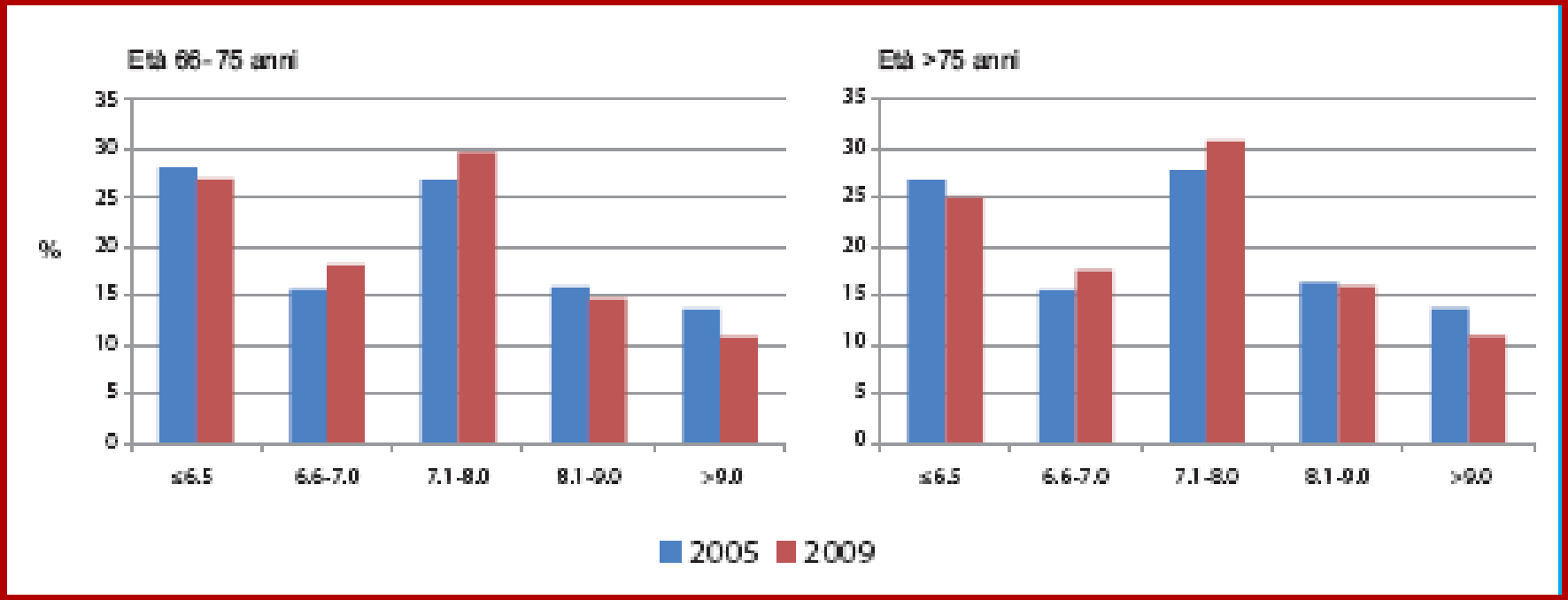
# Anti-diabetes treatment in Italian Elderly Population

Variazione assoluta 2009-2005 nella distribuzione delle classi di trattamento antidiabetico per le 2 fasce di età anziana




Annali AMD, 2011

# Distribuzione della popolazione anziana Con diabete per 5 classi di HbA1c




Annali AMD, 2011

# Guidelines Recommendations Specifically designed for Older adults

Although there are several guidelines for the management of diabetes in general, only a few are specifically designed for older adults with diabetes :

- Brown AF, et al. California Healthcare Foundation/American Geriatrics Society Panel on Improving Care for Elders with Diabetes. Guidelines for improving the care of the older person with diabetes mellitus. J Am Geriatr Soc 2003;51(5 Suppl Guidelines):S265-80.

- Sinclair A, et al. Diabetes mellitus in older people: position statement on behalf of the International Association of Gerontology and Geriatrics (IAGG), the European Diabetes Working Party for Older People (EDWPOP), and the International Task Force of Experts in Diabetes. J Am Med Dir Assoc 2012;13:497-502

# Guidelines Recommendations for Older adults Main message

- Older adults who are functional, cognitively intact, and have significant life expectancy should receive diabetes care using goals developed for younger adults.

- Glycemic goals for older adults not meeting the above criteria may be relaxed using individual criteria, BUT

hyperglycemia leading to symptoms or risk of acute hyperglycemic complications, should be avoided in all patients

Diabetes Care January 2012 vol. 35 no. Supplement 1 S11-S63

# DPP-4 inhibitors in older adults with diabetes Summary of main studies

- Vildagliptin 100 mg daily resulted in better glycemic control, tolerability, and fewer adverse events compared with metformin 1,500 mg daily in drug-naive elderly patients with type 2 diabetes (mean age of 71 years with 3 years of diabetes duration) . Schweizer A , Diabetes Obes Metab 2009;11:804-12.

- Vildagliptin is effective and well-tolerated in type 2 diabetic patients aged 75 years or older (mean age, 77 years) Schweizer A , Diabetes Obes Metab 2011;13:55-64

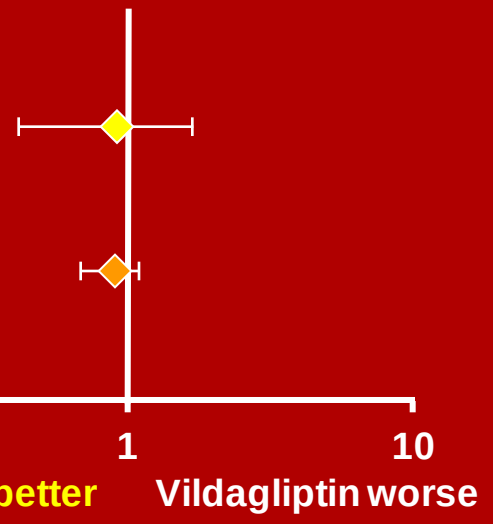
- Sitagliptin provides similar glycemic improvement with less hypoglycemia in the elderly with type 2 diabetes compared to sulfonylurea Shankar R, Diabetes 2012;61(Suppl 1):A278.

In older adults with type 2 diabetes, reductions in HbA1c after treatment with a DPP-4 inhibitor were not different from those in younger patients.
Treatment with DPP-4 inhibitors in older diabetic adults was associated with a low risk of hypoglycemia, and these agents were weight neutral
Schwartz SL. Am J Geriatr Pharmacother 2010;8:405-18.

# No Increased Risk of Adjudicated CARDIOVASCULAR Events, relative to all comparators[a]

**Incidences and Odds Ratios for Adjudicated CV Events by Treatment**

| | Vildagliptin n / N (%) | Reference n / N (%) | M-H RR (95% CI) |
|---|---|---|---|
| Vilda 50 mg qd[b] | 10 / 1393 (0.72) | 14 / 1555 (0.90) | 0.88 (0.37–2.11) |
| Vilda 50 mg bid[b] | 81 / 6116 (1.32) | 80 / 4872 (1.64) | 0.84 (0.62–1.14) |




bid=twice daily; CI=confidence interval; CV=cardiovascular; M-H RR=Mantel-Haenszel risk ratio; qd=once daily; vilda=vildagliptin.

[a]vs comparators (all non-vildagliptin treatment groups). All-study safety population.

[b]Meta-analysis of vildagliptin 50 mg bid data vs all comparators according to the methodology set by the US Food and Drug Administration[c] [50 mg bid odds ratio = 0.84 (95% CI 0.62–1.14)].

[c]Guidance for Industry: Diabetes Mellitus - Evaluating Cardiovascular Risk in New Antidiabetic Therapies to Treat Type 2 Diabetes, U.S. Department of Health and Human Services Food and Drug Administration Center for Drug Evaluation and Research (CDER), December 2008.

Schweizer A, et al. *Diabetes Obes Metab.* 2010; 12: 485–494.

ALTERNATIVA

# Comparison of β-cell function in elderly NGT or IGT patients

| | NGT | IGT | P |
|---|---|---|---|
| HOMA | | | |
| % β-cell | 150 ± 9 | 114 ± 7 | 0.008 |
| Correlation with age | $r = -0.18$ | $r = -0.05$ | |
| | $P = 0.003$ | $P = 0.53$ | |
| | $Y = -2.1x + 238.6$ | $Y = -0.37x + 131.8$ | |
| Decrease/year | 1.1% | — | |
| Hyperglycemic clamp | | | |
| First phase (μU/ml) | 186 ± 7 | 139 ± 8 | <0.001 |
| Correlation with age | $r = -0.14$ | $r = -0.19$ | |
| | $P = 0.02$ | $P = 0.03$ | |
| | $Y = -1.36x + 241.9$ | $Y = -1.48x + 209.3$ | |
| Second phase (μU/ml) | 68 ± 3 | 51 ± 3 | 0.001 |
| Correlation with age | $r = -0.11$ | $r = -0.054$ | |
| | $P = 0.064$ | $P = 0.54$ | |
| | $Y = -0.54x + 89.8$ | $Y = -0.14 + 57.6$ | |

Szoke E, et al. *Diabetes Care*. 2008;31:539–543.