DM Nurse AGM 2013: from Disease to patient centred DM management

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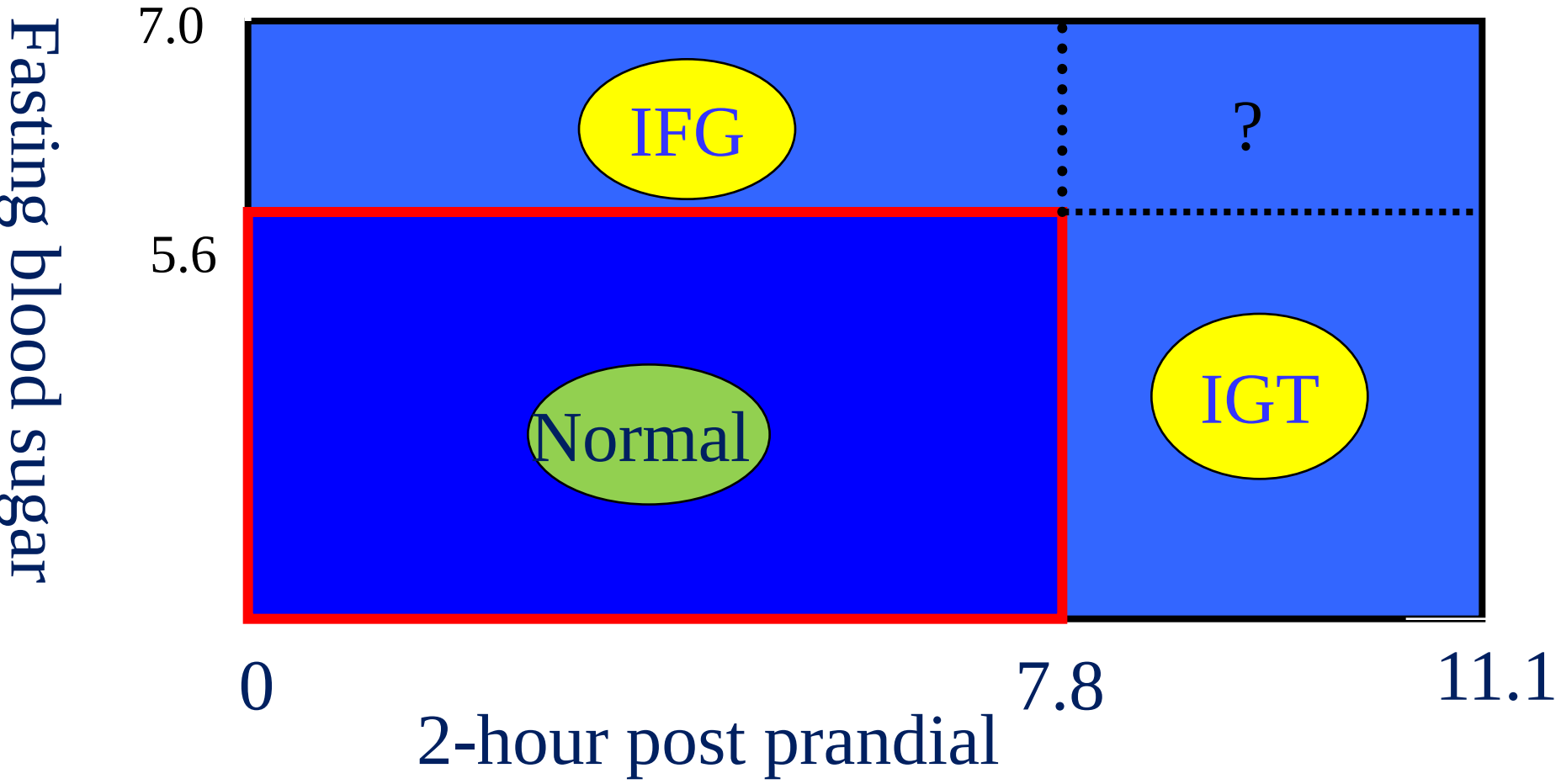
Hon. Associated Prof, Department of Medicine and Therapeutics, CUHK

Hon Associated Prof. Department of Medicine, HKU

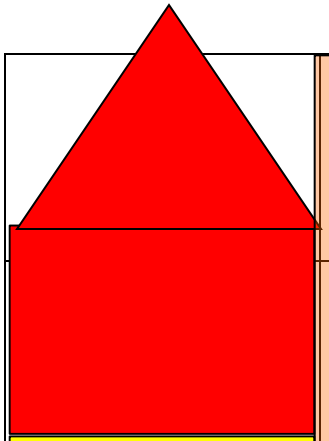
Disease mn

- Definition of Diabetes mellitus
- Classification
- Natural history of T2DM
- Treatment

Diagnosis

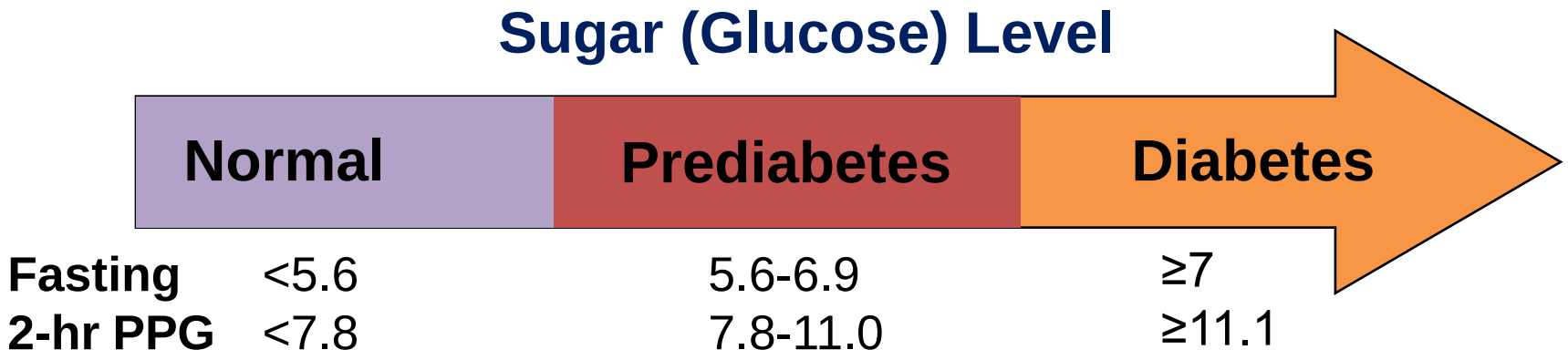

7.0
5.6
IFG
?
Normal
IGT
0
7.8
11.1
Fasting blood sugar
2-hour post prandial

Diagnosis



	HbA1c %	FBS mmol/l	2hr PP mmol/l
	≥6.5	≥7	≥11.1
	5.7-6.4	5.6-6.9	7.8-11
	≤5.6	≤5.5	≤7.8

A Progressive Disease: Prediabetes to Diabetes

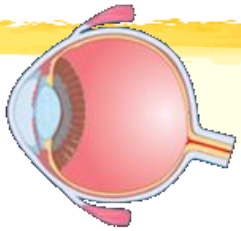


- **Prediabetes** is defined by impaired fasting plasma glucose (IFG) or impaired glucose tolerance **(IGT)**
  - Associated with increased risk of developing diabetes mellitus and cardiovascular diseases
- **Type 2 diabetes (T2D)** follows prediabetes; caused by poor insulin utilization and related to insulin resistance

PPG = post prandial glucose.

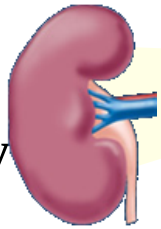
AACE Diabetes Mellitus Clinical Practice Guidelines Task Force. *Endocr Prac*. 2007;13(suppl 1):3-68.

Diabetes is characterized by *chronic hyperglycaemia* and association with serious complications

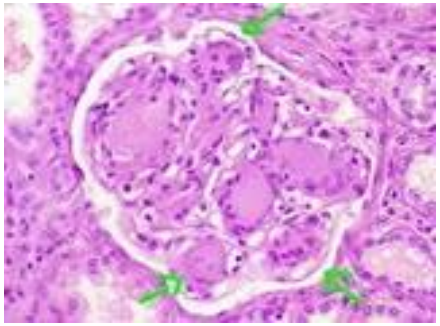


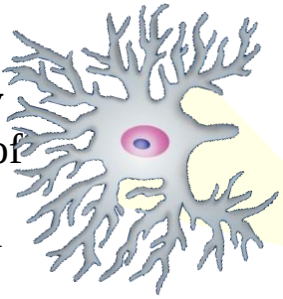
Diabetic Retinopathy
Leading cause of blindness in adults[1,2]





Diabetic Nephropathy
Leading cause of endstage renal disease[3,4]



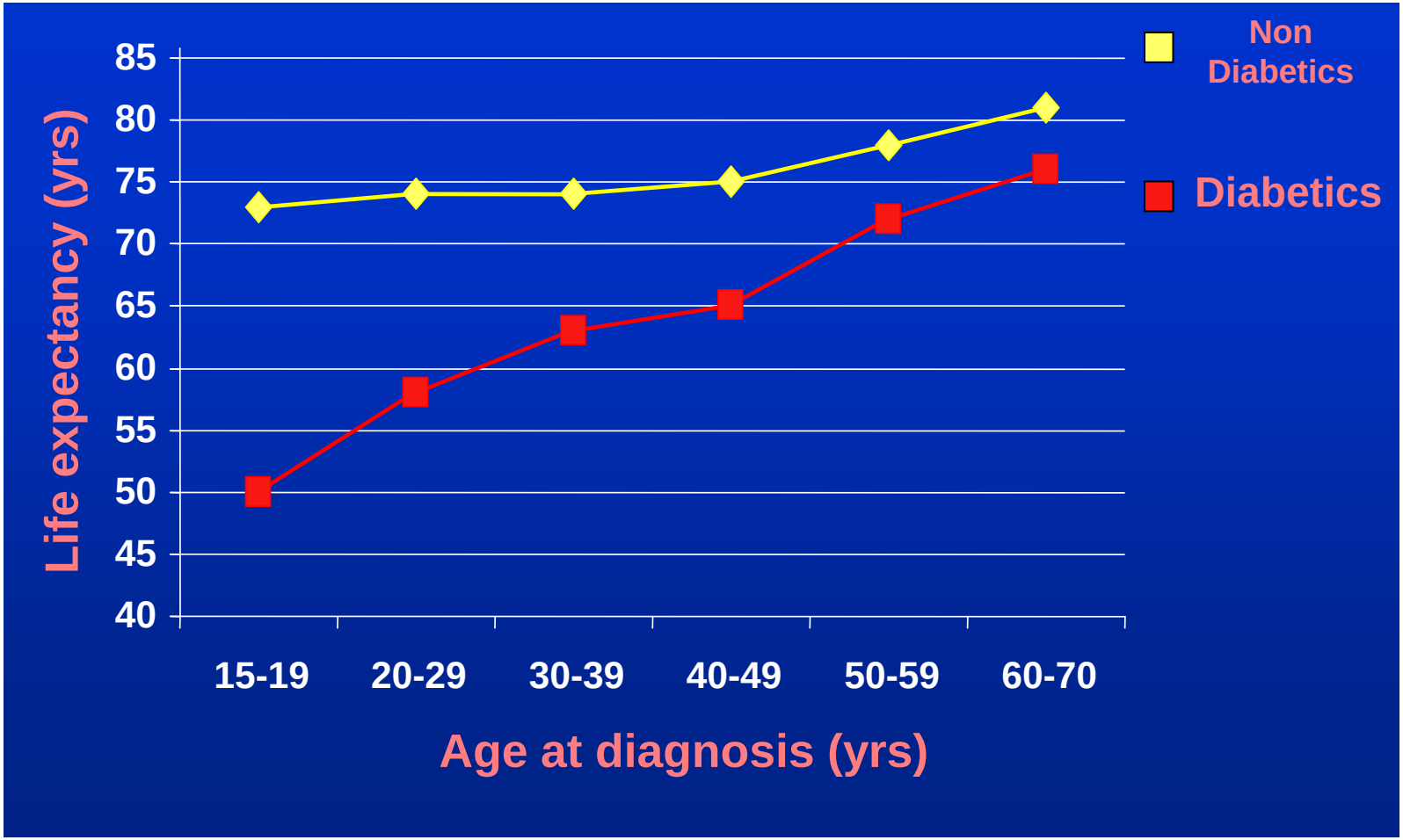


Diabetic Neuropathy
Leading cause of non-traumatic lower extremity amputations[7,8]

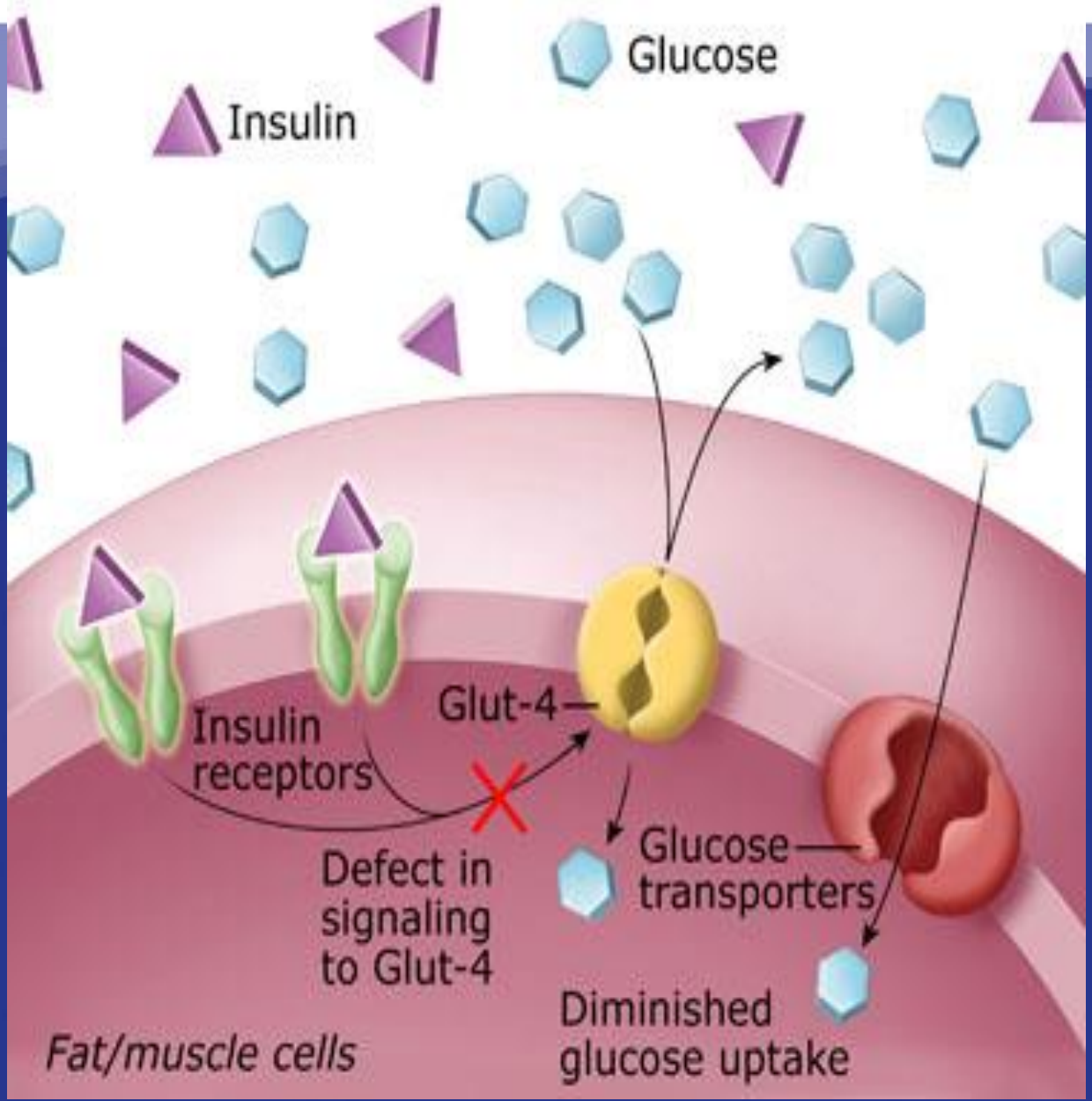


1. UKPDS Group. *Diabetes Res* 1990;13(1):1–11. 2. Fong DS *et al*. *Diabetes Care* 2003;26(Suppl 1):S99–S102. 3. HDS. *J Hypertens* 1993;11(3):309–317.
4. Molitch ME *et al*. *Diabetes Care* 2003;26(Suppl 1):S94–S98. 5

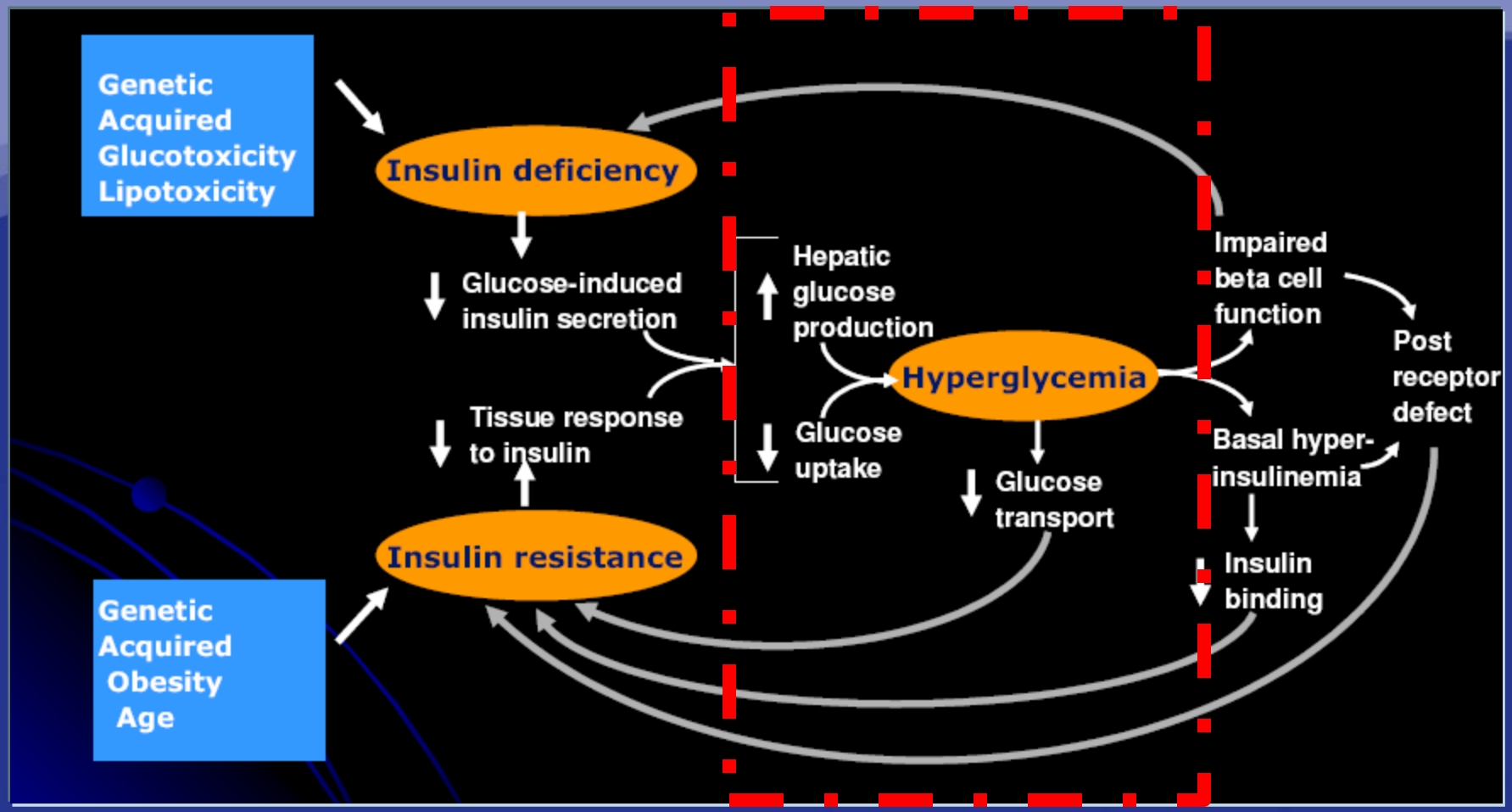
Life expectancy and diabetes



Type 2 Diabetes: Insulin Resistance

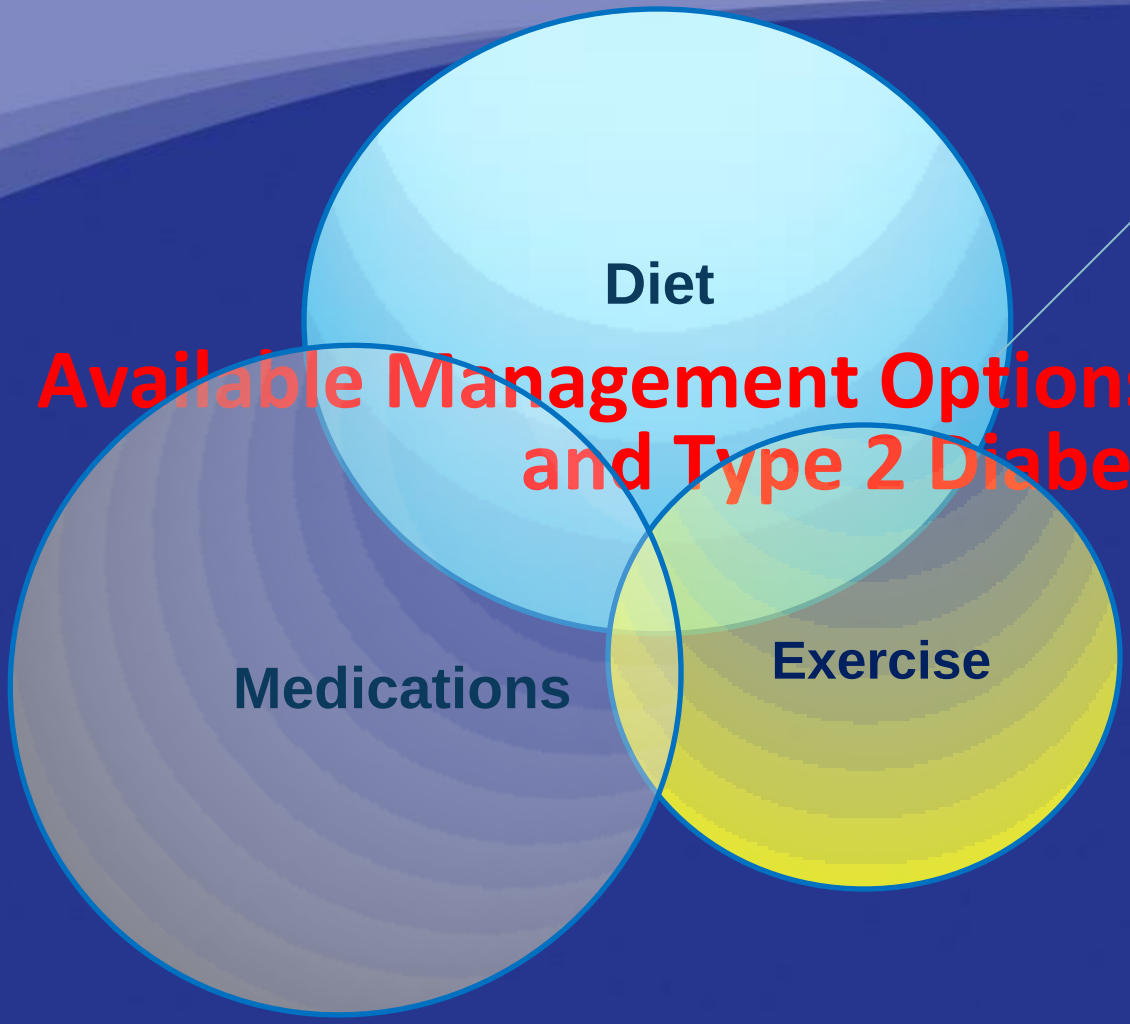


Multifacet defects in T2DM

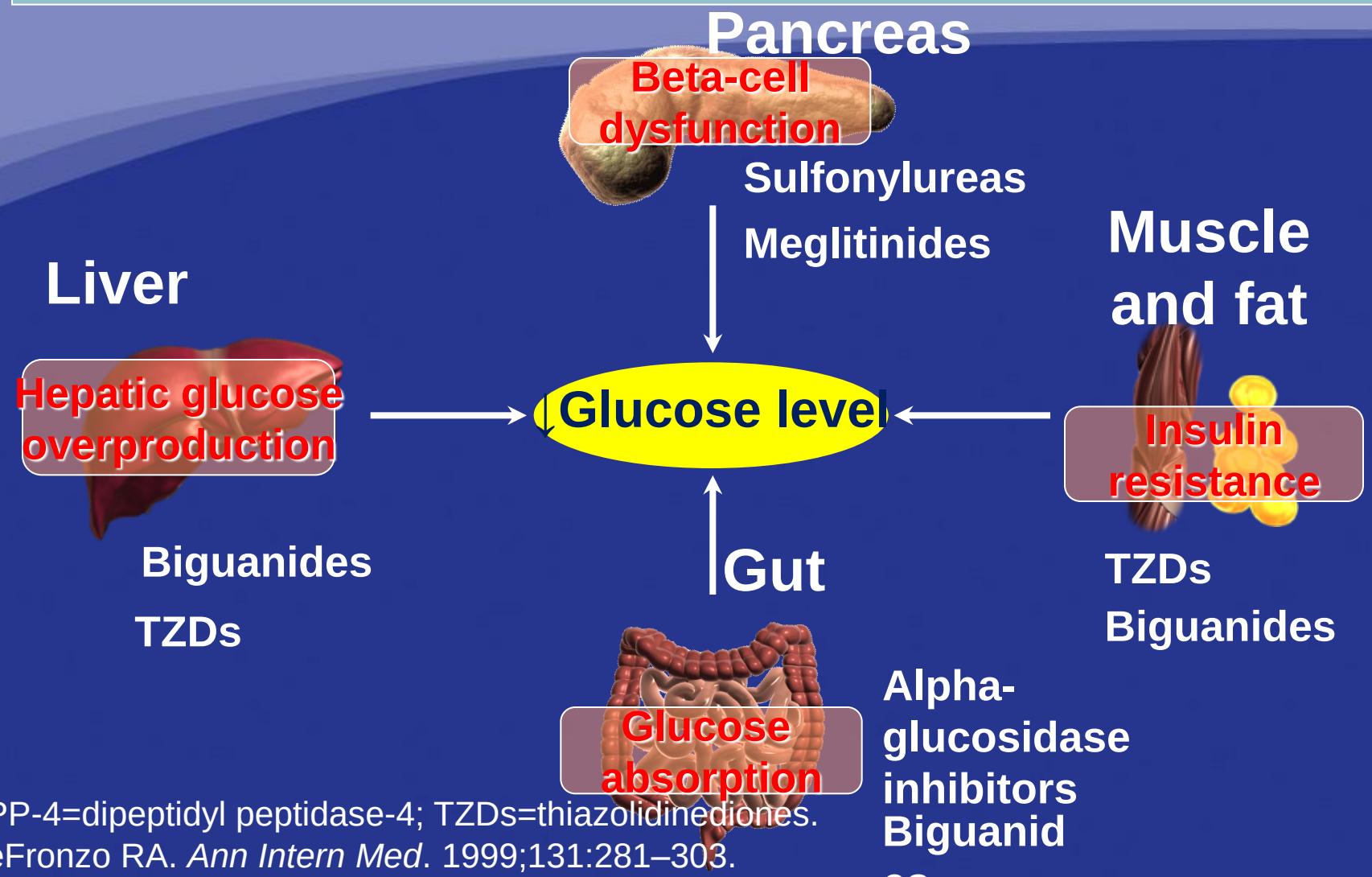


Hyperglocagonaemia
Impaired GLP-1 response

Available Management Options for Prediabetes and Type 2 Diabetes



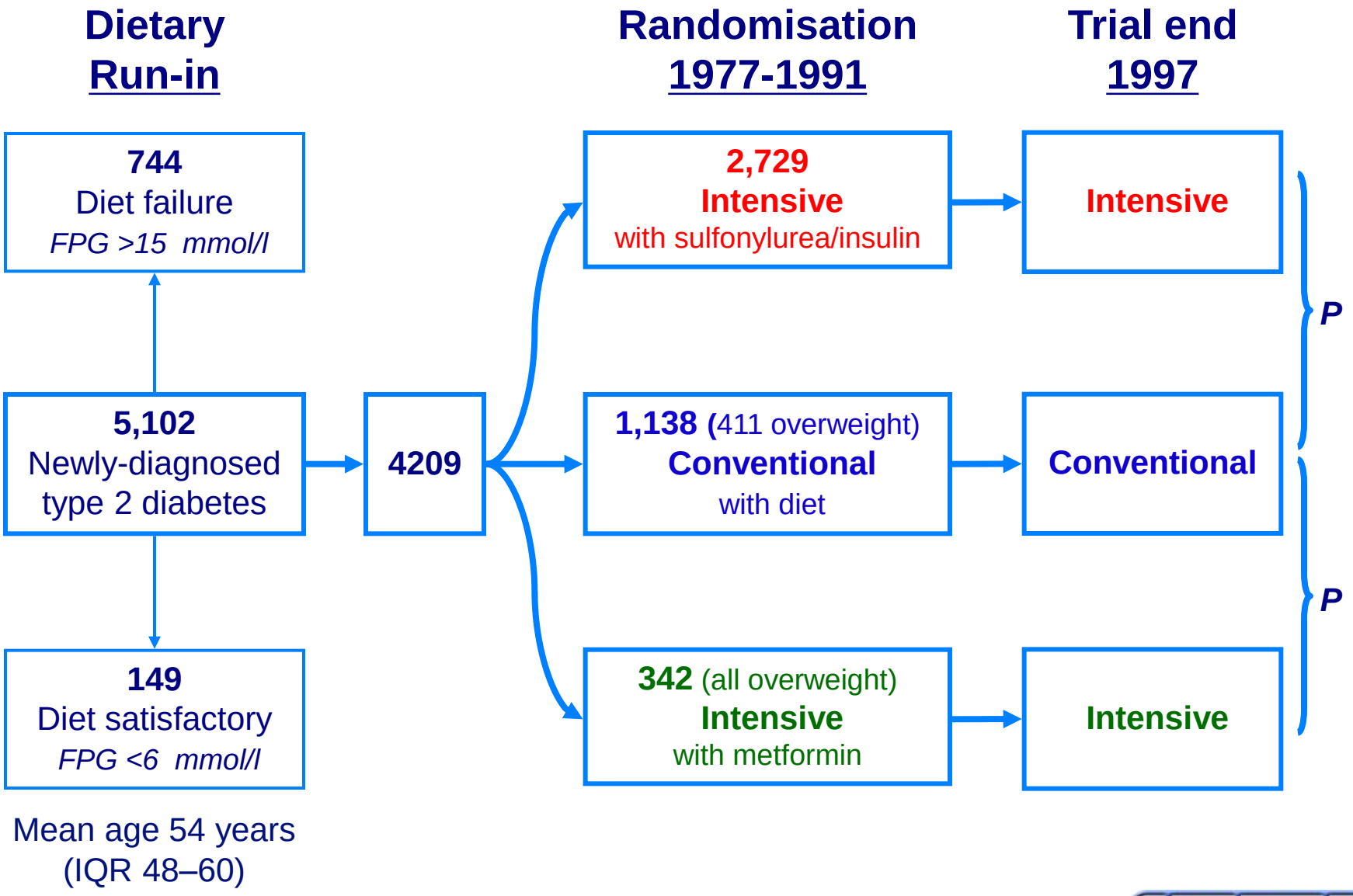
Major Targeted Sites of Oral Drug Classes



DPP-4=dipeptidyl peptidase-4; TZDs=thiazolidinediones.

DeFronzo RA. *Ann Intern Med*. 1999;131:281–303.
Buse JB et al. In: *Williams Textbook of Endocrinology*. 10th ed. Philadelphia: WB Saunders; 2003:1427–1483.

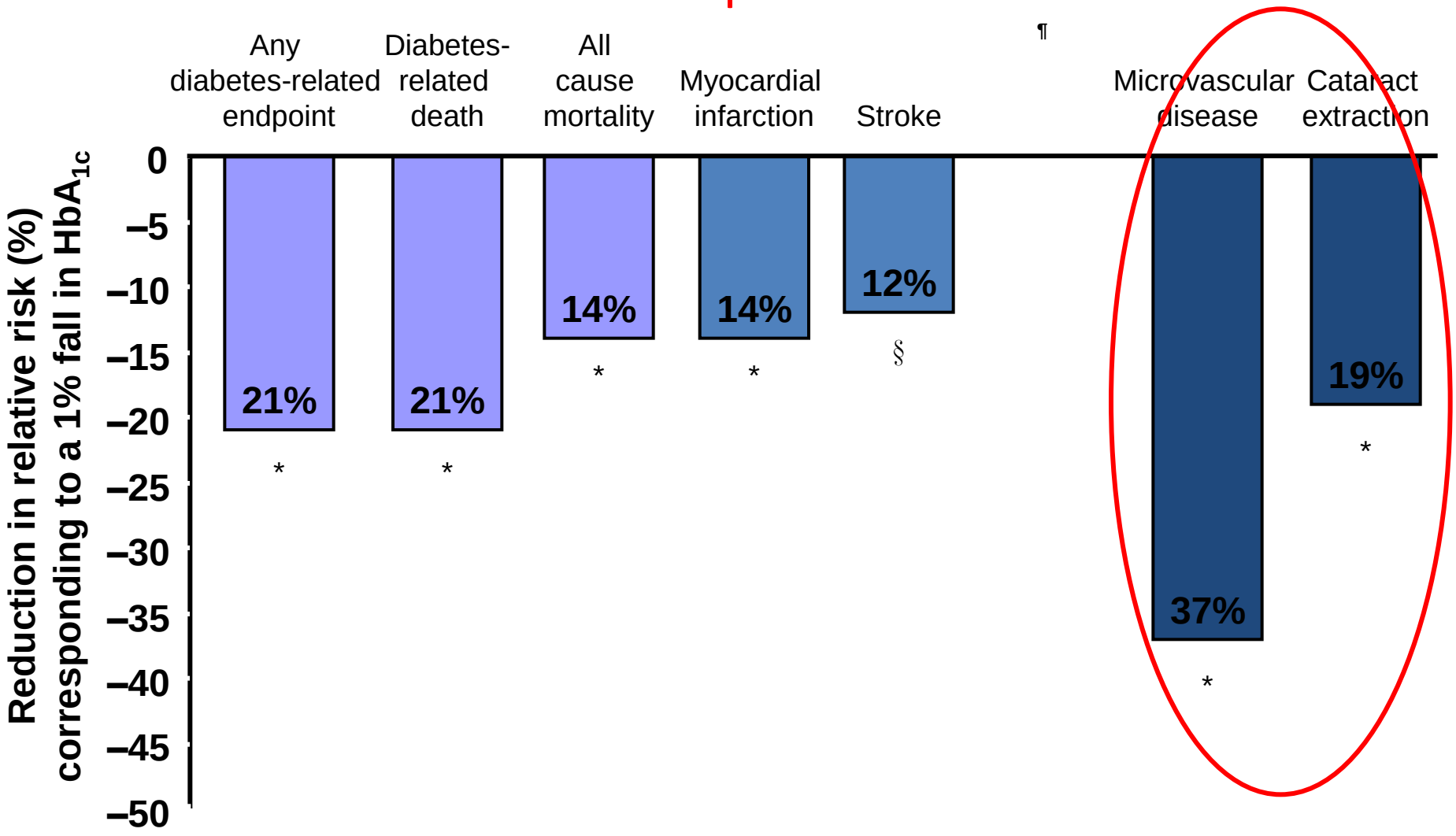
Glucose Interventional Trial



UKPDS 80. N Eng J Med 2008; ***359****:*

ukpds~ptm

UKPDS: A 1% fall in HbA_{1c} results in a reduction of relative risk of complications

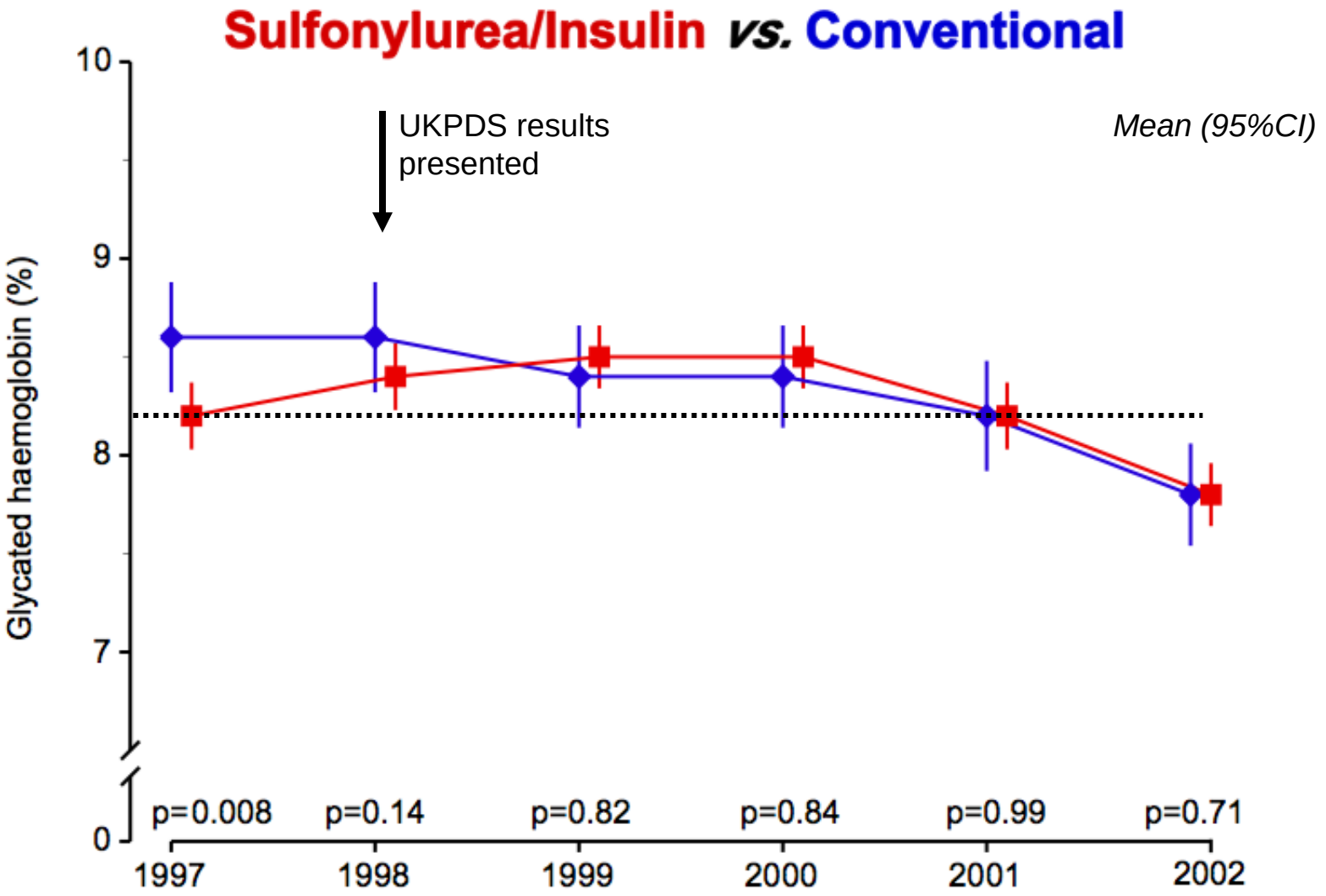


*P < 0.0001 versus baseline; §P = 0.035

¶Lower extremity amputation or fatal peripheral vascular disease

Adapted from Stratton IM, *et al.* UKPDS 35. *BMJ* 2000;321:405–412.

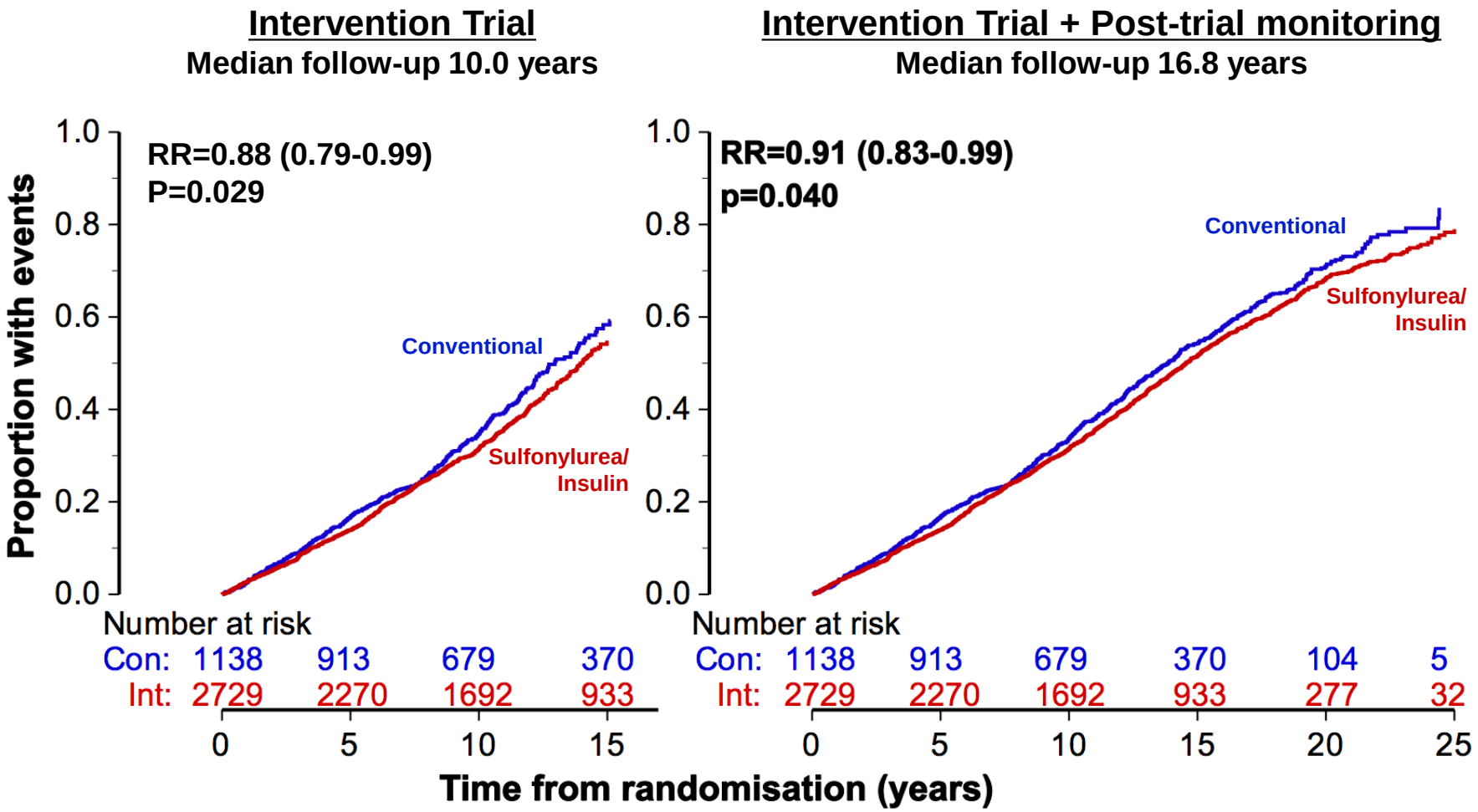
Post-Trial Changes in HbA_{1c}



UKPDS 80. N Eng J Med 2008; ***359****:*

ukpds~ptm

Any Diabetes-related Endpoint



UKPDS 80. N Eng J Med 2008; ***359****:*

ukpds~ptm

Legacy Effect of Earlier Glucose Control

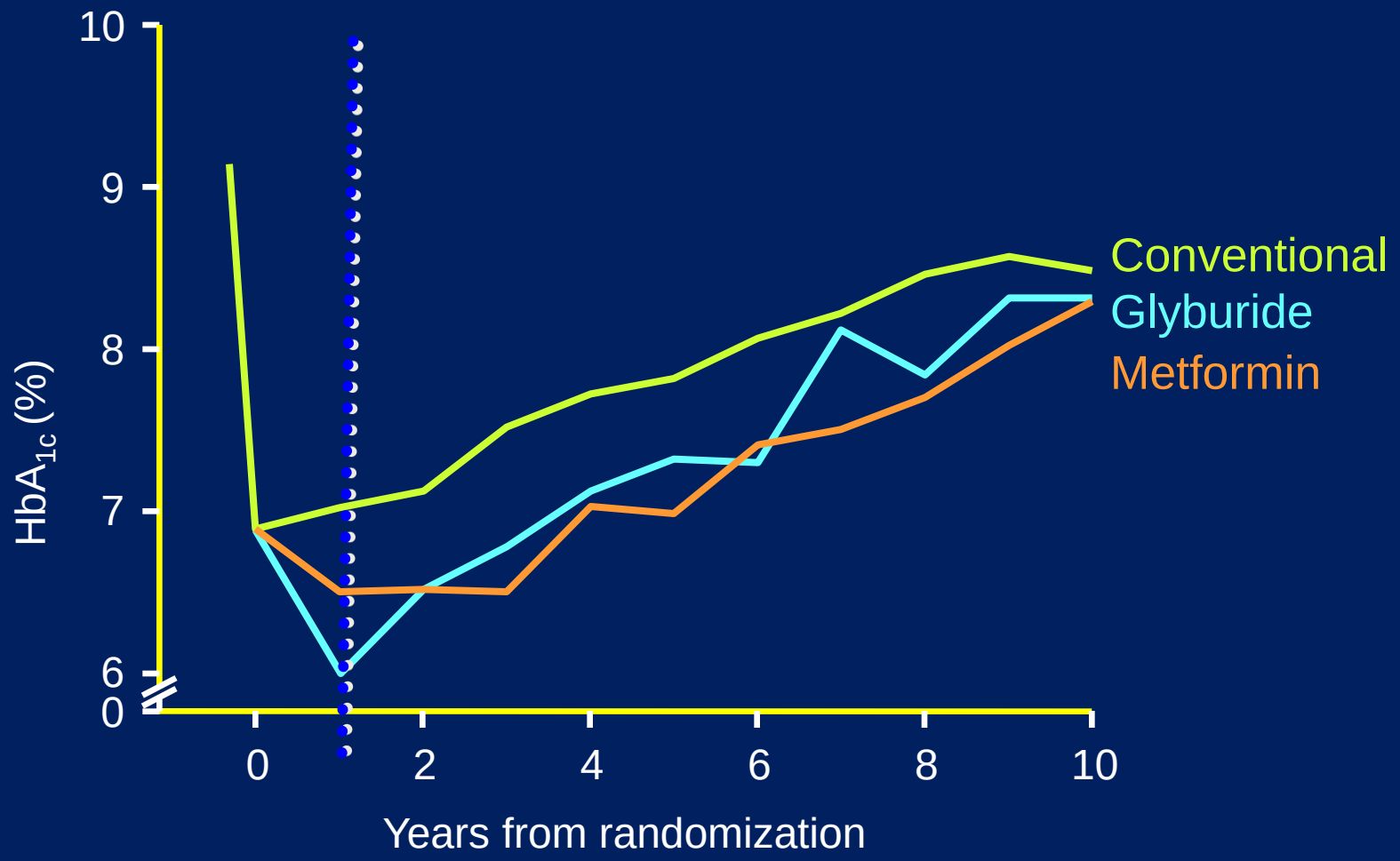
After median 8.5 years post-trial follow-up

Aggregate Endpoint		1997	2007
Any diabetes related endpoint	*RRR:*	12%	**9%**
	P:	0.029	**0.040**
Microvascular disease	*RRR:*	25%	**24%**
	P:	0.0099	**0.001**
Myocardial infarction	*RRR:*	16%	**15%**
	P:	0.052	**0.014**
All-cause mortality	*RRR:*	6%	**13%**
	P:	0.44	**0.007**

RRR = Relative Risk Reduction, P = Log Rank

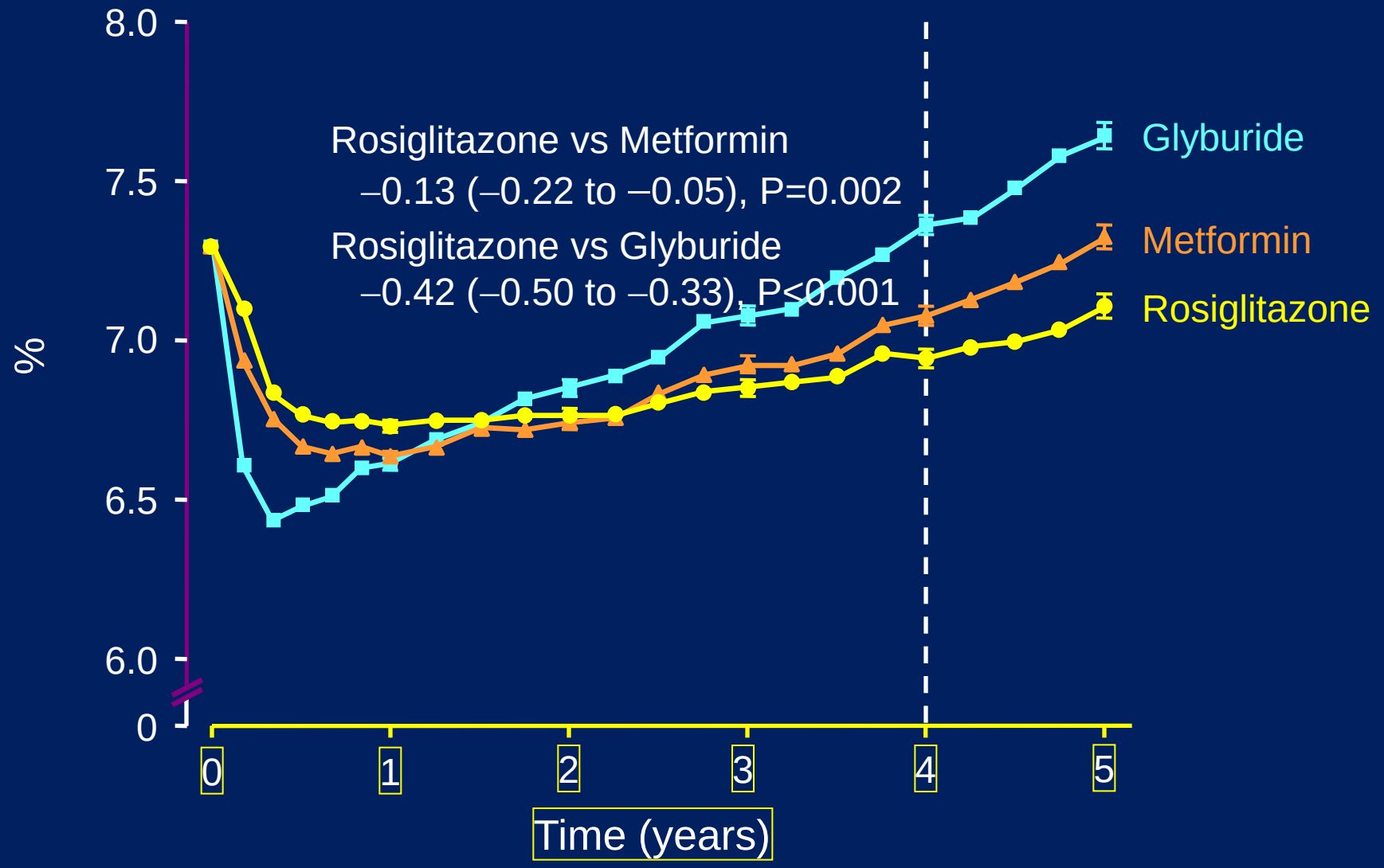
UKPDS 80, NEJM 2008, 359

Progressive Hyperglycaemia on Monotherapy in Type 2 Diabetes



Adapted from UKPDS 34. Lancet 1998;352:854–65

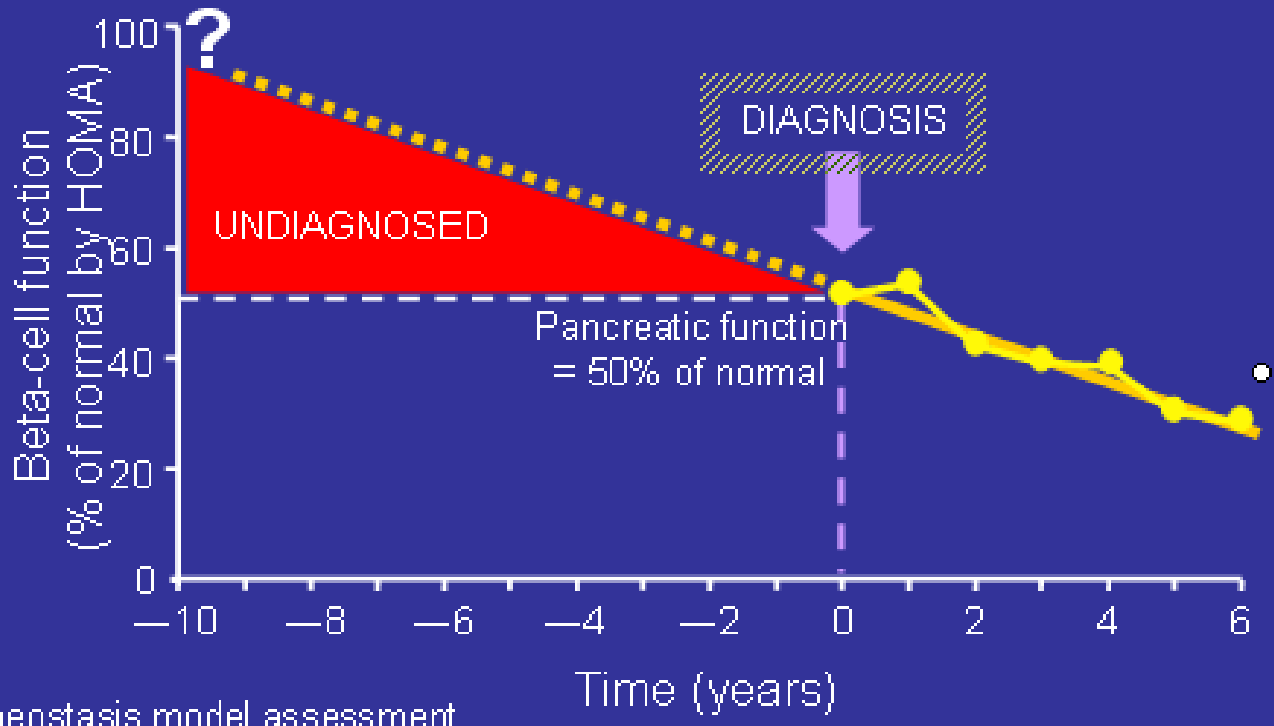
HbA_{1c} Over Time



ADOPT study: 2006

~50% of beta-cell function is lost before diagnosis[1]

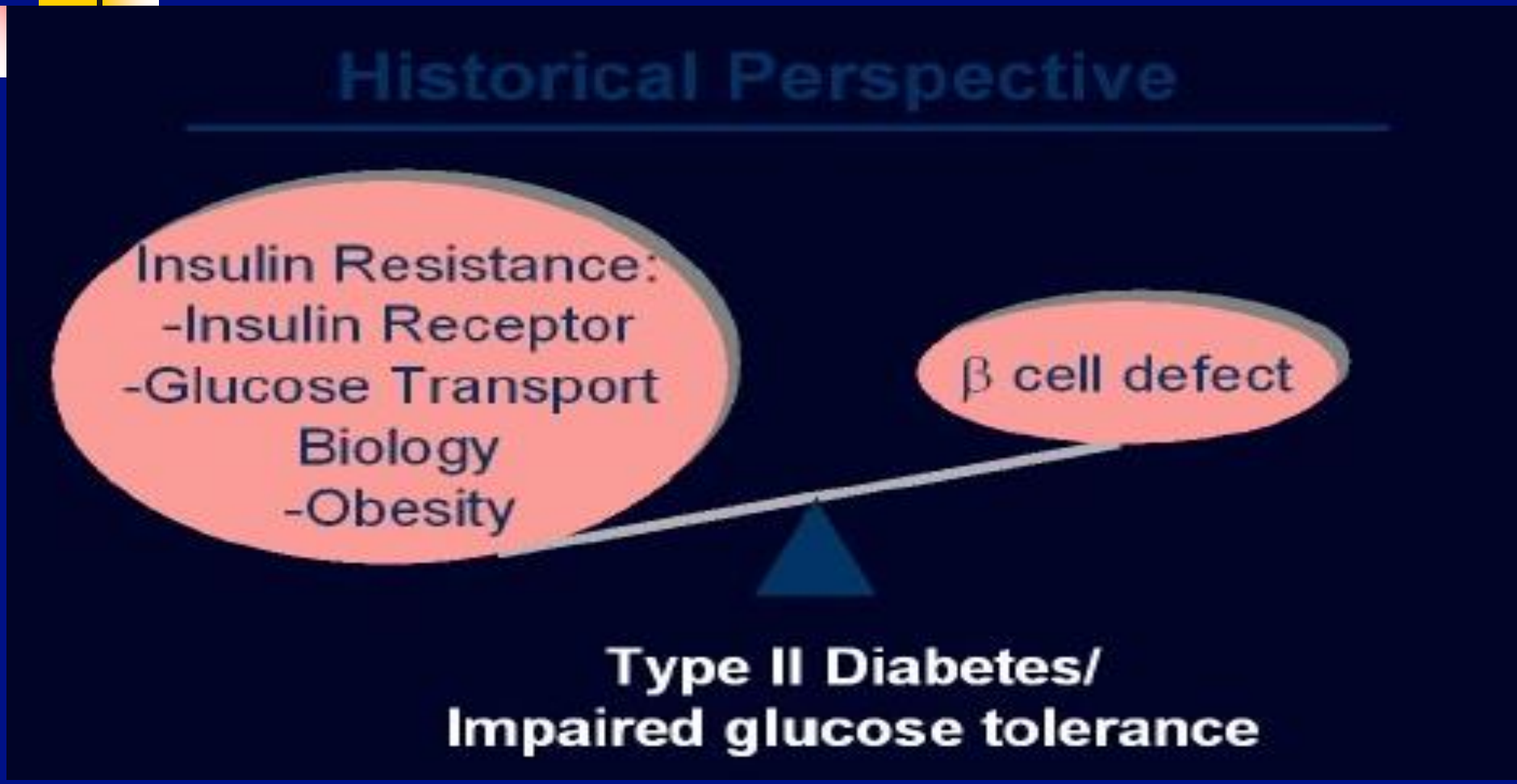
- At diagnosis, 50% of patients with type 2 diabetes may already have developed complications[2]



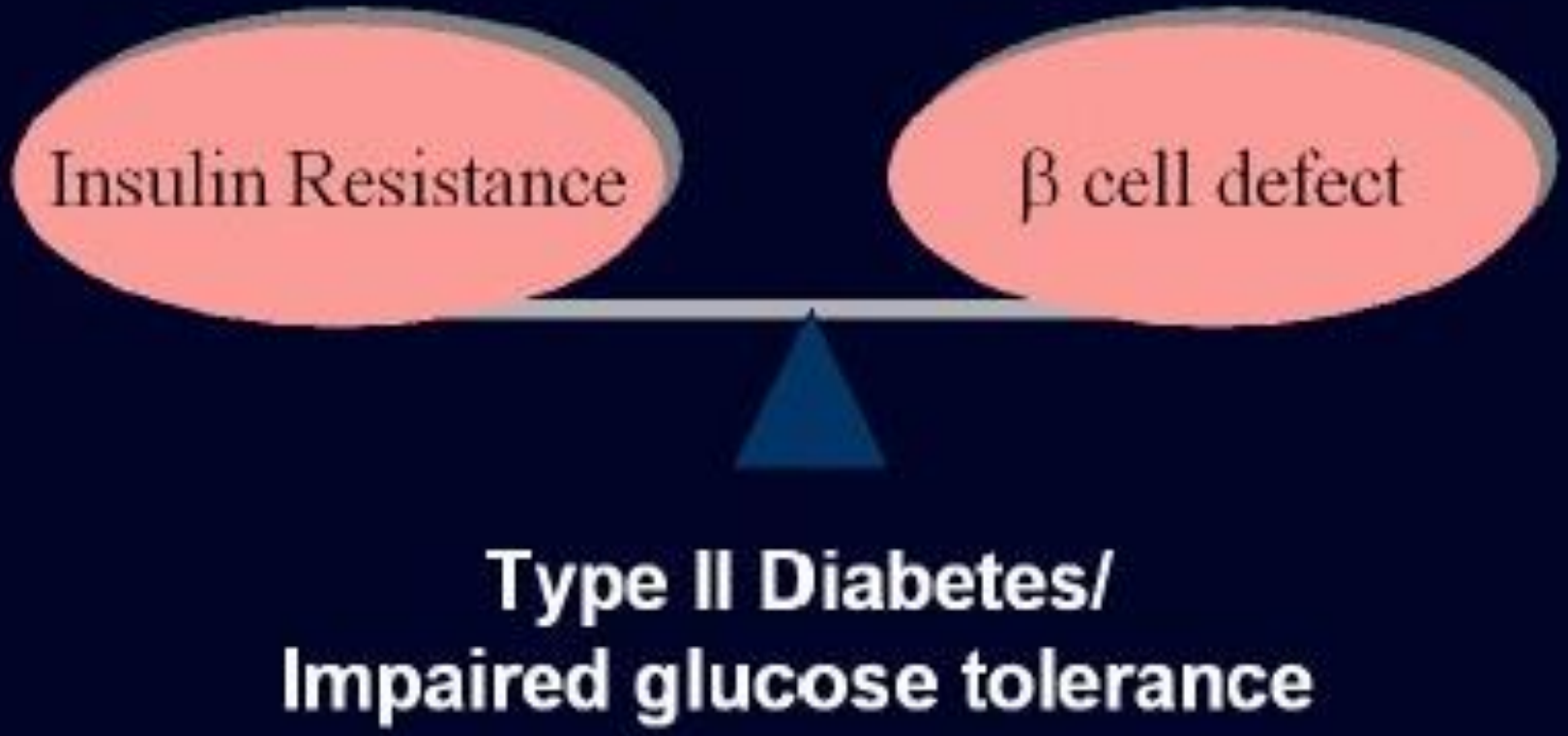
HOMA, homeostasis model assessment
Adapted from Holman[1]

1. Holman RR. *Diabetes Res Clin Pract* 1998;40(Suppl 1):S21–5
2. UKPDS Group. *Diabetologia* 1991; 34:877–90

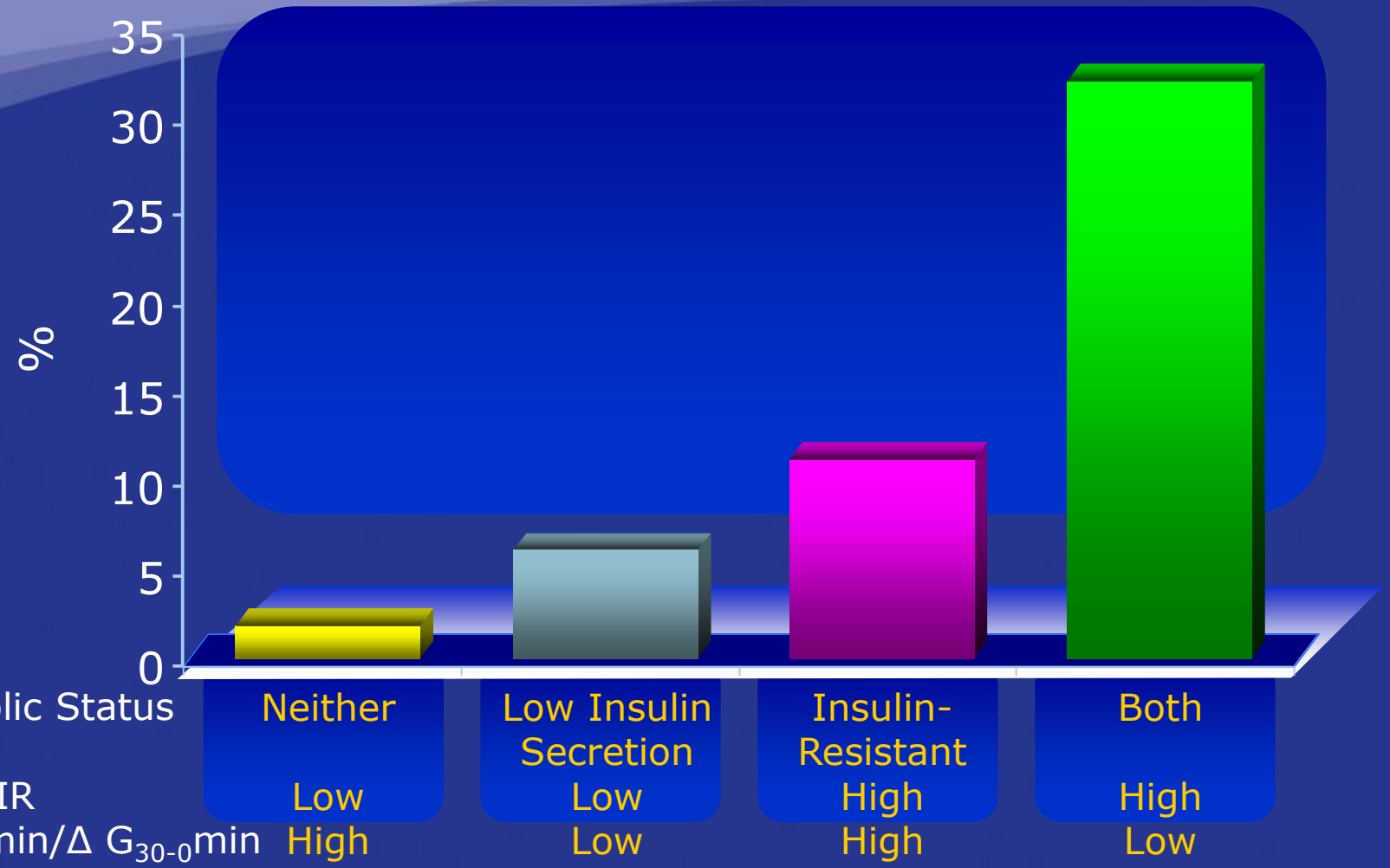
Historical perspective



Pathology of T2DM



Conversion to Type 2 Diabetes (7-Year Incidence)

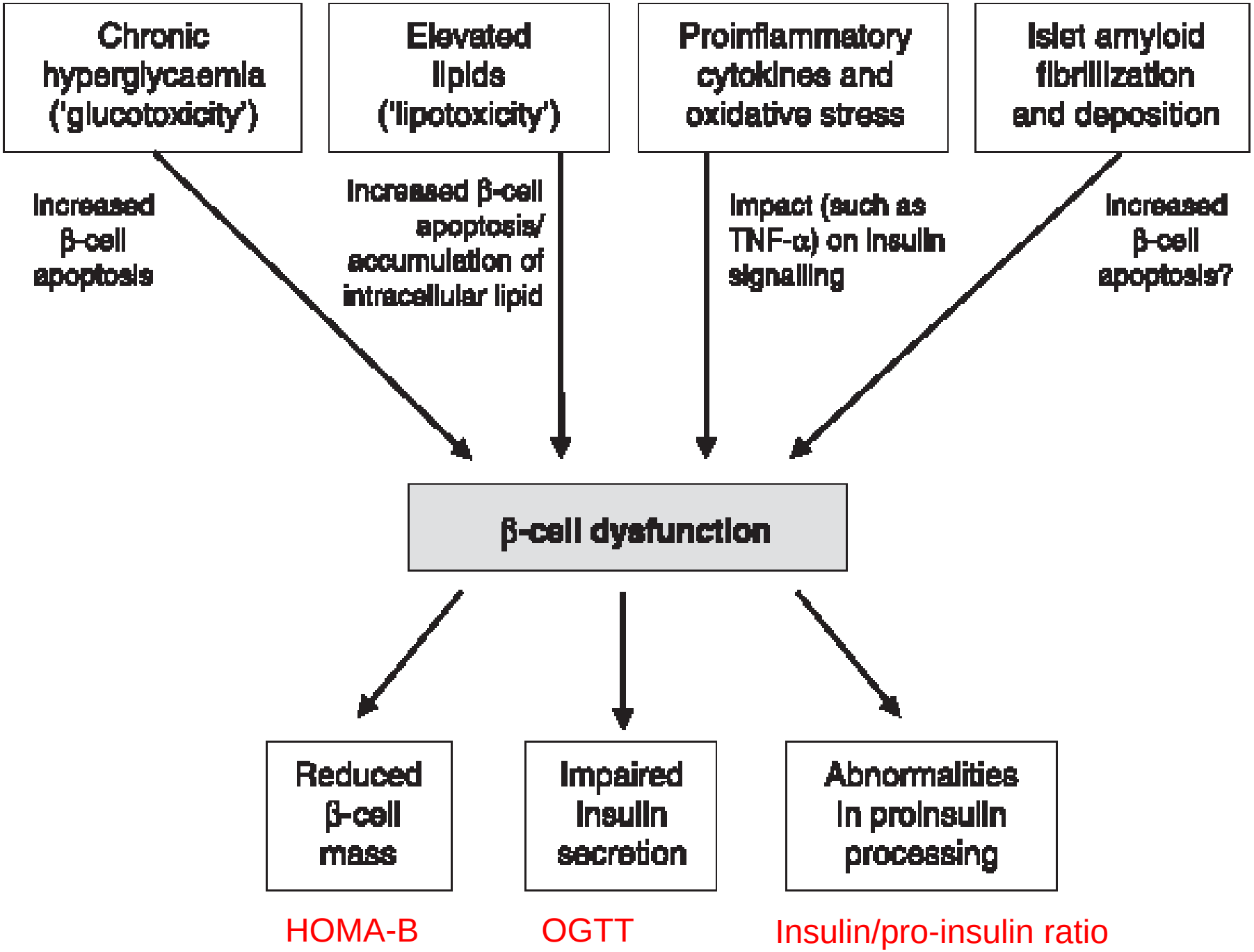


Haffner et al. *Circulation* 2000; 101: 975-980.

Why decompensation ?

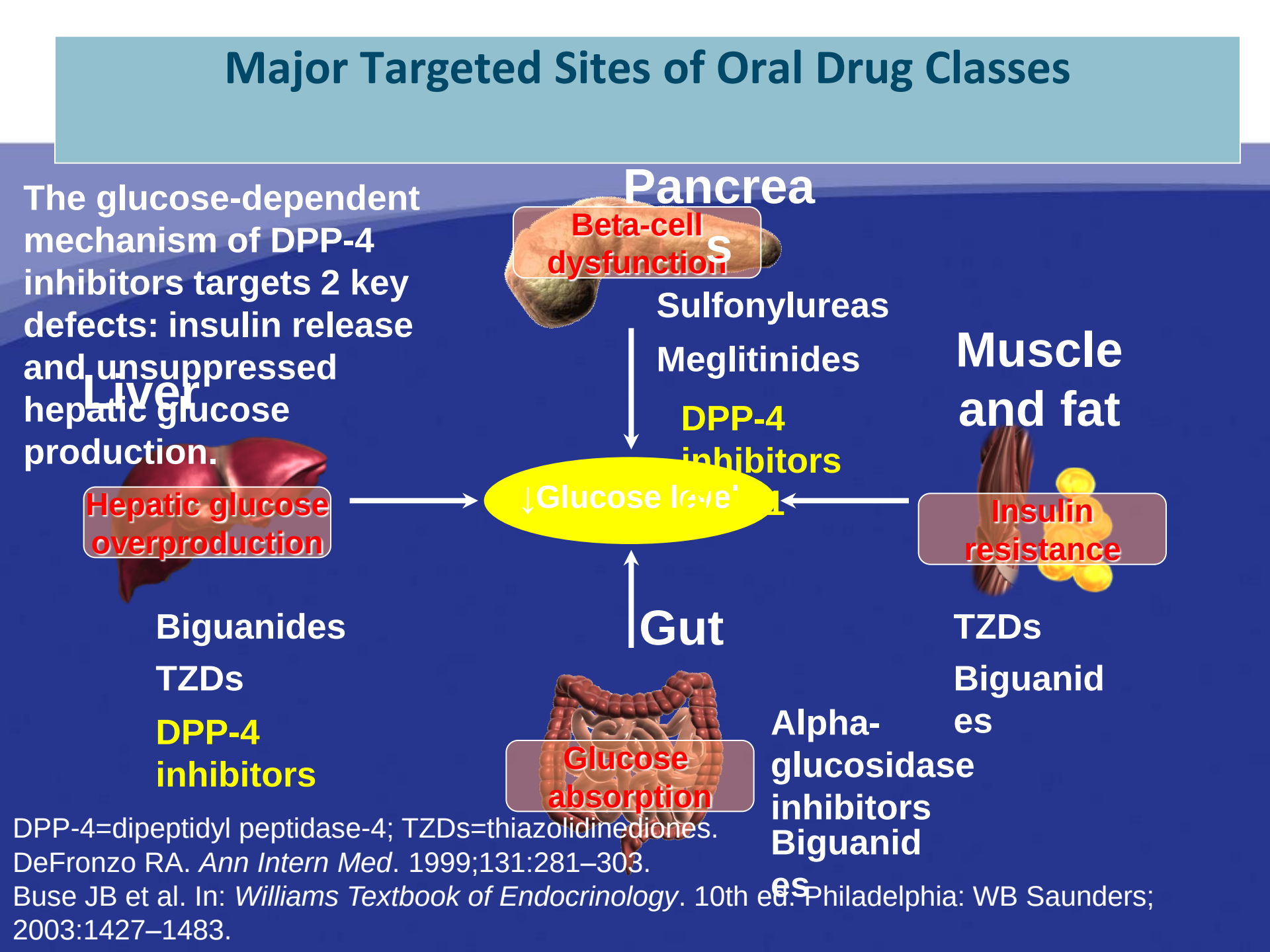
Possible Mechanisms for Loss of Insulin Secretion in Diabetes

- Mechanisms
  - Loss of β-cell mass
  - Loss of secretory function from each cell
- Mediators:
  - Glucotoxicity
  - Lipotoxicity
  - Altered insulin signaling


Chronic hyperglycaemia ('glucotoxicity')
Elevated lipids ('lipotoxicity')
Proinflammatory cytokines and oxidative stress
Islet amyloid fibrillization and deposition
Increased β-cell apoptosis
Increased β-cell apoptosis/ accumulation of intracellular lipid
Impact (such as TNF-α) on insulin signalling
Increased β-cell apoptosis?
β-cell dysfunction
Reduced β-cell mass
Impaired insulin secretion
Abnormalities in proinsulin processing
HOMA-B
OGTT
Insulin/pro-insulin ratio

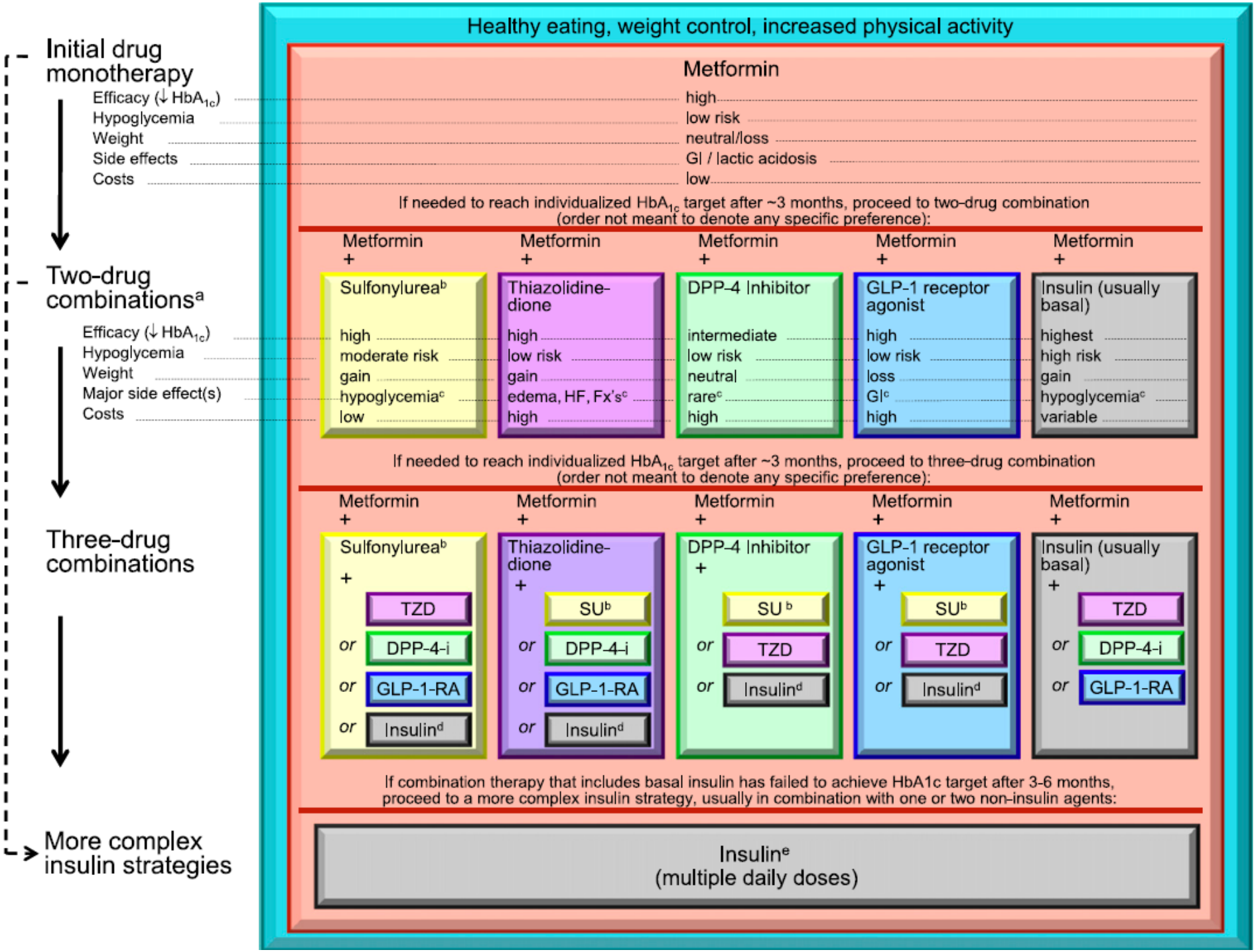
Major Targeted Sites of Oral Drug Classes

The glucose-dependent mechanism of DPP-4 inhibitors targets 2 key defects: insulin release and unsuppressed hepatic glucose production.



DPP-4=dipeptidyl peptidase-4; TZDs=thiazolidinediones.

DeFronzo RA. *Ann Intern Med*. 1999;131:281–303.
Buse JB et al. In: *Williams Textbook of Endocrinology*. 10th ed. Philadelphia: WB Saunders; 2003:1427–1483.


Healthy eating, weight control, increased physical activity
Initial drug monotherapy
Efficacy (↓ HbA1c)
Hypoglycemia
Weight
Side effects
Costs
Metformin
high
low risk
neutral/loss
GI / lactic acidosis
low
If needed to reach individualized HbA1c target after ~3 months, proceed to two-drug combination (order not meant to denote any specific preference):
Two-drug combinations[a]
Efficacy (↓ HbA1c)
Hypoglycemia
Weight
Major side effect(s)
Costs
Metformin + Sulfonylurea[b]
high
moderate risk
gain
hypoglycemia[c]
low
Metformin + Thiazolidine-dione
high
low risk
gain
edema, HF, Fx's[c]
high
Metformin + DPP-4 Inhibitor
intermediate
low risk
neutral
rare[c]
high
Metformin + GLP-1 receptor agonist
high
low risk
loss
GI[c]
high
Metformin + Insulin (usually basal)
highest
high risk
gain
hypoglycemia[c]
variable
If needed to reach individualized HbA1c target after ~3 months, proceed to three-drug combination (order not meant to denote any specific preference):
Three-drug combinations
Metformin + Sulfonylurea[b] + TZD or DPP-4-i or GLP-1-RA or Insulin[d]
Metformin + Thiazolidine-dione + SU[b] or DPP-4-i or GLP-1-RA or Insulin[d]
Metformin + DPP-4 Inhibitor + SU[b] or TZD or Insulin[d]
Metformin + GLP-1 receptor agonist + SU[b] or TZD or Insulin[d]
Metformin + Insulin (usually basal) + TZD or DPP-4-i or GLP-1-RA
If combination therapy that includes basal insulin has failed to achieve HbA1c target after 3-6 months, proceed to a more complex insulin strategy, usually in combination with one or two non-insulin agents:
More complex insulin strategies
Insulin[e] (multiple daily doses)

Early use of insulin in type 2 diabetes

by acutely lowering both hyperglycaemia and elevated free fatty acids with intensive insulin therapy, has yielded prolonged remissions in therapy in which only diet was necessary to maintain normoglycaemia

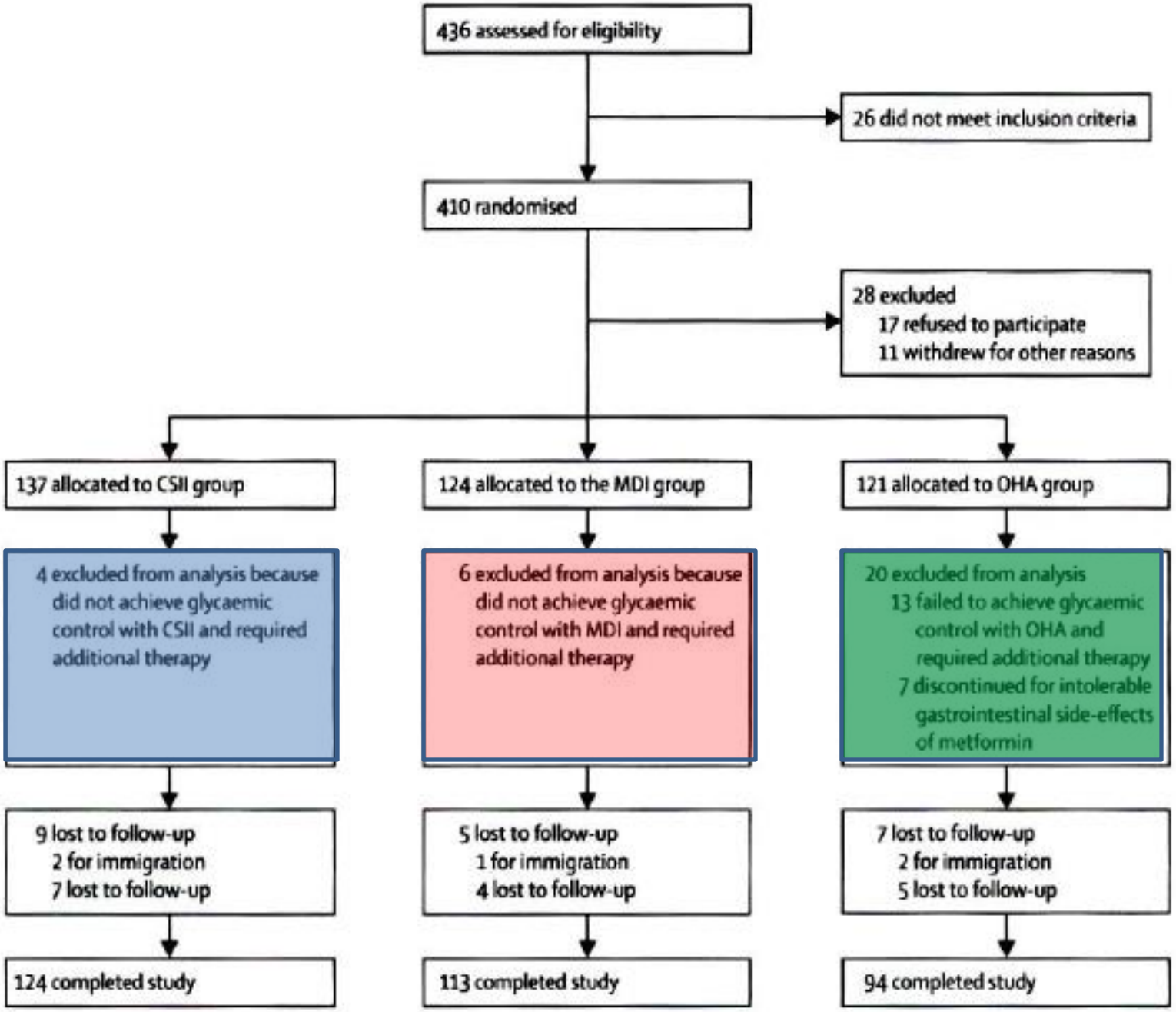
Diabetes Research and Clinical Practice 68S1 (2005) S30–S35

THE LANCET

Effect of intensive insulin therapy on β-cell function and glycaemic control in patients with newly diagnosed type 2 diabetes: a multicentre randomised parallel-group trial

Jianping Weng, Yanbing Li*, Wen Xu, Lixin Shi, Qiao Zhang, Dalong Zhu, Yun Hu, Zhiguang Zhou, Xiang Yan, Haoming Tian, Xingwu Ran, Zuojie Luo, Jing Xian, Li Yan, Fangping Li, Longyi Zeng, Yanming Chen, Liyong Yang, Sunjie Yan, Juan Liu, Ming Li, Zuzhi Fu, Hua Cheng*

2008 May 24 , Vol 371 , pp1753


436 assessed for eligibility
26 did not meet inclusion criteria
410 randomised
28 excluded
17 refused to participate
11 withdrew for other reasons
137 allocated to CSII group
124 allocated to the MDI group
121 allocated to OHA group
4 excluded from analysis because did not achieve glycaemic control with CSII and required additional therapy
6 excluded from analysis because did not achieve glycaemic control with MDI and required additional therapy
20 excluded from analysis
13 failed to achieve glycaemic control with OHA and required additional therapy
7 discontinued for intolerable gastrointestinal side-effects of metformin
9 lost to follow-up
2 for immigration
7 lost to follow-up
5 lost to follow-up
1 for immigration
4 lost to follow-up
7 lost to follow-up
2 for immigration
5 lost to follow-up
124 completed study
113 completed study
94 completed study

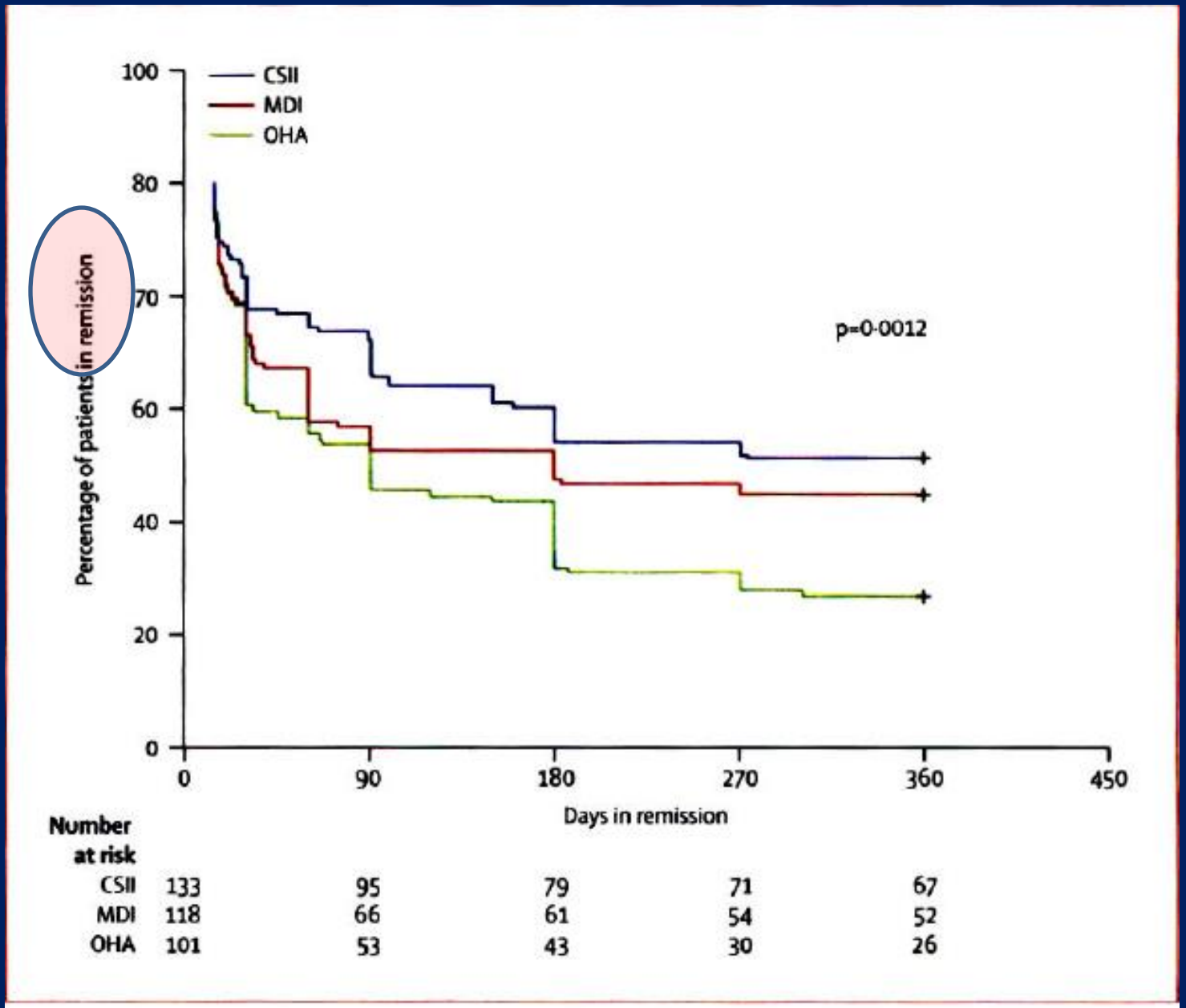
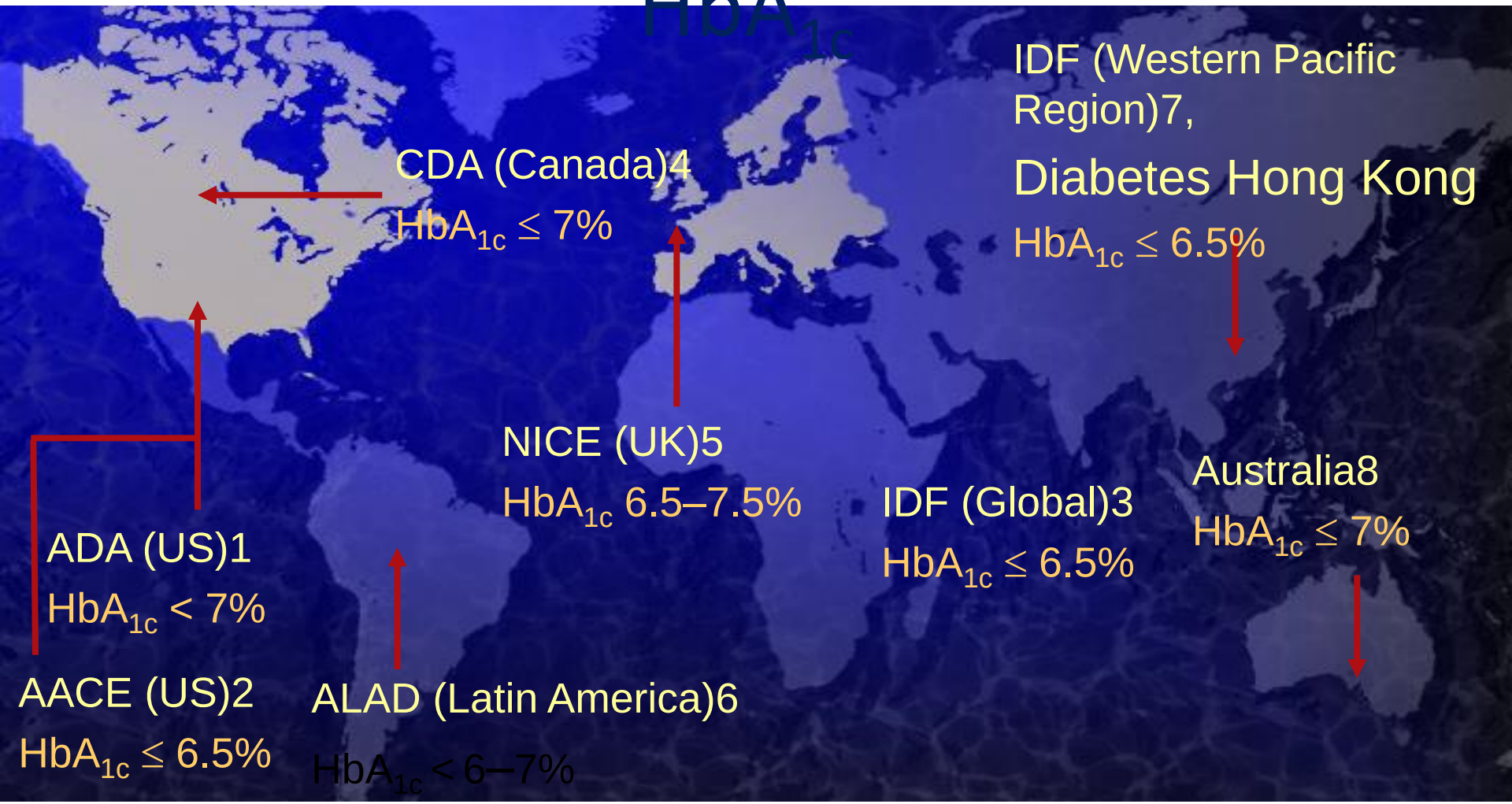


Figure 2: **Kaplan-Meier estimates of time to primary endpoint**

Diabetes management guidelines: HbA_{1c}



1American Diabetes Association. *Diabetes Care* 2004; 27 (Suppl. 1):S15–S34.
2American Association of Clinical Endocrinologists. *Endocr Pract* 2005; i
3http://www.idf.org/webdata/docs/IDF%20GGT2D.pdf. 4Canadian Diabetes Association. *Can J Diabetes* 2003; 27 (Suppl. 2):S1–S152.
5National Institute for Clinical Excellence. 2002. Available at: http://www.nice.org.uk. 6ALAD. *Rev Asoc Lat Diab* 2000; Suppl. 1.
7Asian-Pacific Policy Group. Practical Targets and Treatments (3rd Edition). 8NSW Health Department. 1996.
9http://www.idf.org/webdata/T2D_practical.tt.pdf.

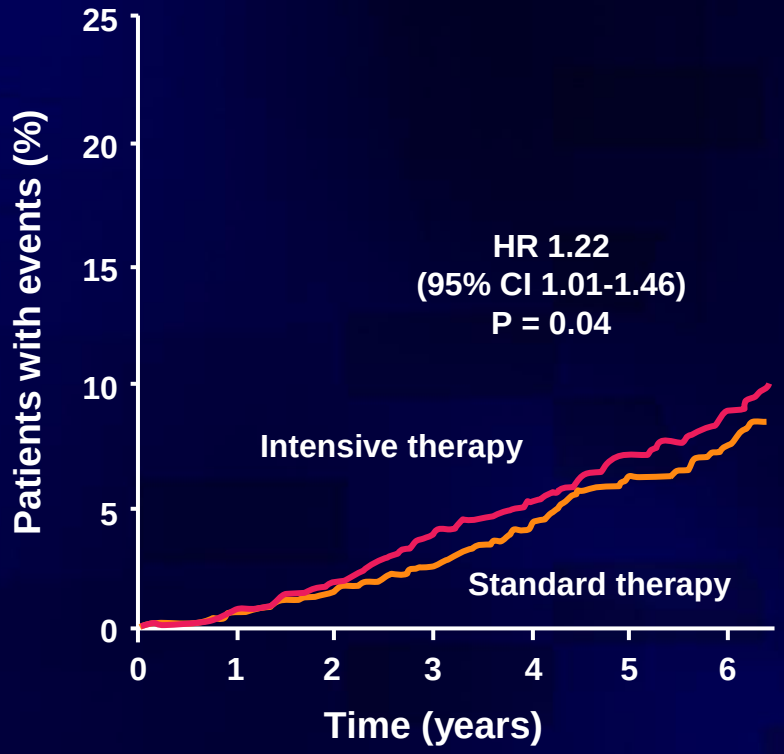
Trials of intensive glucose control: Baseline characteristics

	UKPDS	ADVANCE	ACCORD	VADT
Number	4209	11,140	10,251	1791
Age (years)	53	66	62	60
Male (%)	61	58	62	97
DM duration (years)	0	7.9	10	11.5
A1C (%)	7.1*	7.5	8.1	9.4
Hx CVD (%)	-	~32	~35	~40
Insulin use (%)	0	~1.5	~35	~52
Follow-up (years)	~10	5	3.4	5.6

*Calculated

ACCORD Study Group. *N Engl J Med*. 2008; ADVANCE Collaborative Group. *N Engl J Med*. 2008. Duckworth W et al. *N Engl J Med*. 2009; UKPDS Group. *Lancet*. 1998.

ACCORD: Treatment effect on all-cause and CV mortality

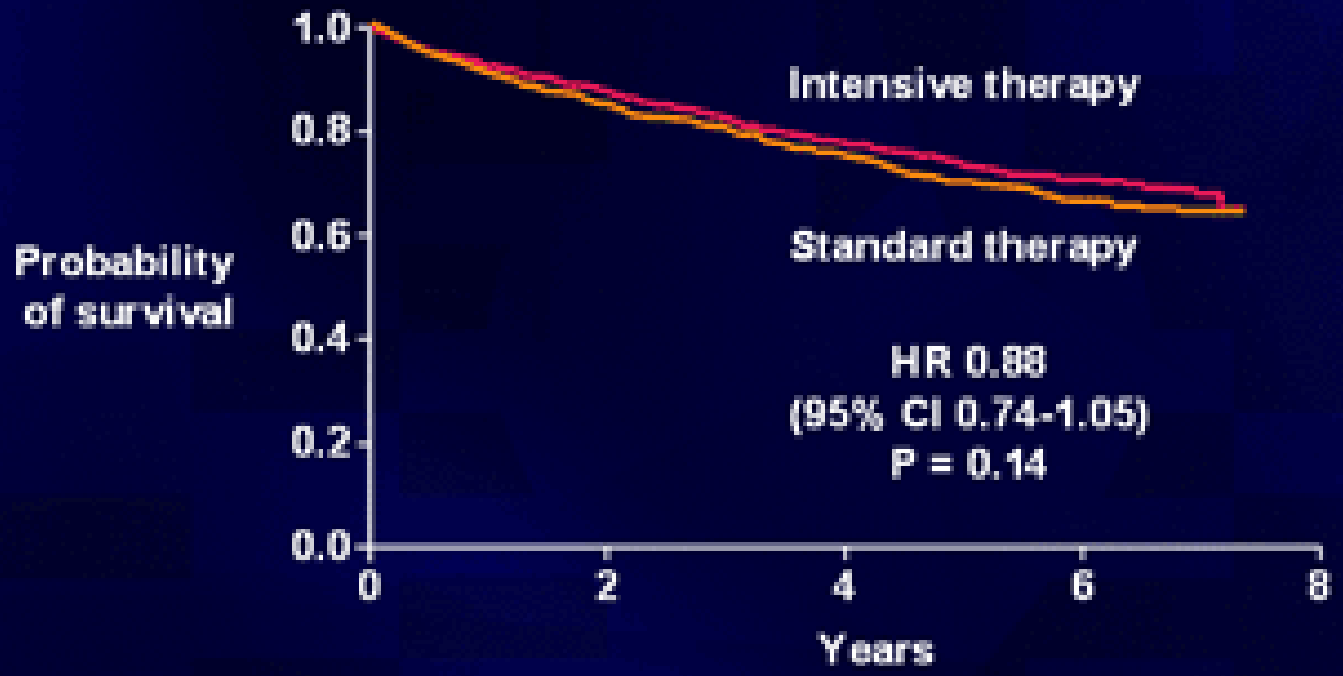


Outcome	Intensive therapy (n = 5128)		Standard therapy (n = 5123)		HR (95% CI)	P
	n (%)	% per yr	n (%)	% per yr		
Primary outcome	352 (6.9)	2.11	371 (7.2)	2.29	0.90 (0.78-1.04)	0.16
Secondary outcome: Death						
Any cause	257 (5.0)	1.41	203 (4.0)	1.14	1.22 (1.01-1.46)	0.04
CV causes	135 (2.6)	0.79	94 (1.8)	0.56	1.35 (1.04-1.76)	0.02

ACCORD Study Group. *N Engl J Med.* 2008;358:2545-59.

VADT: Treatment effect on primary outcome (composite)

N = 1791 with poorly controlled T2DM



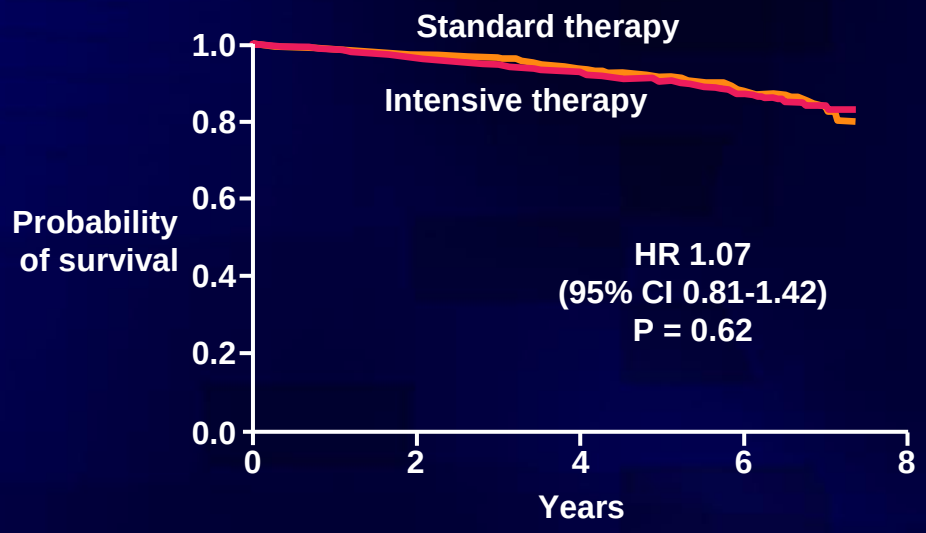
No. at risk									
Standard therapy	899	770	693	637	570	471	240	55	0
Intensive therapy	892	774	707	639	582	510	252	62	0

Primary outcome = Time to major CV event

Duckworth W et al. *N Engl J Med*. 2009;360:129-39.

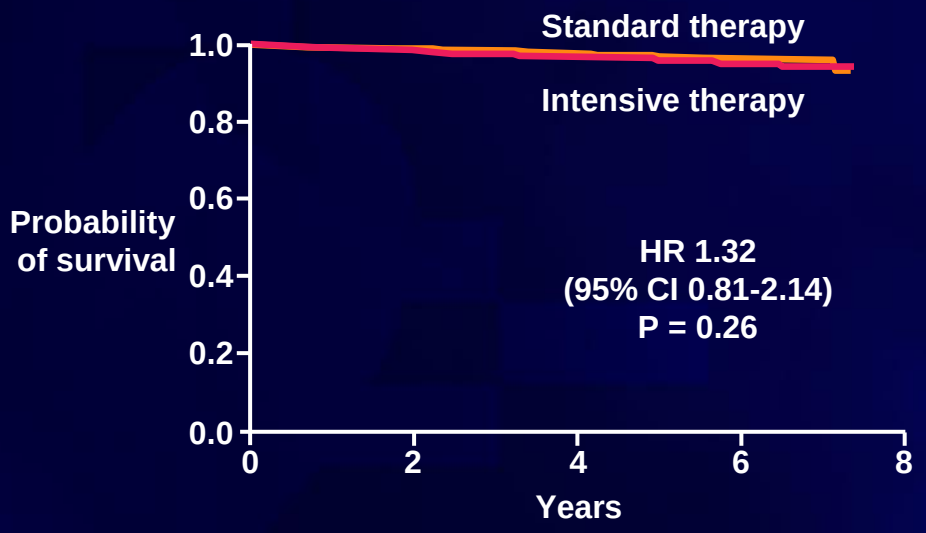
VADT: Treatment effect on all-cause and CV mortality

Death from any cause



No. at risk									
Standard therapy	899	836	801	772	727	637	322	76	0
Intensive therapy	892	832	791	752	720	650	341	86	0

Death from CV causes



No. at risk									
Standard therapy	899	833	797	767	724	635	320	75	0
Intensive therapy	892	828	786	746	713	646	337	85	0

Duckworth W et al. *N Engl J Med*. 2009;360:129-39.

VADT, ACCORD, ADVANCE: Glycemic control and rates of hypoglycemia

	A1C (%)		Hypoglycemia (%)	
	Standard	Intensive	Standard	Intensive
VADT	8.4	6.9	3.1	8.5
ACCORD	7.5	6.4	3.5	10.5
ADVANCE	7.3	6.5	1.5	2.7

ACCORD Study Group. *N Engl J Med.* 2008;358:2545-59.
ADVANCE Collaborative Group. *N Engl J Med.* 2008;358:2560-72.
Duckworth W et al. *N Engl J Med*. 2009;360:129-39.
Kelly TN et al. *Ann Intern Med*. 2009;151:394-403.

HbA1c 7-9%

Table 3: Targets of glycemic control in geriatric population as suggested by various premier agencies

	American Diabetes Association	Department of Veterans Affairs	American Geriatric Society
Glycated hemoglobin target	<7.0%	7.0% in adults with life expectancy of >15 years along with good functional status (no major co-morbidity 8.0% if frail or if life expectancy is 5- 15 years (in the presence of moderate co-morbidities) 9% if life expectancy is <5 years (major co-morbidities	<7.5% in adults who have good functional status 8% if frail or if life expectancy is <5 years)

Source: Hornick and Aron 2008[20]

The European Geriatrics Society and the International Diabetes Federation

Table 1. Glycemic targets in older patients with diabetes

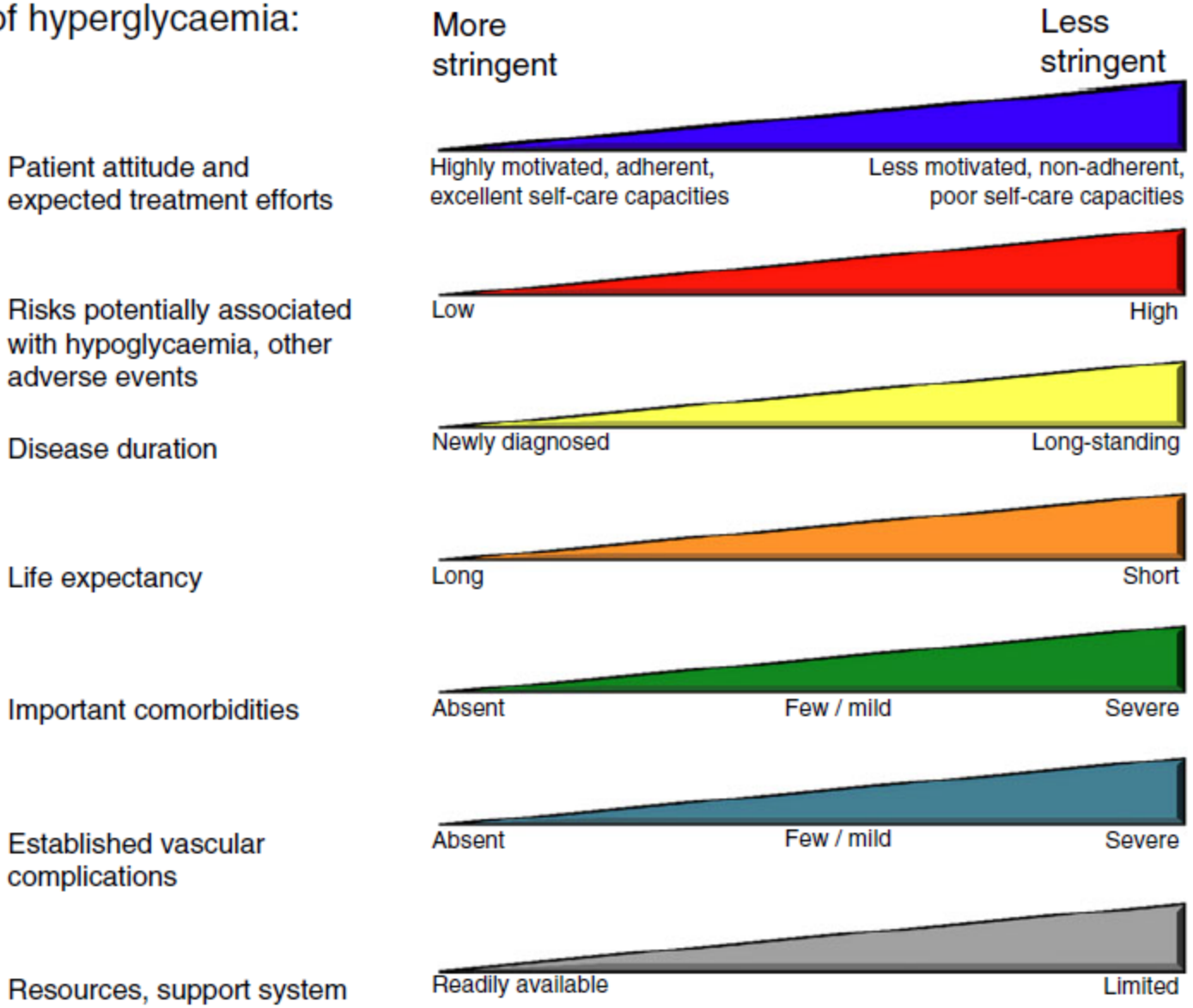
	Healthy	*Frail*
Fasting blood glucose	<7.0 mmol/L	<10.0 mmol/L
2-h postmeal glucose	<10.0 mmol/L	<14.0 mmol/L
A1c	<7.0%	<8.5%

A1c = glycated hemoglobin

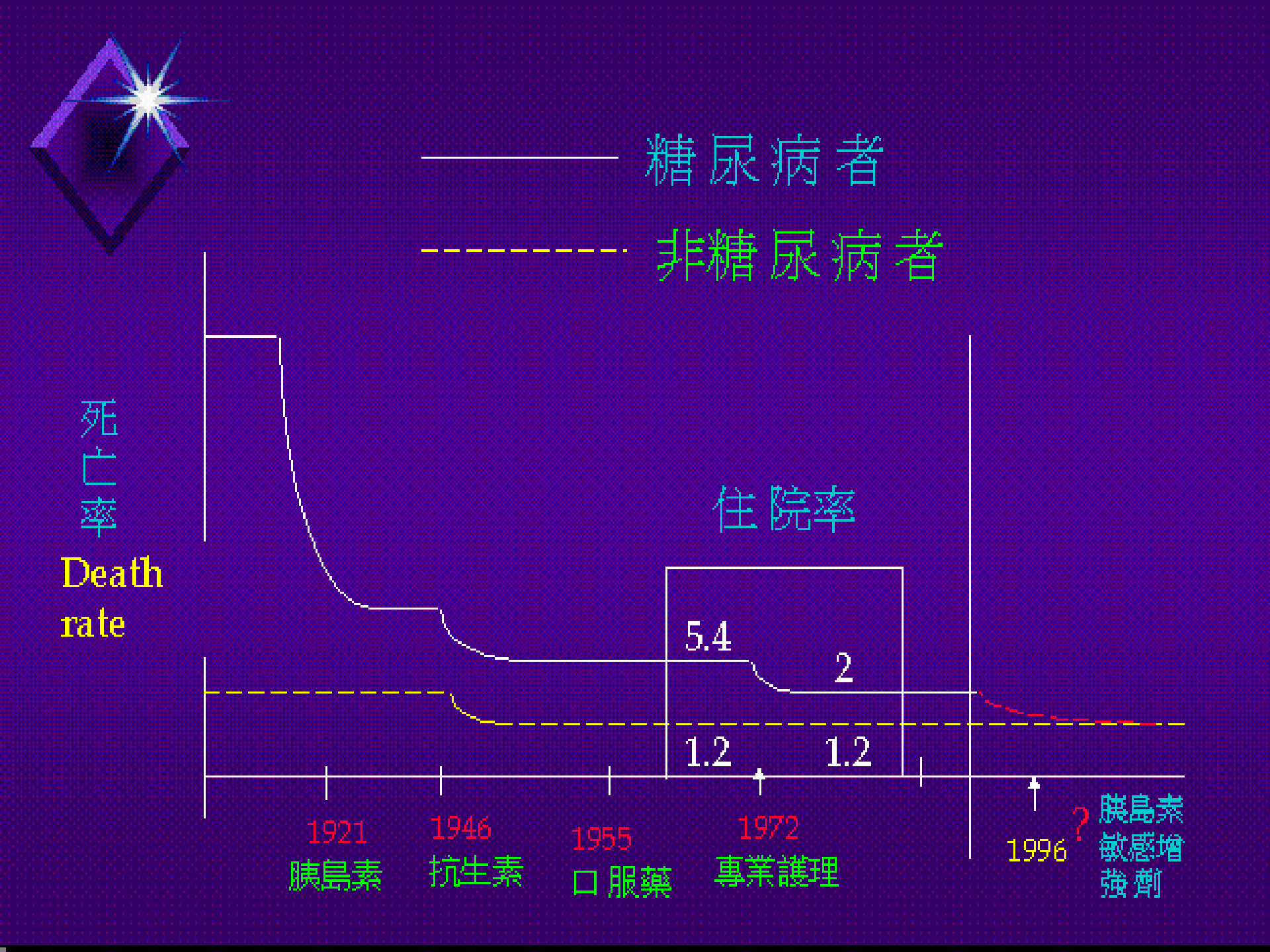
Management of hyperglycaemia in type 2 diabetes: a patient-centered approach. Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Accepted: 24 February 2012 / Published online: 20 April 2012

Approach to management of hyperglycaemia:

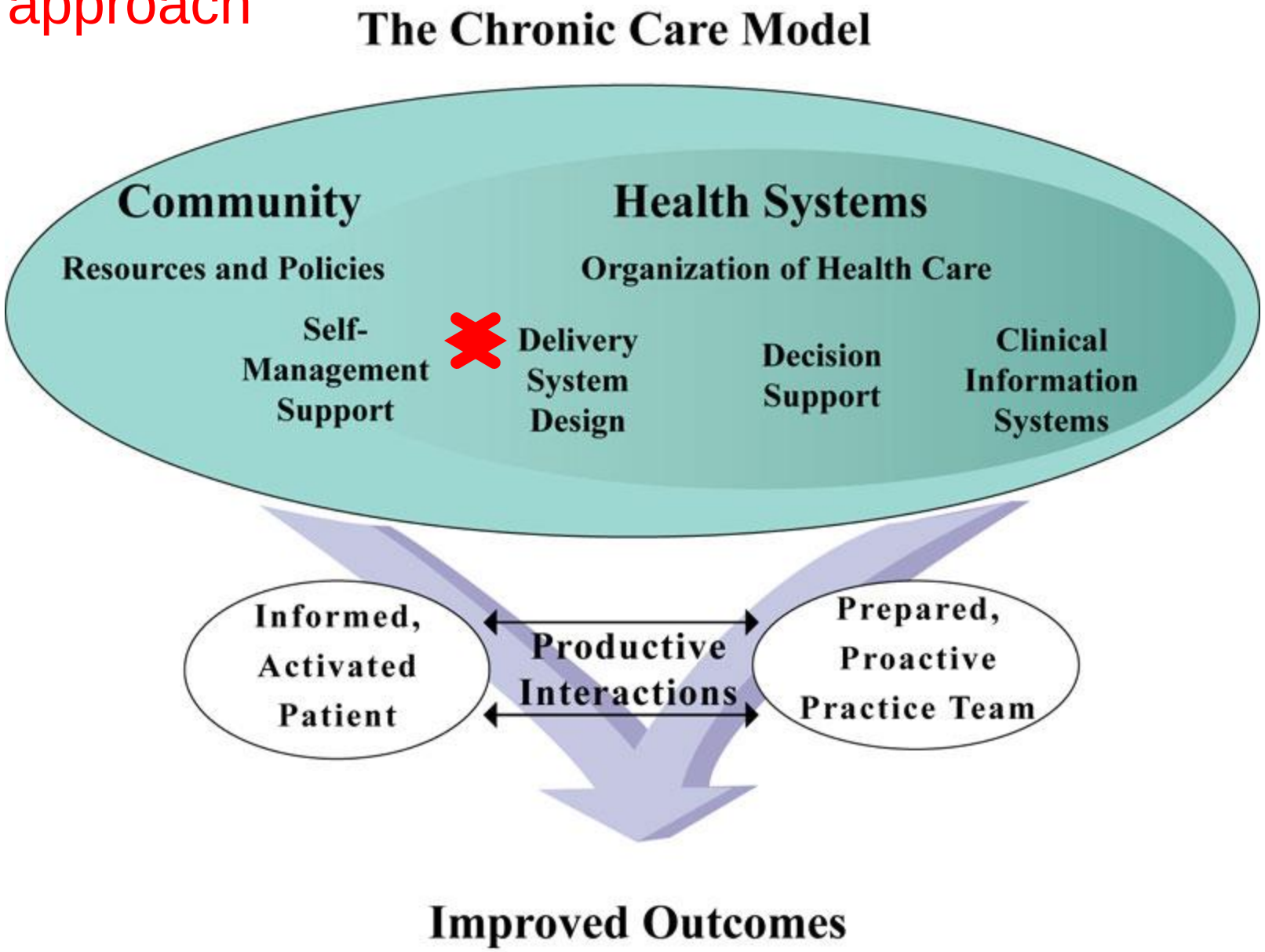



SMDD
Claudio Munoz


糖尿病者
非糖尿病者
死亡率
Death rate
住院率
5.4
2
1.2
1.2
1921
胰島素
1946
抗生素
1955
口服藥
1972
專業護理
1996
?
胰島素敏感增強劑



Patient Centred : Multidisciplinary team approach

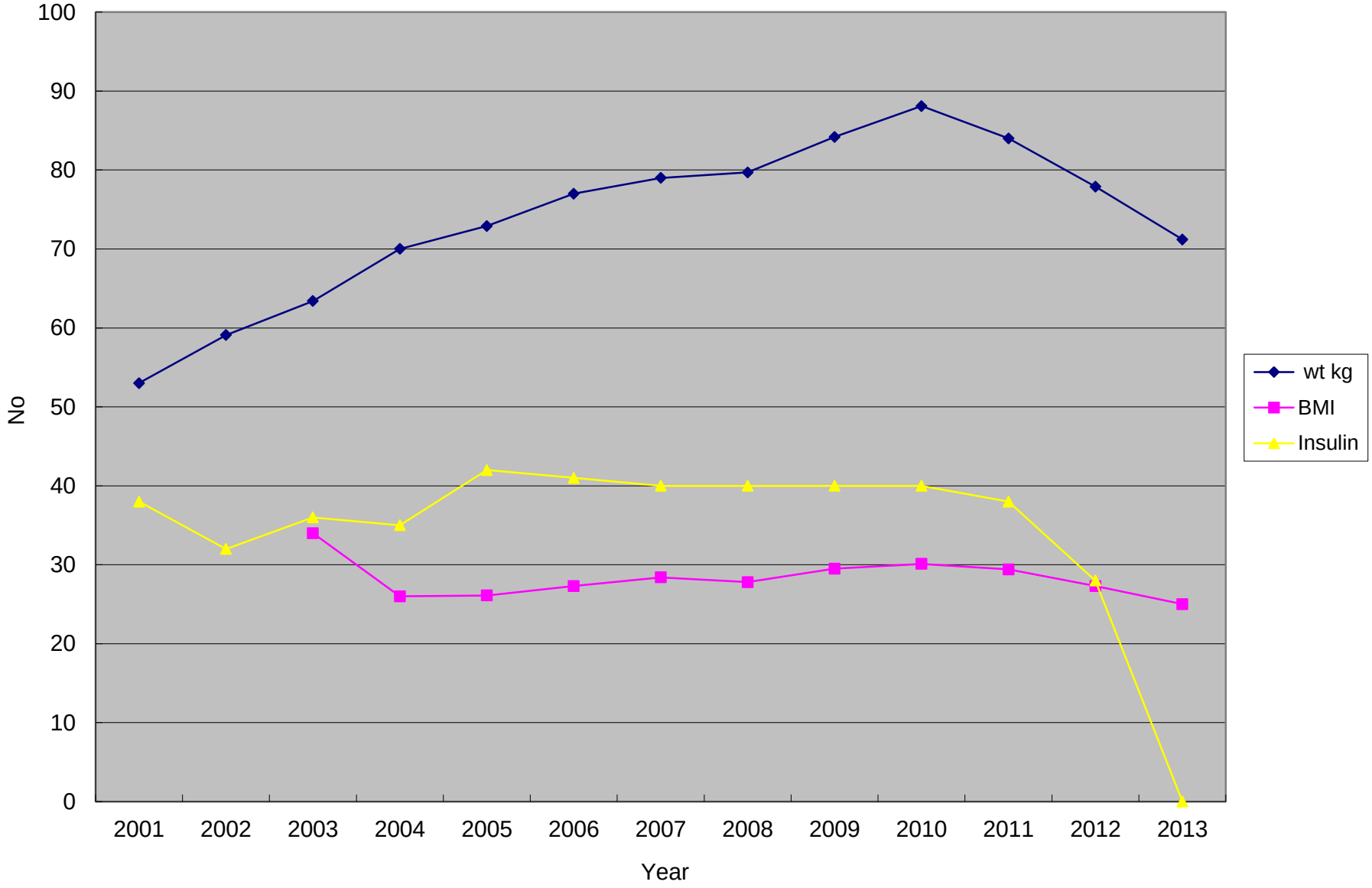


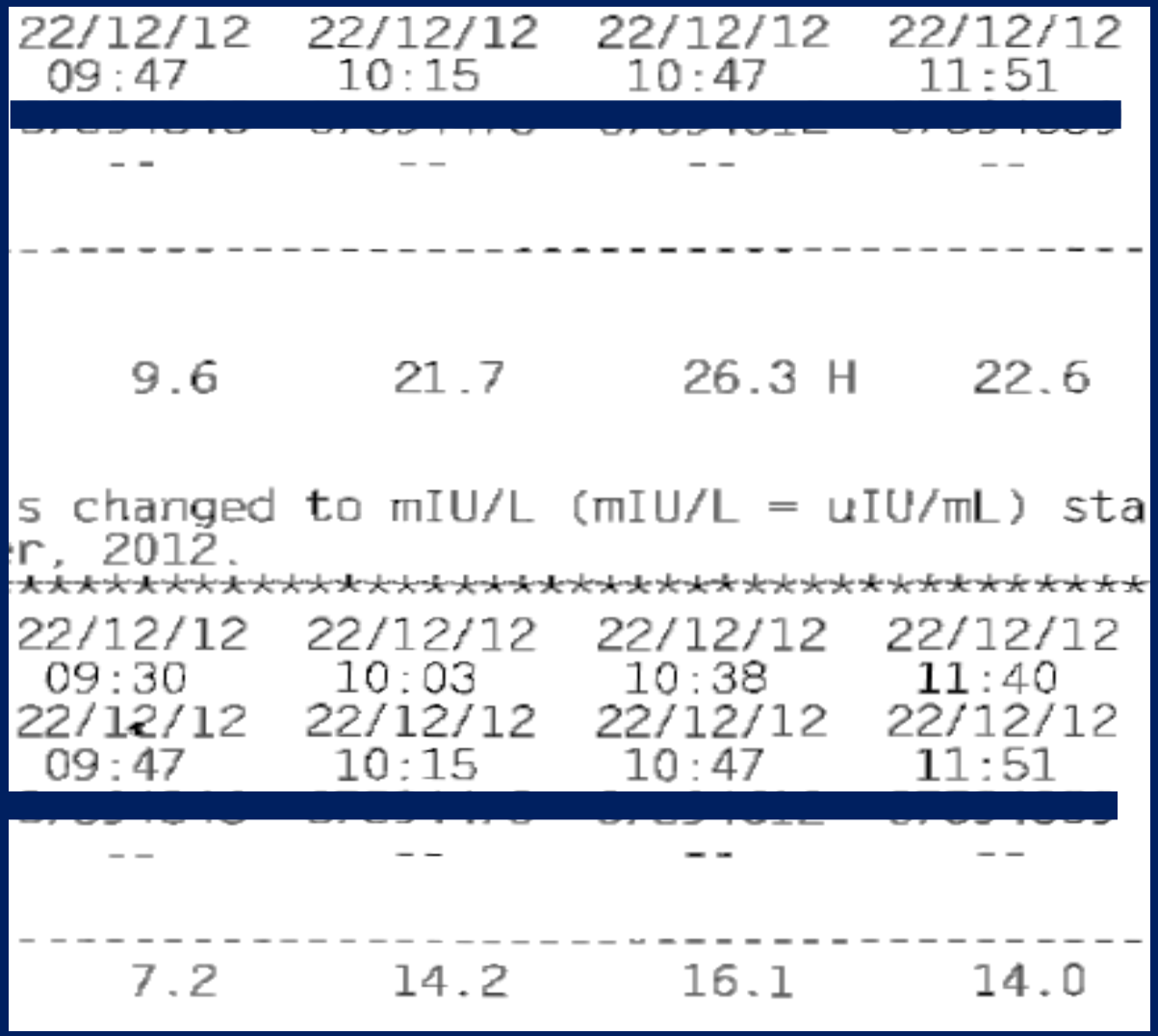
cases

Case1: M/ 23

- 2001, age 11, referred from DH
- 1 mn. polyuria , polydipsia
- Dec Bw from 56 to 51kg
- blood sugar 17.3

- urine ketone moderate
- Spot sugar 29.3
- blood gas no acidosis


100
90
80
70
60
50
40
30
20
10
0
No
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
wt kg
BMI
Insulin



HOMA IRI =3.07

HOMA beta =51.89

Case 2: M31

- 2010 June polyuria, polydipsia, loss 10 pound
- Hba1c 18%,
- metformin 500 mg bd
- diamicron 160 mg bd
- 2010 Aug impending DKA,UCH
- protaphane 20
- FBS 8.5
- HbA1c 11.1%
- 2010 Nov Hba1c 6%,
- FBS 5.1
- SMBG : single , frequent <3.3 , occ 2.8
  - » Jog 1 hr 3-5 /week
- detemir 10 unit nocte, metformin 750 bd

Case 3:
M/63, well all along

Collect Date	:	30/03/10	30/03/10	06/08/10	06/08/10	26/11/10	
Collect Time	:	21:37	22:55	08:53	08:53	08:57	
Arrive Date	:	30/03/10	30/03/10	06/08/10	06/08/10	26/11/10	
Arrive Time	:						
Request No.	:					94	
Urgency	:						
Test(s)						Ref. Range	U
Cholesterol					6.83	See Below	mr
Triglycerides					2.91	See Below	mr
HDL-Chol					0.94	See Below	mr
LDL-Chol(calc)					4.57	See Below	mr
Glucose		41.2	7.8			See Below	mr
Glu(Fasting)				5.4		6.8 H (3.9-6.4)	mr

Collect Date	:	30/03/10	30/03/10	30/03/10	30/03/10	31/03/10	
Collect Time	:	20:55	21:31	22:08	23:47	00:17	
Arrive Date	:	30/03/10	30/03/10	30/03/10	31/03/10	31/03/10	
Arrive Time	:	20:59	21:36	22:11	08:11	00:34	
Request No.	:						
Urgency	:	URGENT	URGENT	URGENT	URGENT	URGENT	
Test(s)						Ref. Range	Units
Heparinized whole blood (WB)							
Sample Type		POCT	POCT	POCT-G	POCT-G	ABG	
pH		7.27 L	7.33 L			7.39 (7.35-7.45)	
pCO2		37	28 L			33 L (35-45)	mmHg
pO2		19 L	109 H			83 (75-100)	mmHg
HCO3		17 L	14 L			20 L (22-26)	mmol/L
Base excess		-9.3 L	-9.8 L			-4.4 L (-2 - +3)	mmol/L
O2 Saturation		21.9 L	97.5			96.3 (95.0-98.0)	%
Sodium (WB)		112 L	125 L			(136-145)	mmol/L
Potassium (WB)		6.4 H	4.6			(3.5-5.1)	mmol/L
Chloride (WB)		77 L	89 L			(98-107)	mmol/L
Glucose (H'stix)				18.8	6.4	See Below	mmol/L

	Mar 2010	May 2010	Aug 2010	Dec 2010
Mixtard	22/12	22/12	18/6	12/0
Metformin		500 mg bd	500 mg bd	500 mg tds

Request No. : 10H0301397
Clinical Information : dm

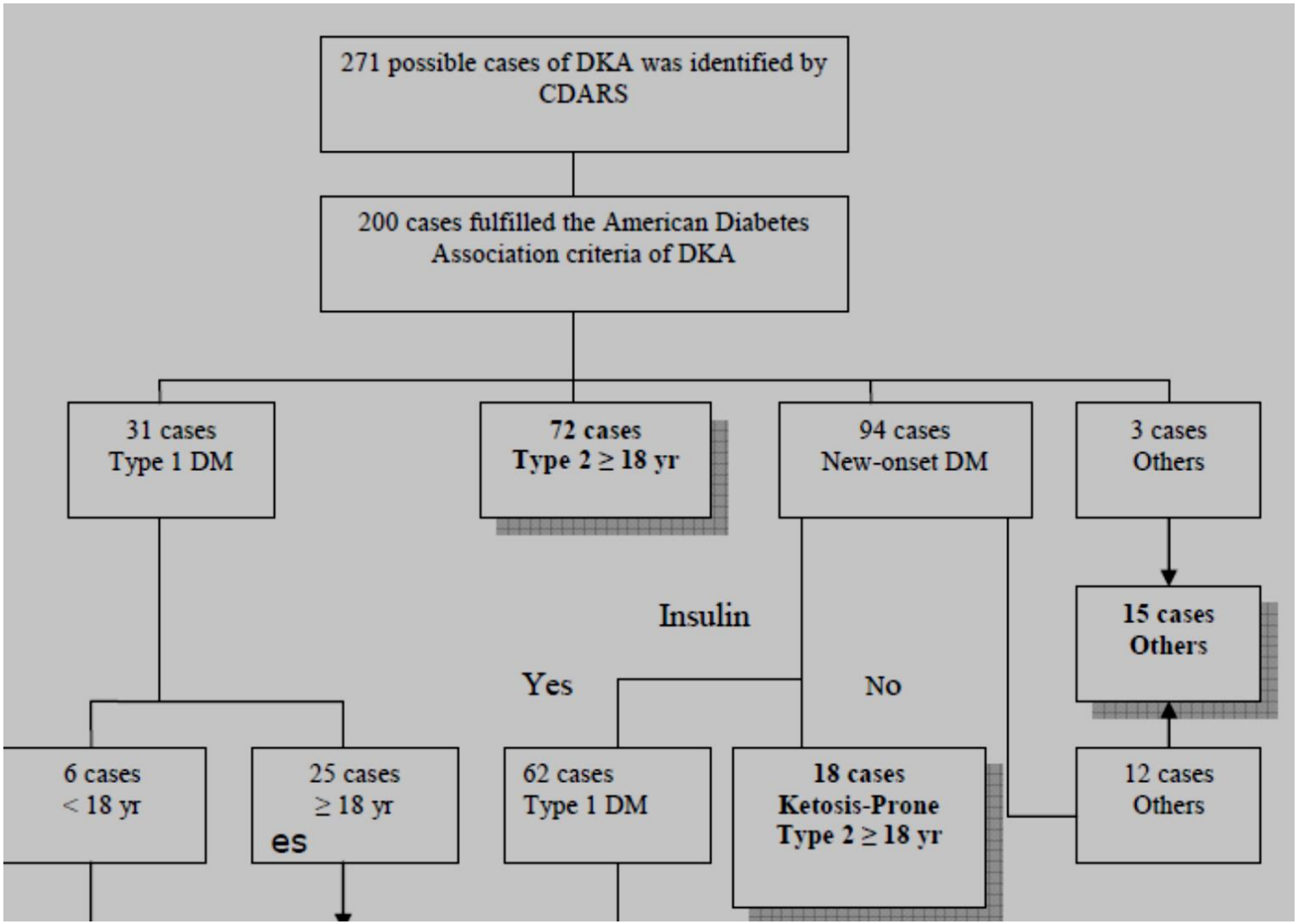
Collect Date :	30/03/10	06/08/10	26/11/10	
Collect Time :	22:55	08:53	08:57	
Arrive Date :	30/03/10	06/08/10	26/11/10	
Arrive Time :	23:47	09:25	09:26	
Request No. :	[redacted]			
Urgency :	--	--	--	
			Ref. Range	Units
HbA1C	16.1 H	7.1 H	6.0	4.0-6.0 %

Ref 2418850,uch

progress

- Gradaully off insulin, in Jan 2013
- Refer FM , march ,
- Metformin 1gm bd
- zocor

Review of KPT2DM in UCH



A 618. 70th Scientific Meeting American Diabetes Association. 2010

Table 6. Clinical characteristic for subgroups of patients.

	T1DM (n = 75)	T2DM (n = 72)	KPT2DM (n = 18)	p value
Sex (M/F)	38 / 37	24 / 48	15 / 3	0.001
Age (years)	40.7 ± 15.7	59.3 ± 13.9 [a]	47.9 ± 14.1 [b]	
Diabetes onset age (years)	36.5 ± 16.8	49.6 ± 15.6 [a]	47.9 ± 14.1 [a]	
Duration of DM (years), median (IQR)	0 (0,4)	6 (3,11)	-	
Duration of symptoms (days)	3 (1,7)	2 (1,4)	3 (2,14)	0.228
Clinical features, No. (%)				
Polydipsia	41 (54.7 %)	19 (26.4 %)	13 (72.2 %)	<0.001
Polyuria	39 (52.0 %)	17 (23.6 %)	13 (72.2 %)	<0.001
Weight loss	21 (28.0 %)	6 (8.3 %)	9 (50.0 %)	<0.001
BMI (kg/m²)	22.9 ± 3.8	22.1 ± 3.6	25.8 ± 3.3 [ab]	

A 618. 70th Scientific Meeting American Diabetes Association. 2010

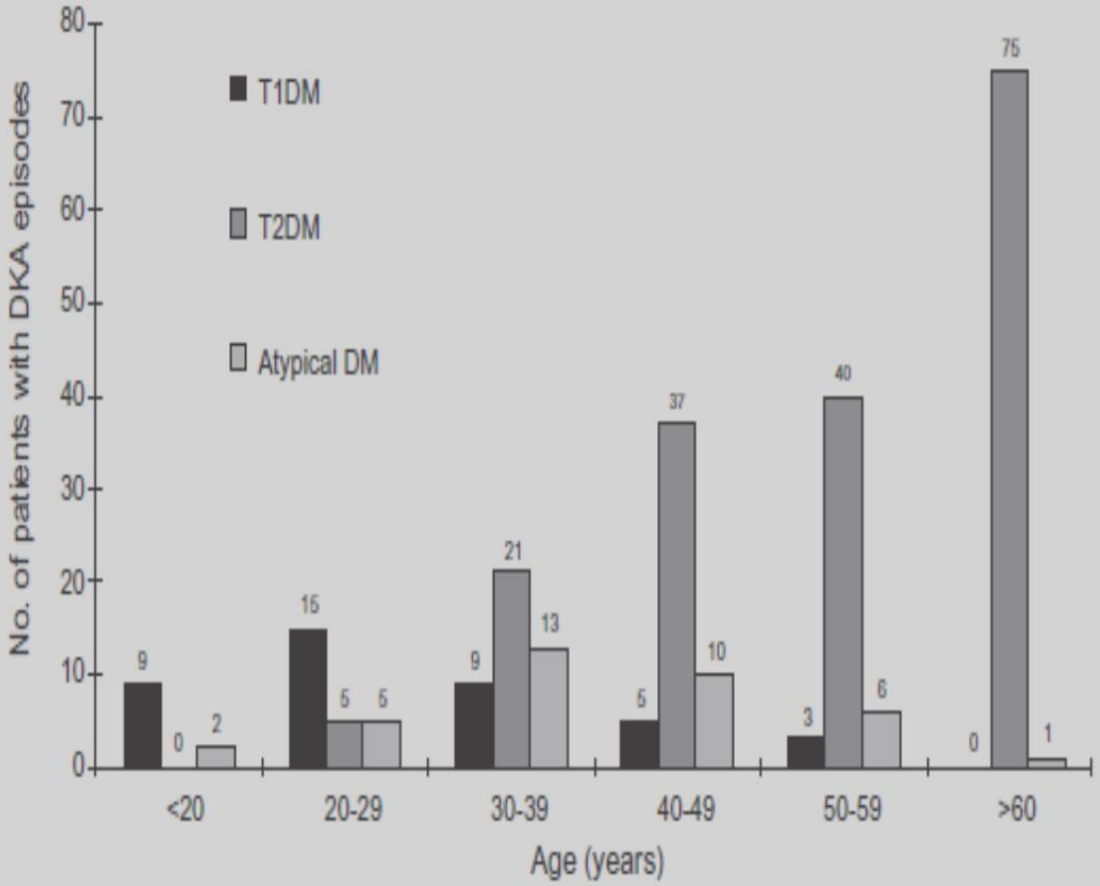


Fig. 1 – Numbers of patients with type 1, type 1 and atypical diabetes in each age group on admission with diabetic ketoacidosis.

Case 4 :

17-Apr-2013

Last complication screening date: 23/02/2012
Type of DM: Type 2
Body Weight: 77.4
Height: 1.75
BMI: 25.27
BP: 153/84
Smoking status: Current-smoker

***** Lab Results *****
(08/04/13) HbA1c: 8.8 % (H)
(08/04/13) Fasting Glucose: 13.5 mmol/L
(19/10/12) TC: 4.27 mmol/L
(19/10/12) LDL-C: 2.51 mmol/L
(19/10/12) HDL-C: 1.31 mmol/L
(19/10/12) TG: 0.98 mmol/L
(19/10/12) Serum K: 4.0 mmol/L
(19/10/12) Serum Na: 142.6 mmol/L
(19/10/12) Serum Cr: 66 umol/L
(19/10/12) eGFR: 116 ml/min/1.73 sq. m.
(19/10/12) Haemoglobin: 15.4 g/dL
(19/10/12) Haematocrit: 0.46

container driver, in HK, , c/o of hunger around 4-5 pm and SMBG, lwoish in the morning,
claimed g ood d rug compliance,
denied noctural,

deterioration in HbA1c,
claimed busy workign schedule ,,
late dinner 9 pm ,
20/10/10 17/01/11 07/02/12 28/05/12 08/04/13

Specimen type: EDTA blood

HbA1C	8.4 H	8.4 H	8.2 H	8.5 H	8.8 H

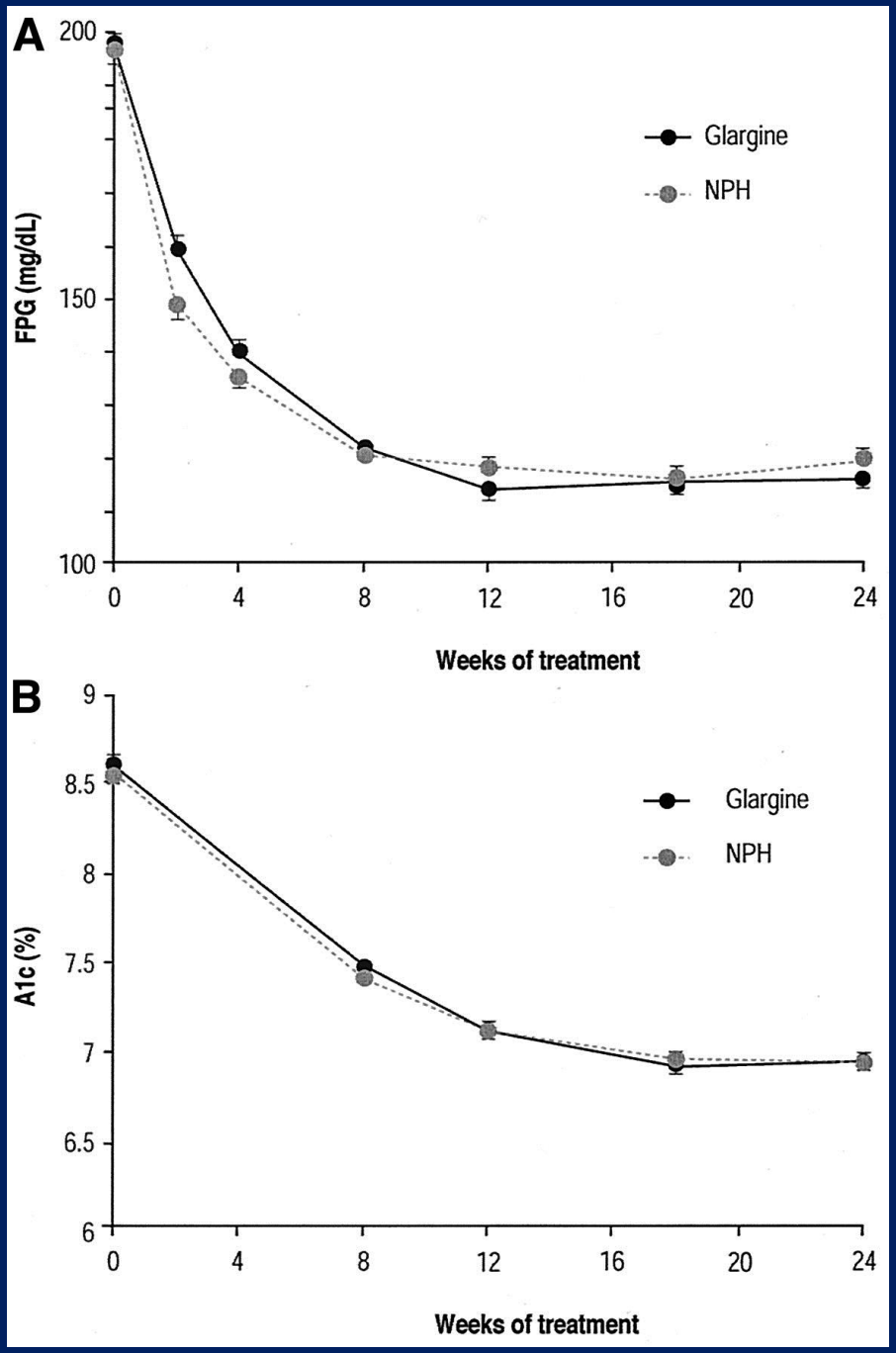
Plan of Management

d river,
poor dm ,
hypo with split protaphane

“Treat to target study”

- 764 qualifying subjects were randomized to either glargine or NPH
- multicenter, open-label, randomized, parallel, 24-week comparative study was performed at 80 sites in the U.S. and Canada
- Patients were randomized to either glargine (Lantus; Aventis) or human NPH insulin (Novolin; Novo Nordisk) to be administered subcutaneously at bedtime, for 24 weeks.
- Oral antihyperglycemic agents were continued at prestudy dosages.

Diabetes Care 26:3080-3086, 2003



Diabetes Care 26:3080-3086, 2003

Achieved similar FPG and HbA1c levels, glargine did so with considerably less symptomatic hypoglycemia

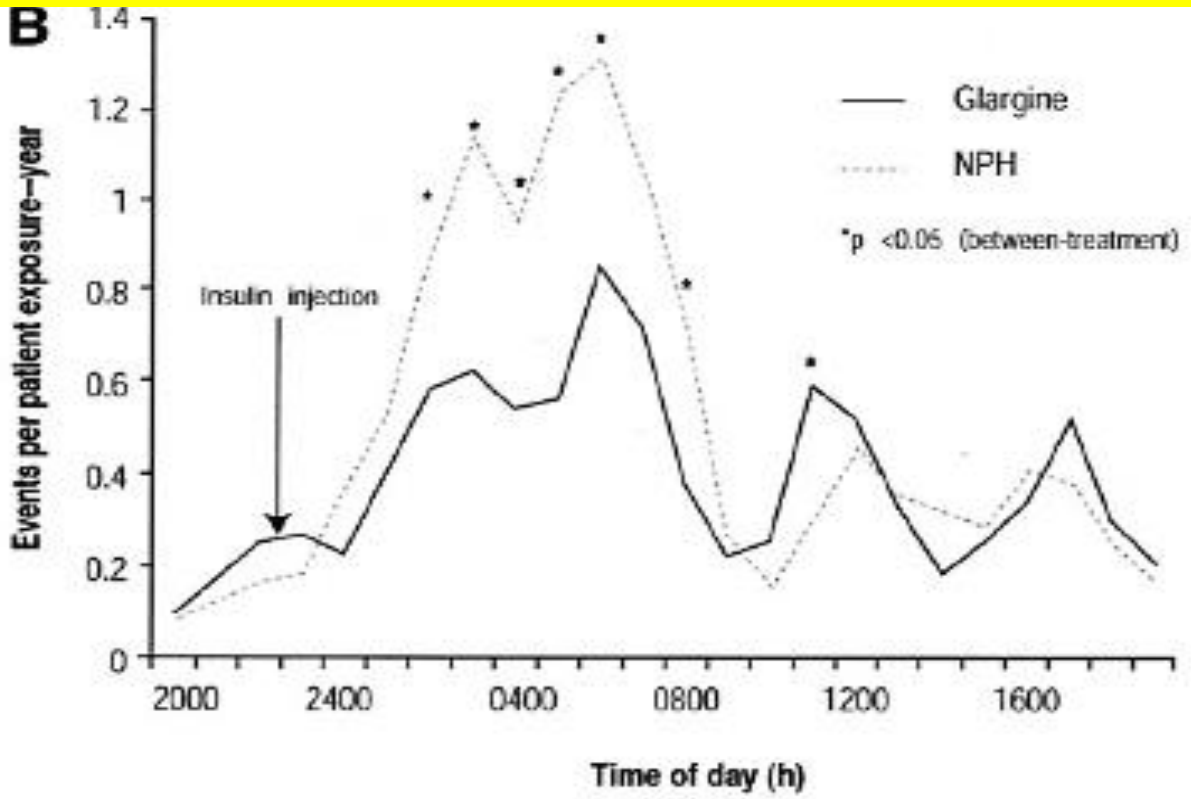


Figure 3—*Distribution of hypoglycemia by time of day. A: The proportion of patients experienc-ing at least one episode of hypoglycemia documented with plasma-referenced glucose ≤72 mg/d (4.0 mmol/l). B: The hourly hypoglycemia rates, expressed as events per patient-year at the same plasma-referenced glucose cutoff.*

Diabetes Care 26:3080-3086, 2003



1

8號新巴沿柴灣道下斜，在筲箕灣消防局附近開始左搖右擺及撞路墜，車速不斷增加（距最後撞擊點約280米）

2

在慈幼會附近巴士站，乘客見司機暈倒，巴士再次撞墜及加速前瀉約100米，驚慌的乘客欲代煞車但失敗

3

新巴在燈位附近先後撞向私家車及七人車

4



新巴在路口向右越線，先撞的士再撞118號九巴

5

的士被兩巴夾扁恍如廢鐵，的士司機、瑞典籍及英國籍乘客同告死亡，兩巴則共有57人受傷

攝影：李澤彤　　註：相片以手機全景拍攝軟件拍攝，零位略有變形　　資料來源：綜合乘客及現場消息

Group 1 entitlement ODL – car, motorcycle

- Must have awareness of hypoglycaemia.
- Must not have had more than one episode of hypoglycaemia requiring the assistance of another person in the preceding twelve months.



- There must be appropriate blood glucose monitoring. This has been defined by the Secretary of State's Honorary Medical Advisory Panel on Driving and Diabetes as no more than 30 minutes before the start of the first journey and every 2 hours while driving.
- ….

http://www.dft.gov.uk/dvla/medical/aag.aspx

Group 2 entitlement vocational lorries, buses



- No episode of hypoglycaemia requiring the assistance of another person has occurred in the preceding 12 months.
- Has full awareness of hypoglycaemia.
- Regularly monitors blood glucose at least twice daily and at times relevant to driving, (no more than 30 minutes before the start of the first journey and every 2 hours while driving), using a glucose meter with a memory function to measure and record blood glucose levels. At the annual examination by an independent Consultant Diabetologist, 3 months of blood glucose readings must be available.
- If meets the medical standards a 1 year licence will be issued.

http://www.dft.gov.uk/dvla/medical/aag.aspx

Firefighter and insulin

- according to NFPA 1582 a Category A condition is an automatic "not medically qualified" see below:

  6.18 Endocrine and Metabolic Disorders.
  6.18.1 Category A medical conditions shall include the following:
  (1) Diabetes mellitus, which is treated with insulin

Patient Characteristics : Case '5'

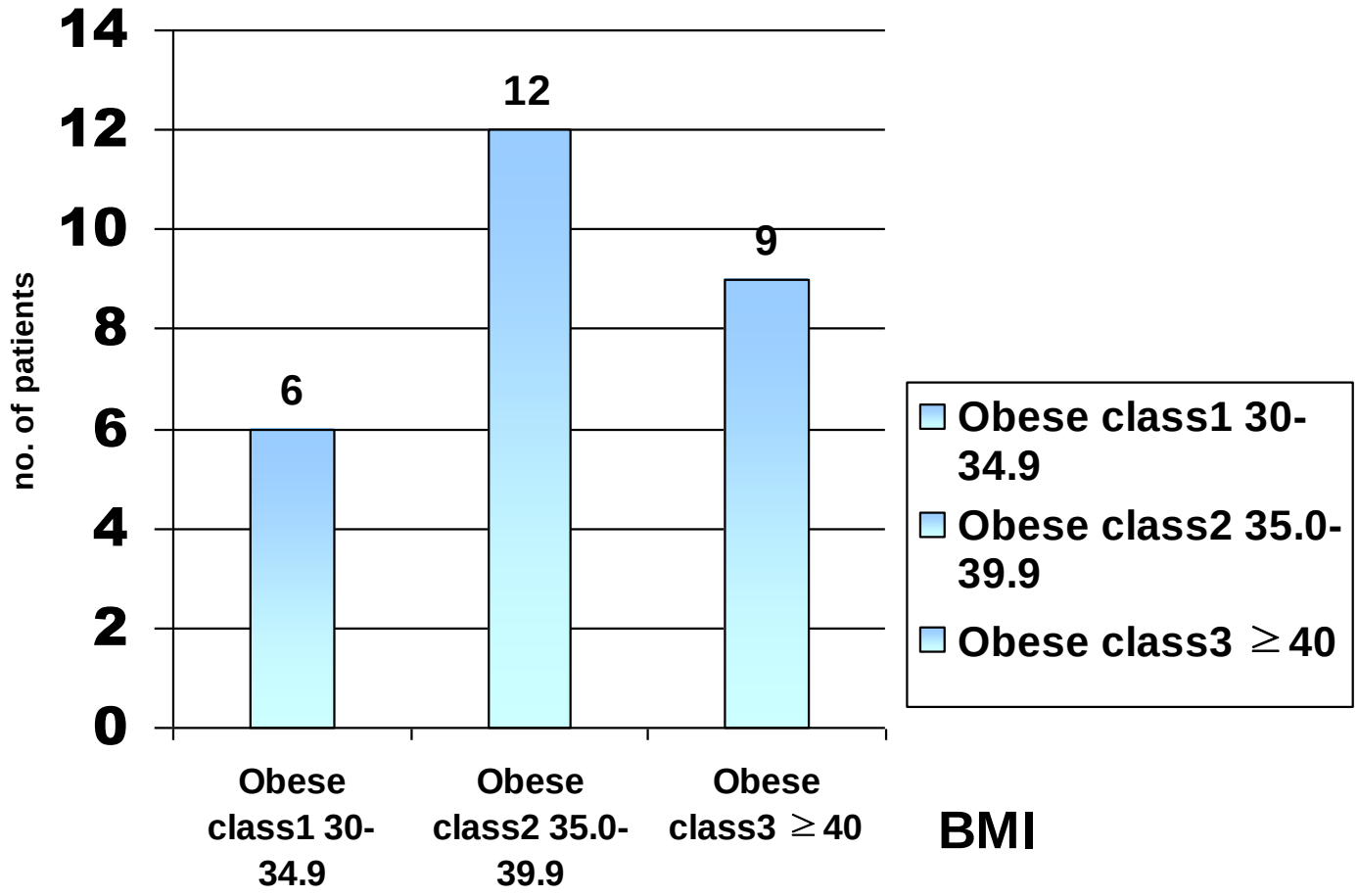
- 27 patients
  - 18 female
  - 9 male

- Mean BMI: 39 (31.8-49.9)±4.6kg/m^2

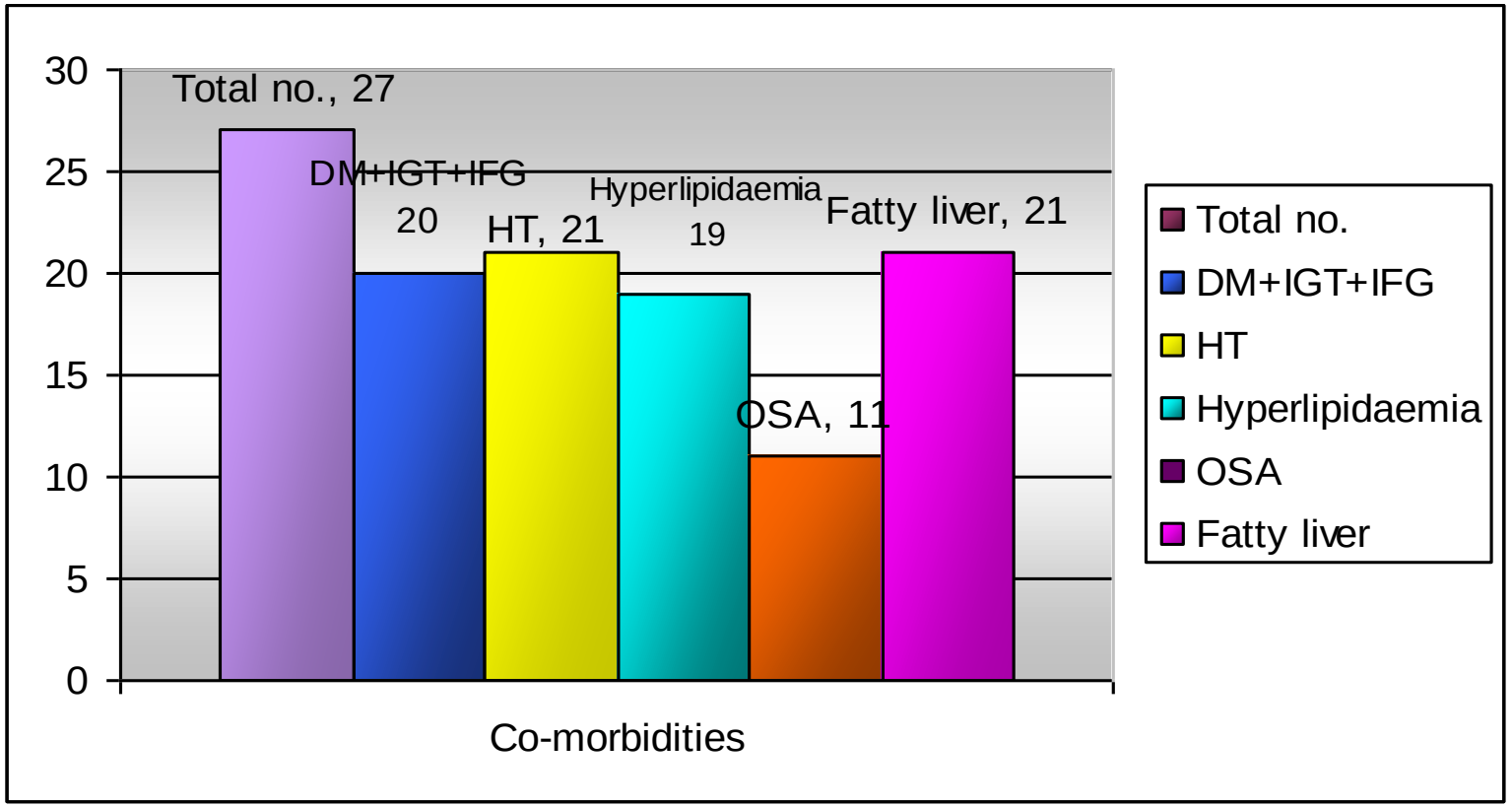
- Mean age: 41.4 (19-63)years old

Flora HO CW , MW Tsang, G Kam HKSEMR Annual Scientific Meeting.2011

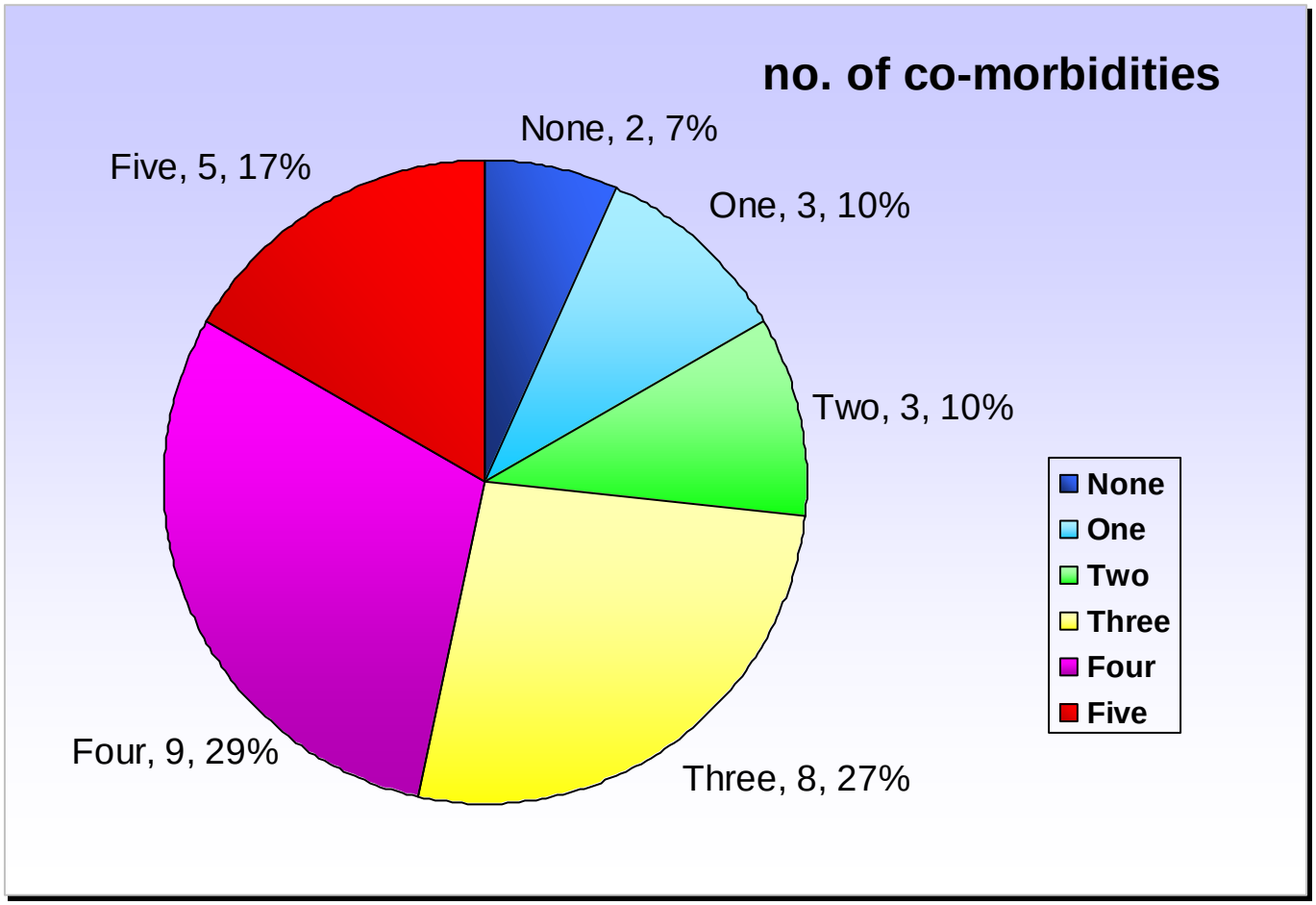
BMI pre op


14
12
10
8
6
4
2
0
no. of patients
6
12
9
Obese class1 30-34.9
Obese class2 35.0-39.9
Obese class3 ≥40
Obese class1 30-34.9
Obese class2 35.0-39.9
Obese class3 ≥40
BMI

Prevalence of co-morbidities



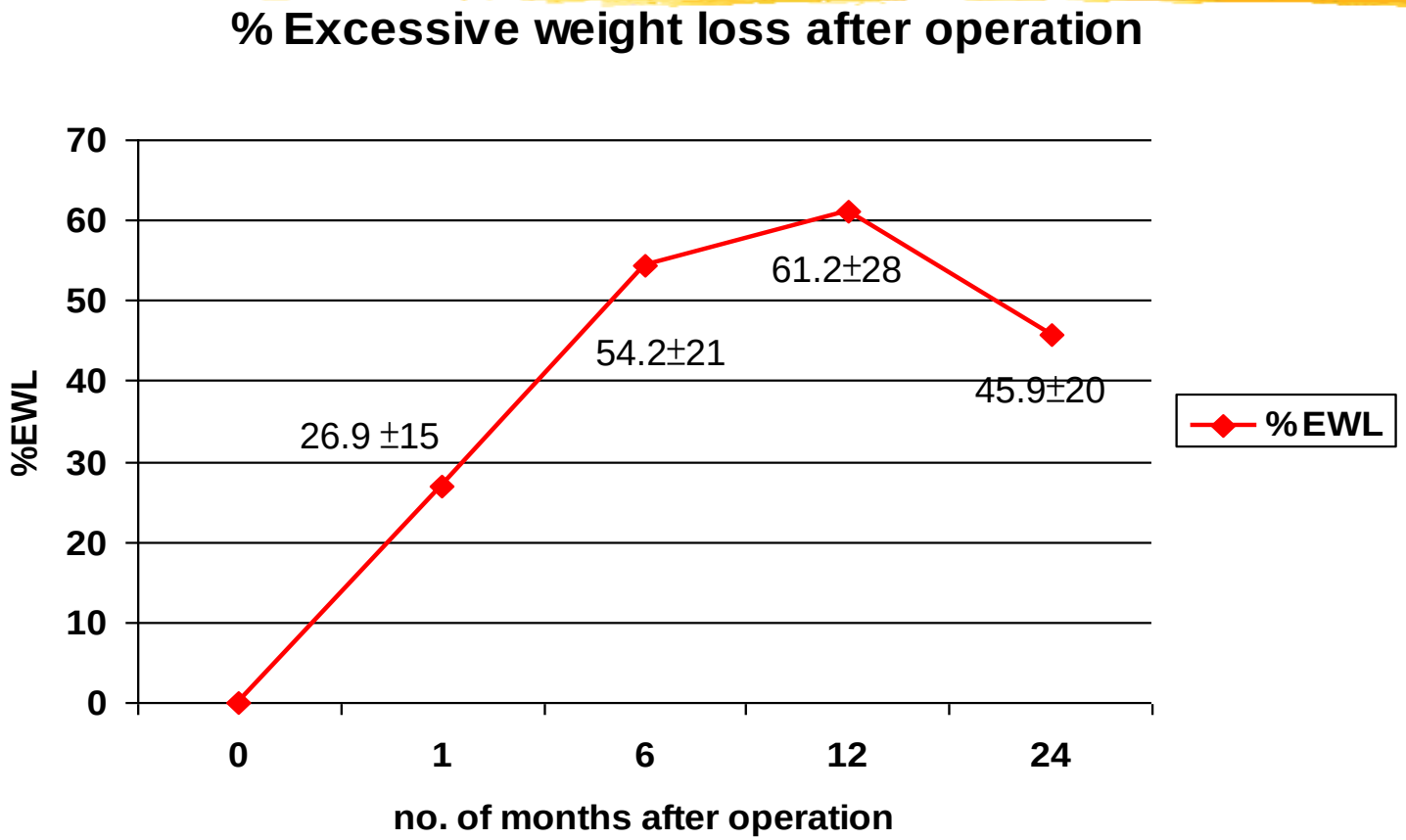
No. of co-morbidities



Result- mean BW and weight loss

	Pre op	1 month post op	6 months post op	12 months post op	24 months post op
Mean bw (kg)	103.5 ±16.9	92.8 ±15.4	91.4 ±13.3	77.1 ±11.8	79.8 ±12.4
Mean weight loss (kg)	--	10.6	31.4	23.9	19.2

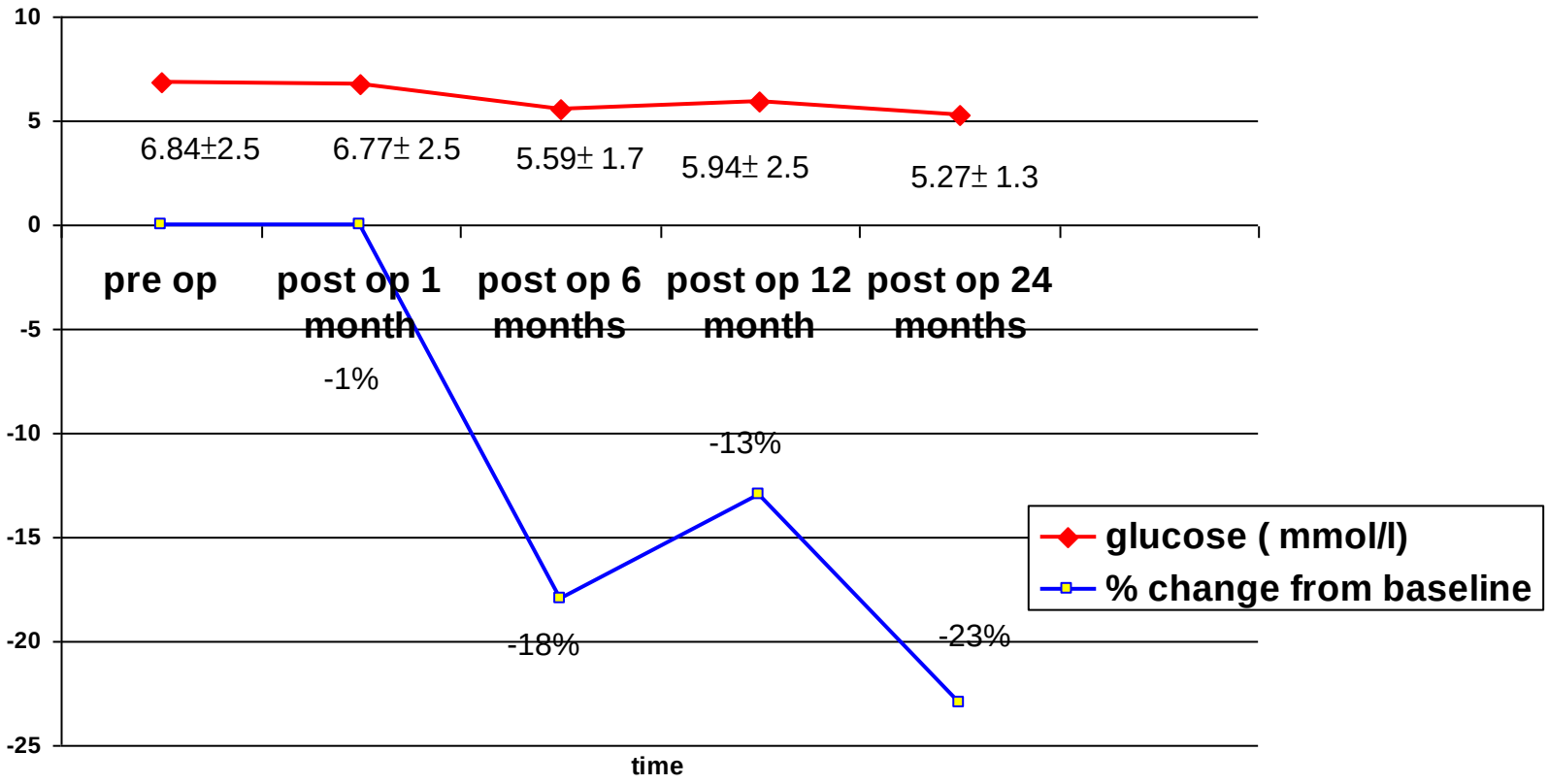
Result- mean % excess weight loss



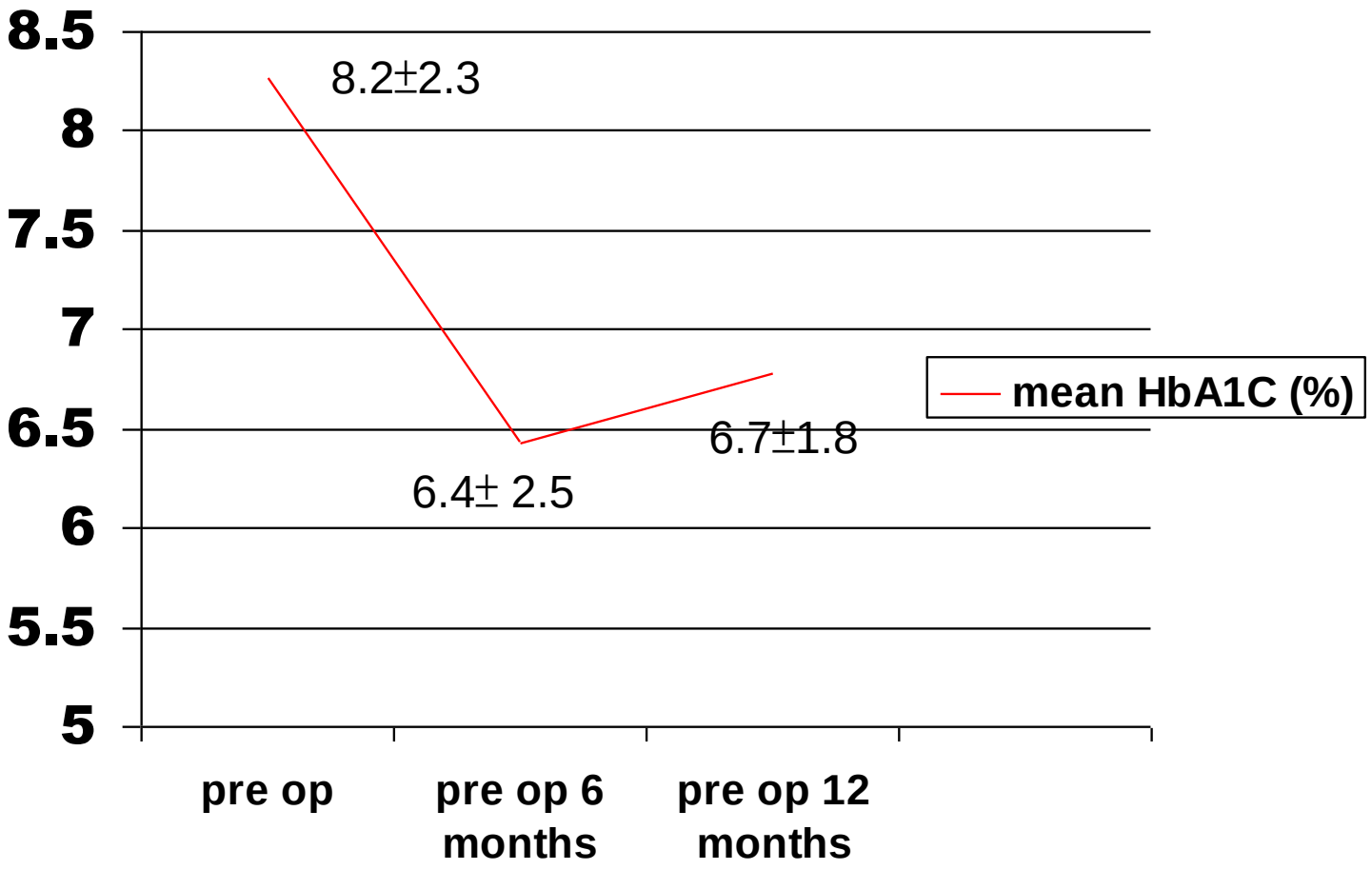
% excess weight loss = (weight loss/ excess weight) x100%

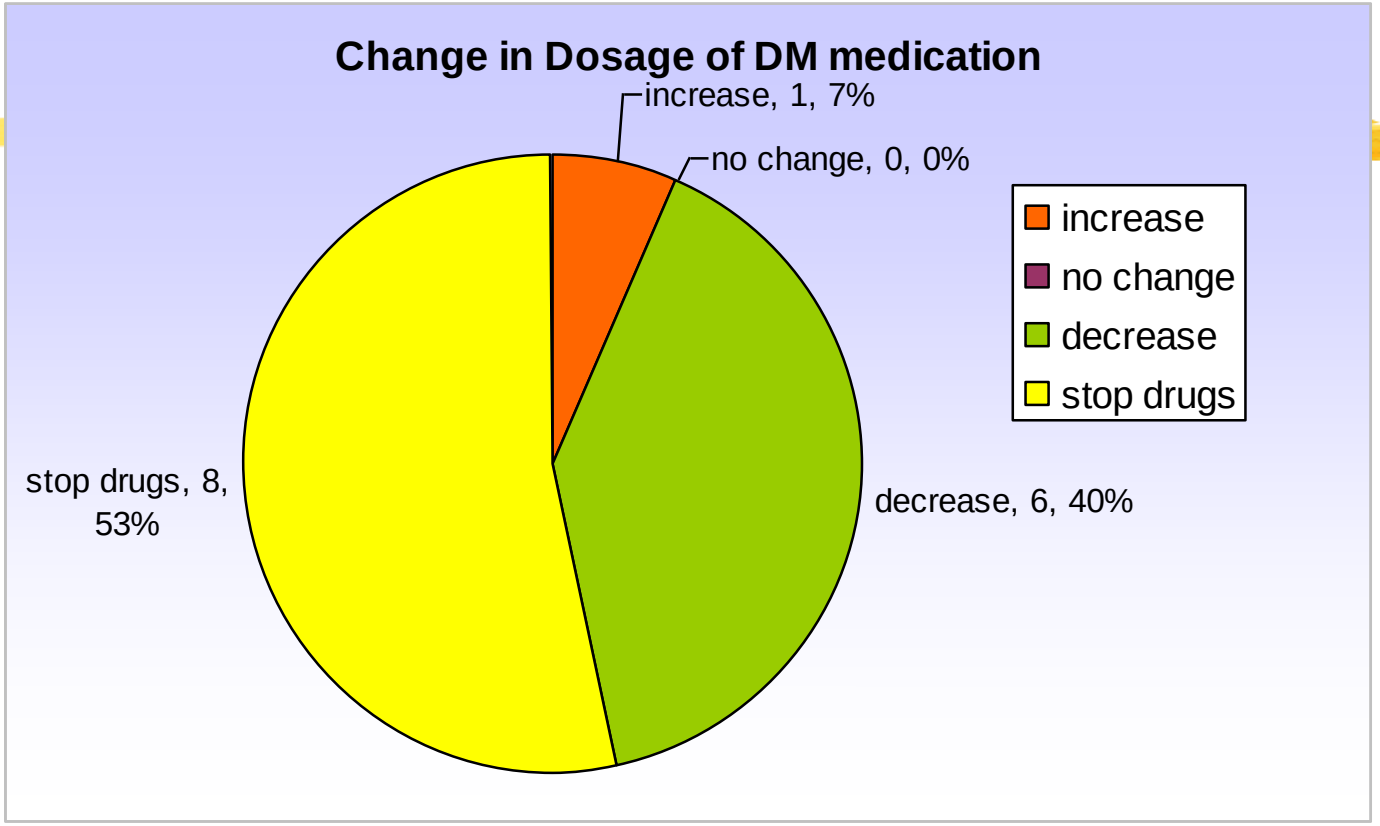
Excess weight = total preoperative weight –ideal weight (kg)

Result- mean fasting blood glucose



Result- mean HbA1C

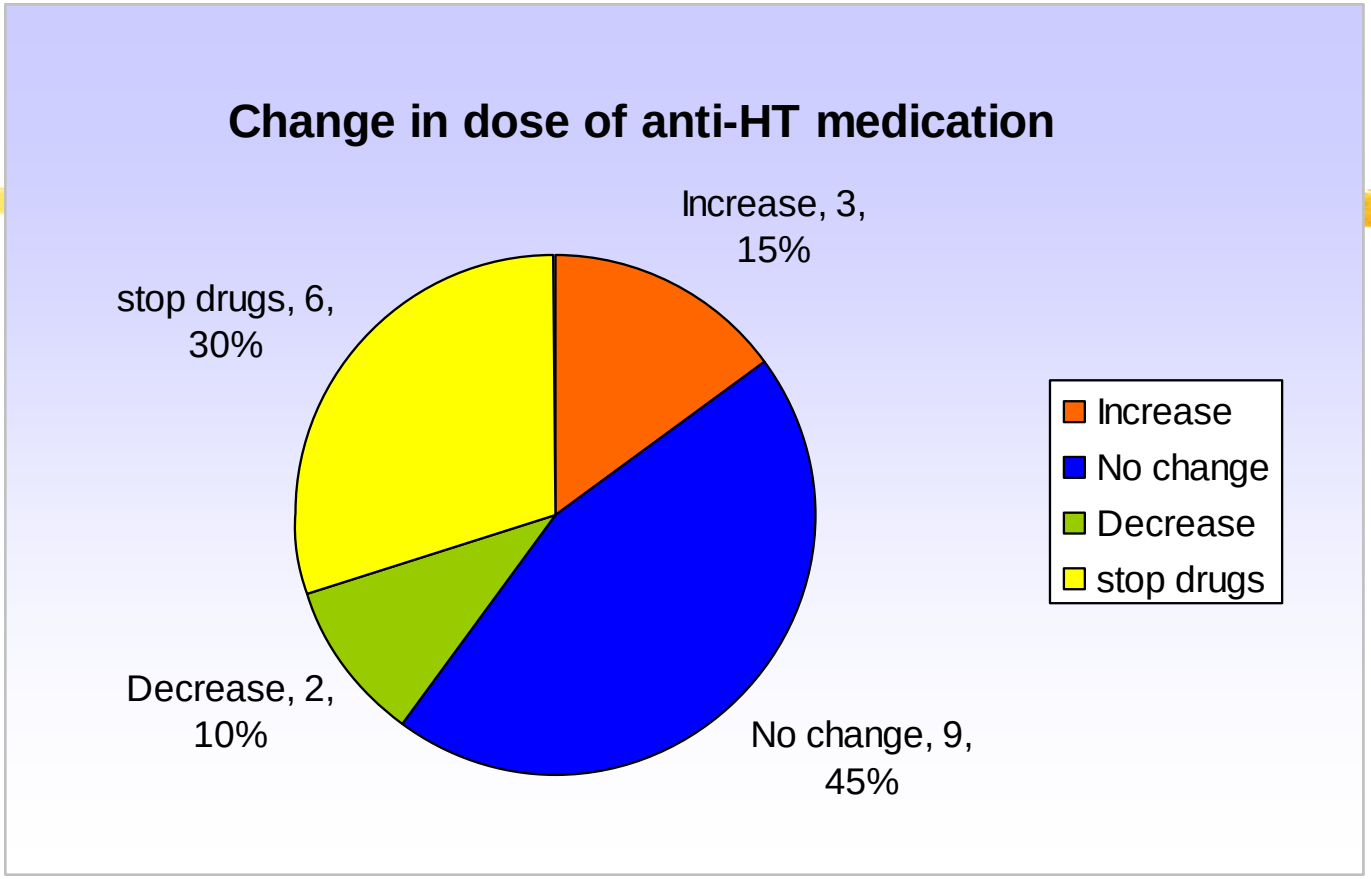




Treatment	no of patients with DM =19
Diet control	3
OHA	11
Insulin+ OHA	5

- All 5 patients on supplement insulin can have dose reduction post op
- 1 patient can stop insulin post op

- Mean total daily units of insulin used:
  - Pre op= 107.2 ±41.5
  - Post op= 41.2 ±28.9



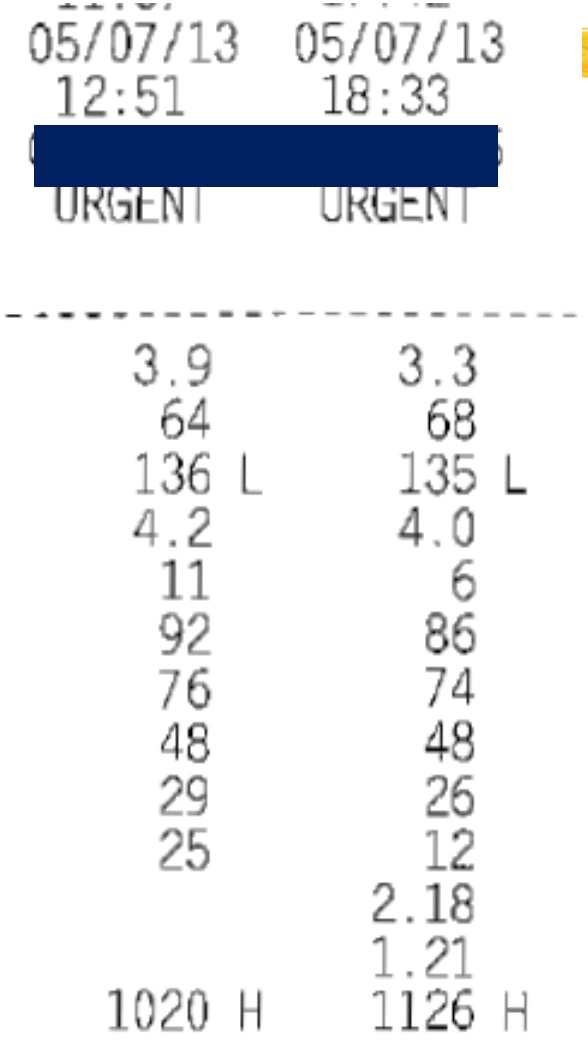
No of patients on anti-HT pre op	20
No. of patients stopping anti-HT post op	6 (30%)
No. of patients had dose reduction of anti-HT	2 (10%)

Case 6 : M/39

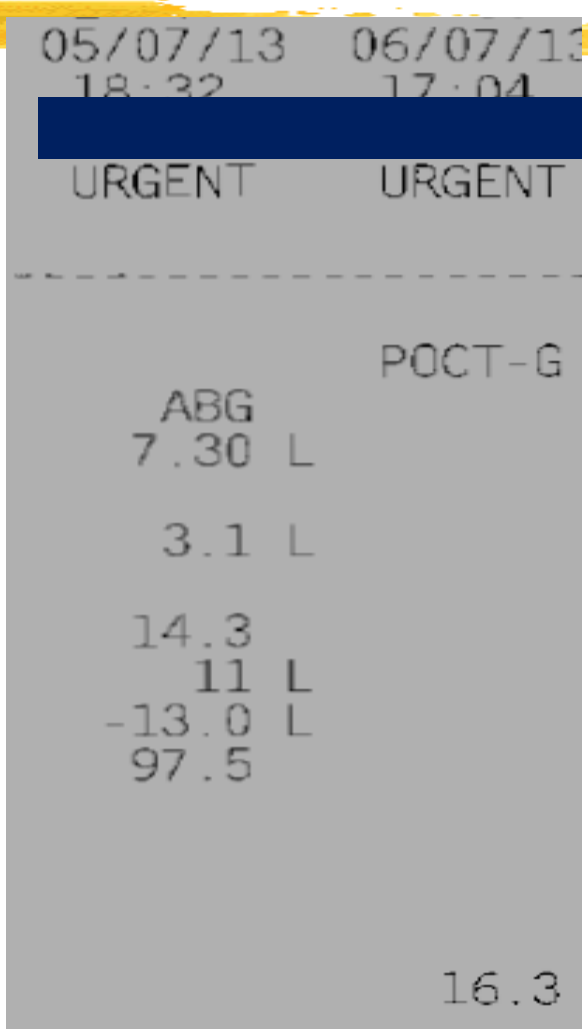
Ref:134181y

Non alcoholic
Admitted DKA 2013
Newly dx DM

BMI



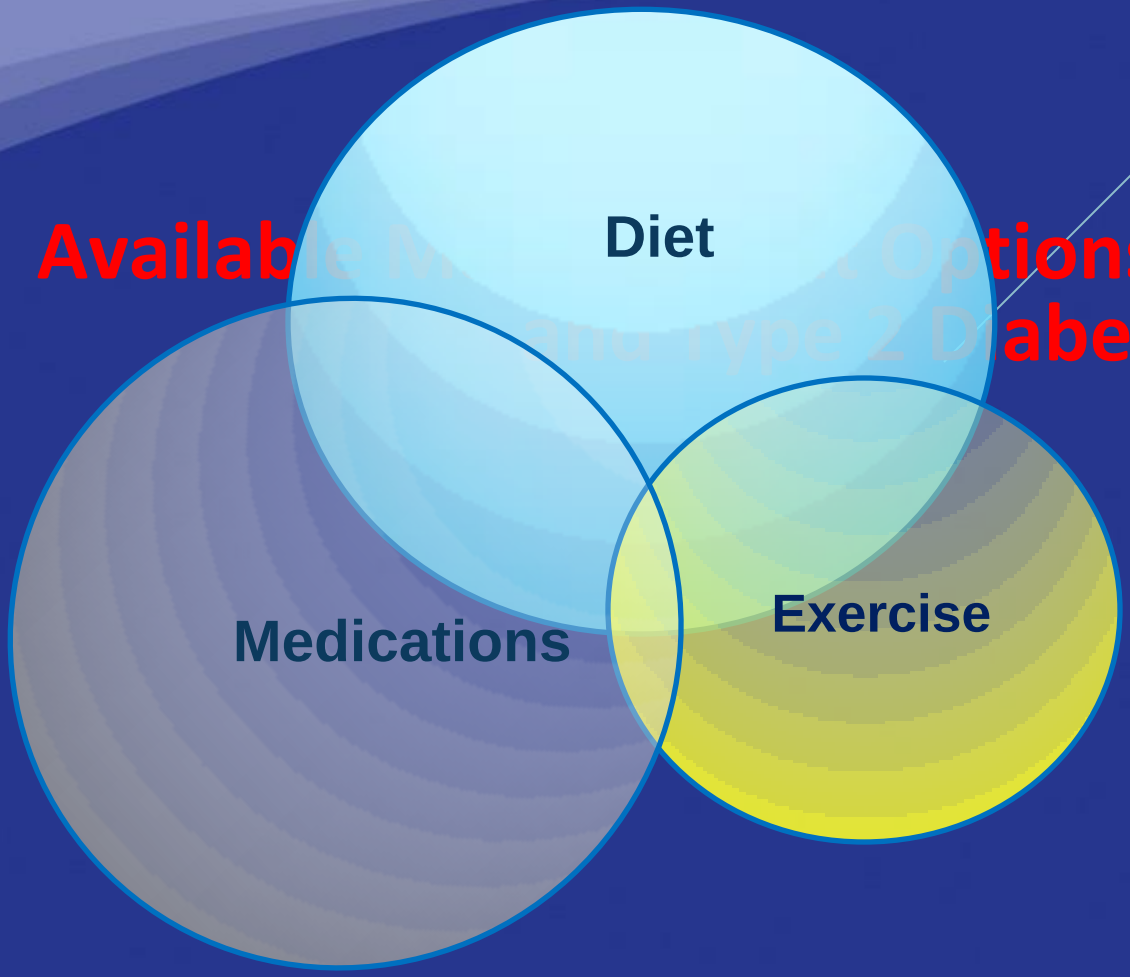
05/07/13 12:51	05/07/13 18:33
[redacted]	
URGENT	URGENT
3.9	3.3
64	68
136 L	135 L
4.2	4.0
11	6
92	86
76	74
48	48
29	26
25	12
	2.18
	1.21
1020 H	1126 H



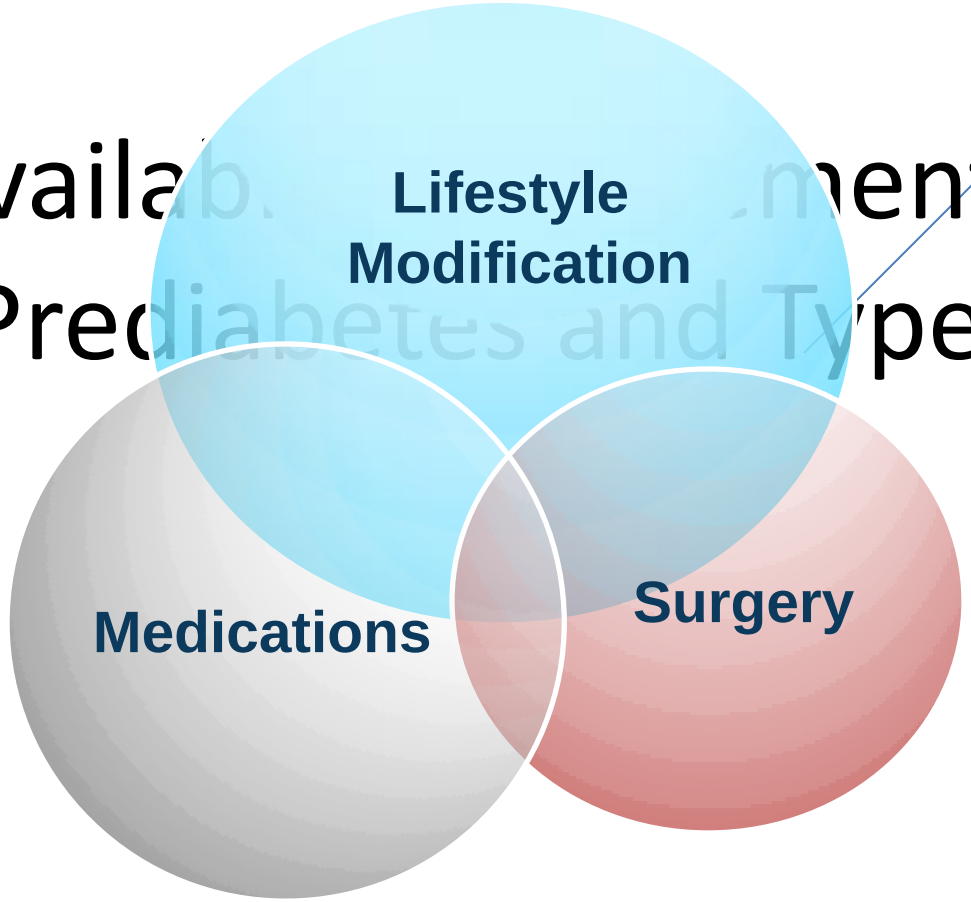
05/07/13 18:32	06/07/13 17:04
[redacted]	
URGENT	URGENT
	POCT-G
ABG	
7.30 L	
3.1 L	
14.3	
11 L	
-13.0 L	
97.5	
	16.3

- On insulin infusion daily insulin requirement over 90 units.
- Patient's concern : need insulin for life?
- Preventable
- Curable

Available Management Options for Prediabetes and Type 2 Diabetes



Availa[illegible]nen[illegible]
Prediabetes and Type 2 Diabetes

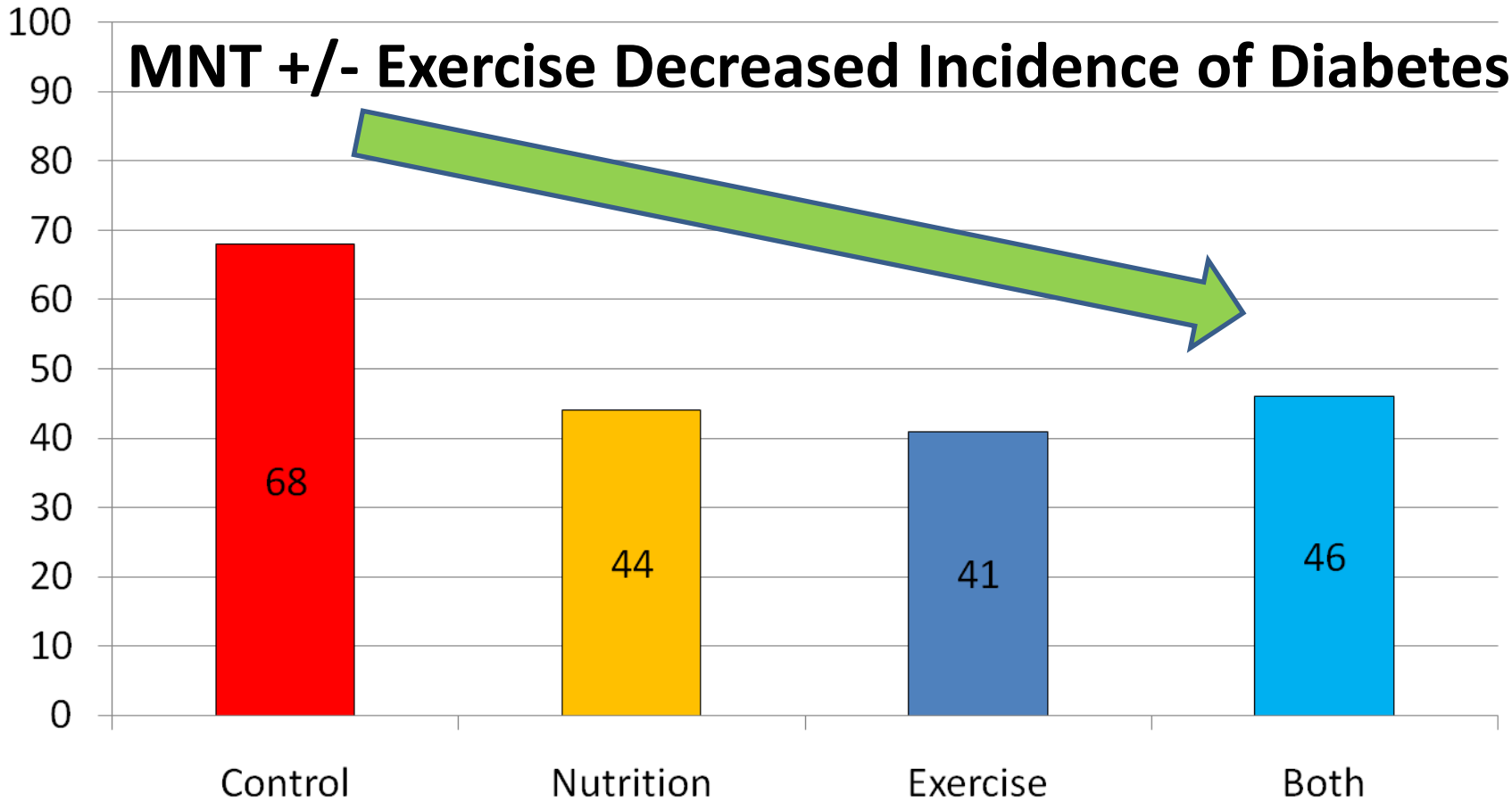


Lifestyle modifications

- Healthy dietary pattern
- Medical nutrition therapy
- Sufficient physical activity

CHN

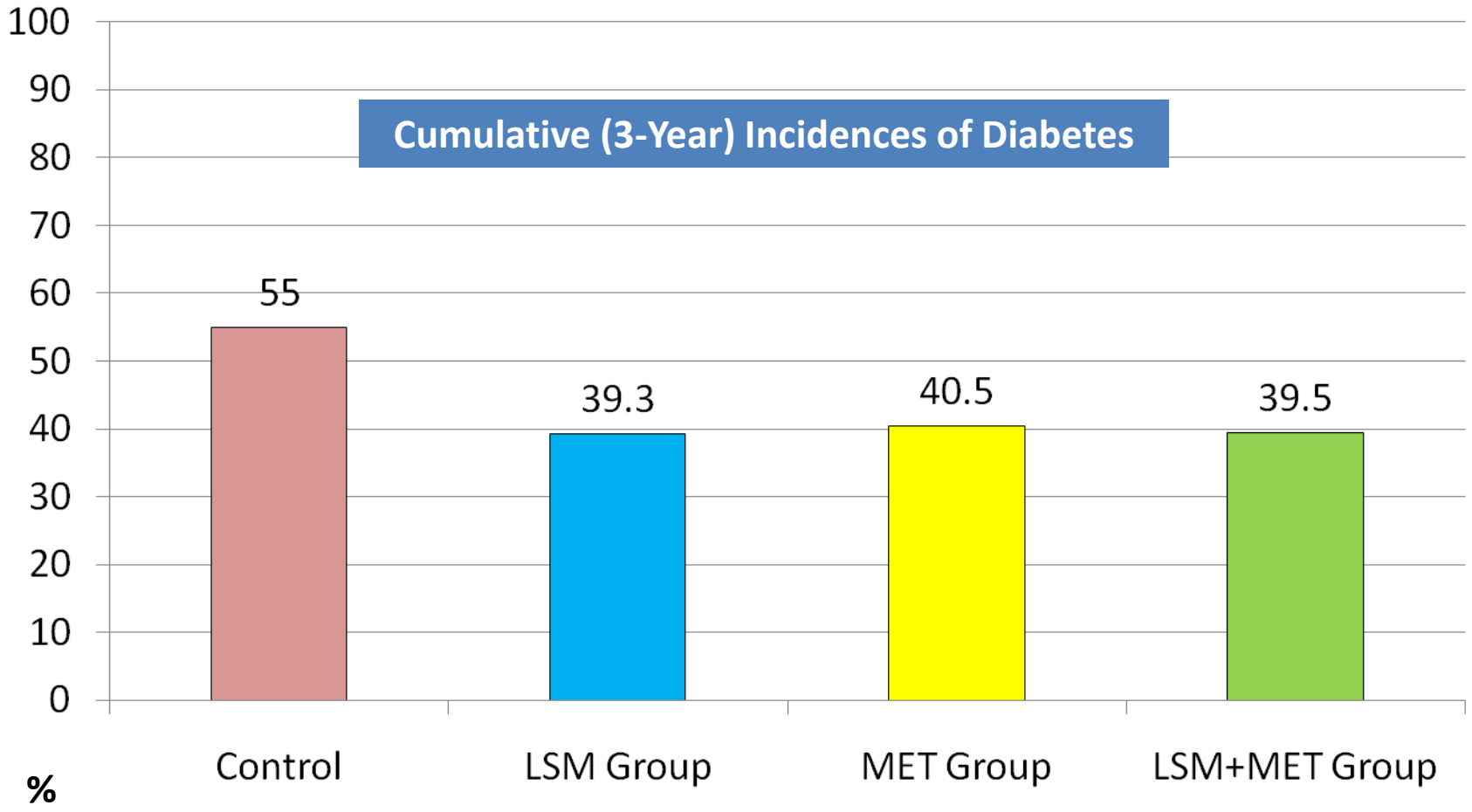
Da Qing Study Results
Lifestyle Impact on 1^0 Prevention



Pan et al. Effects of Diet and Exercise in Preventing NIDDM in People With Impaired Glucose Tolerance: The Da Qing IGT and Diabetes Study. Diabetes Care 1997;20(4):537-544

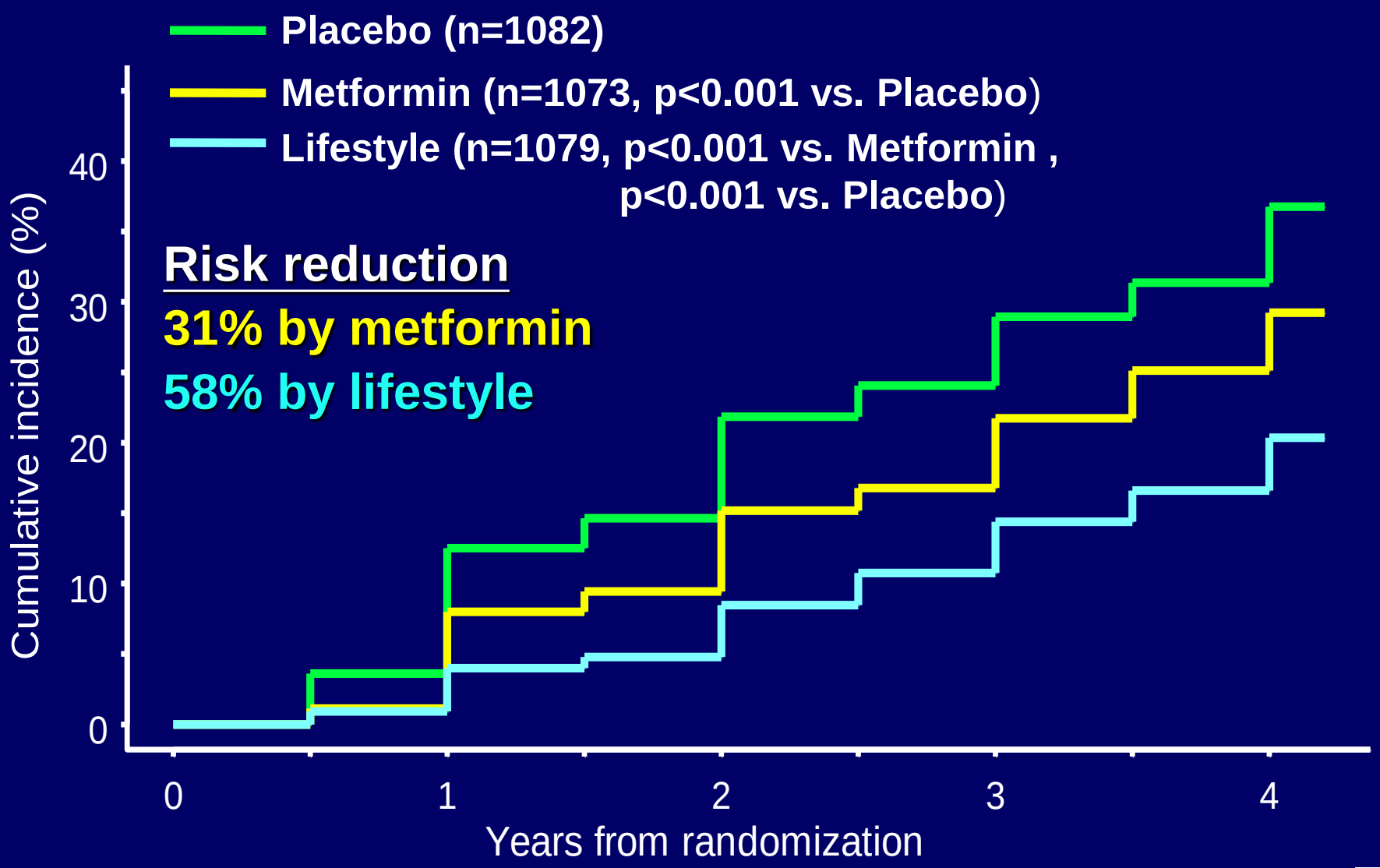
IND

The Indian Diabetes Prevention Programme
Lifestyle Impact on 1^0 Prevention



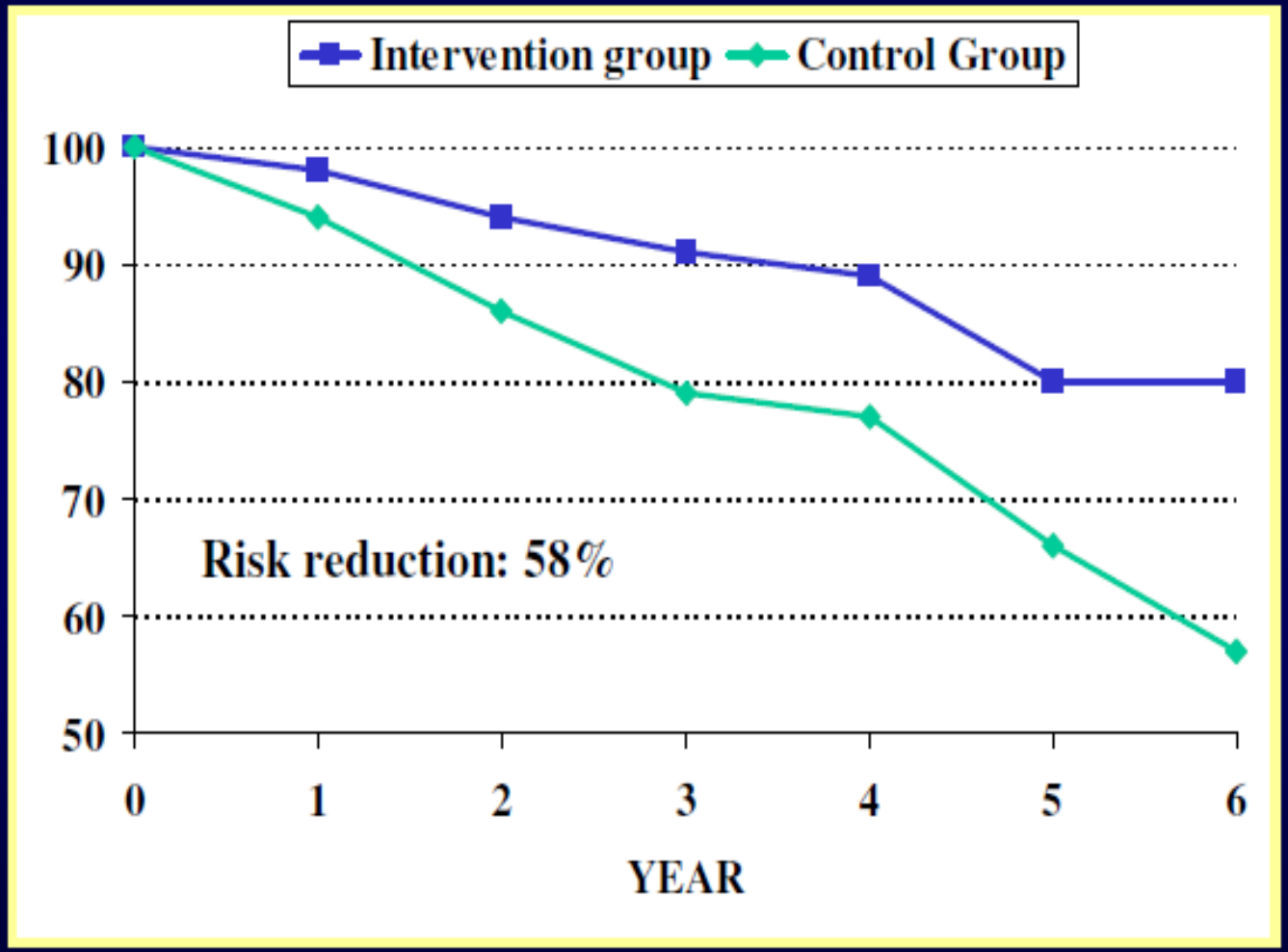
Ramachandran et al. The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). Diabetologia. 2006 Feb;49(2):289-97

Incidence of Diabetes



The DPP Research Group, *NEJM 346*:393-403, 2002

Diabetes in the intervention and control groups during the intervention period (3.2 years)



Tuomilehto et al. New Engl J Med 2001; 344: 1343-1349

Prevention before birth ?

International Congress
Fetal Origins of Adult Disease:

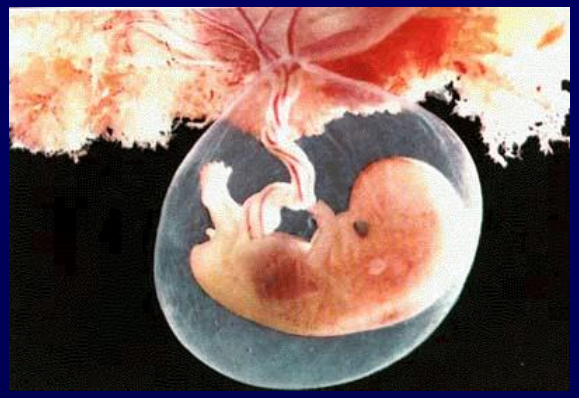
"Barker" hypothesis: programming of function

During early life nutrient exposure sets metabolic behaviour and thereby determines the risk of chronic disease during adult life.



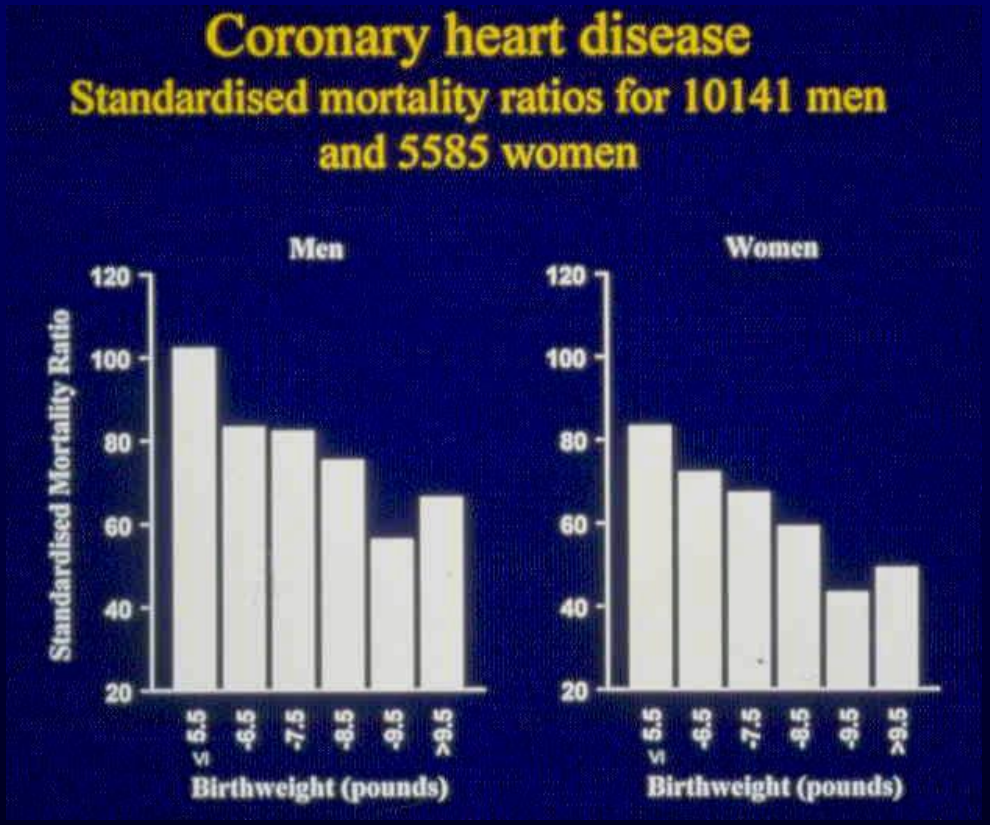


Early Life Origins of Health and Disease



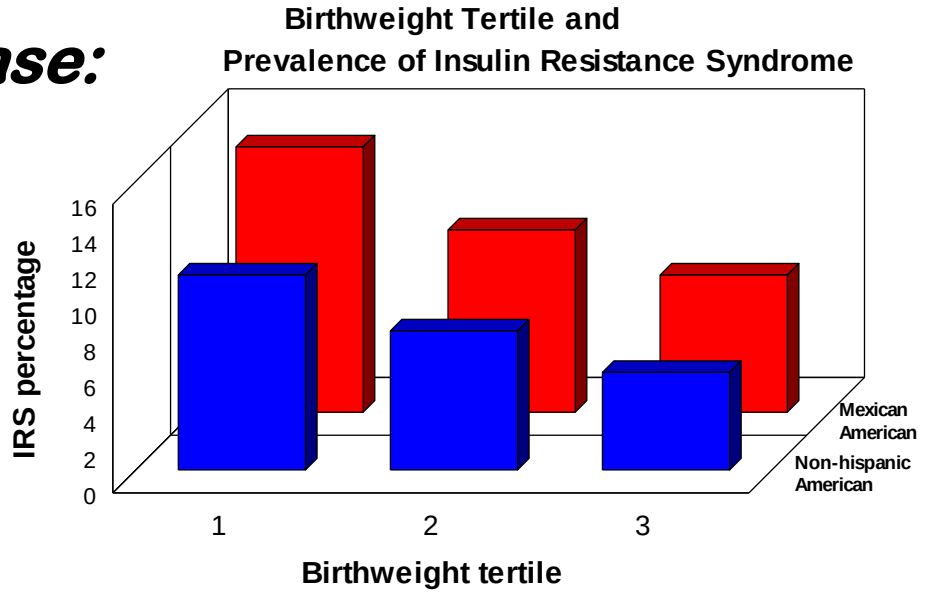
Evidence of a relationship between birth weight and risk of non-communicable disease in adult life:

- Type II diabetes
- Hypertension
- CVD
- Obesity
- Other …….

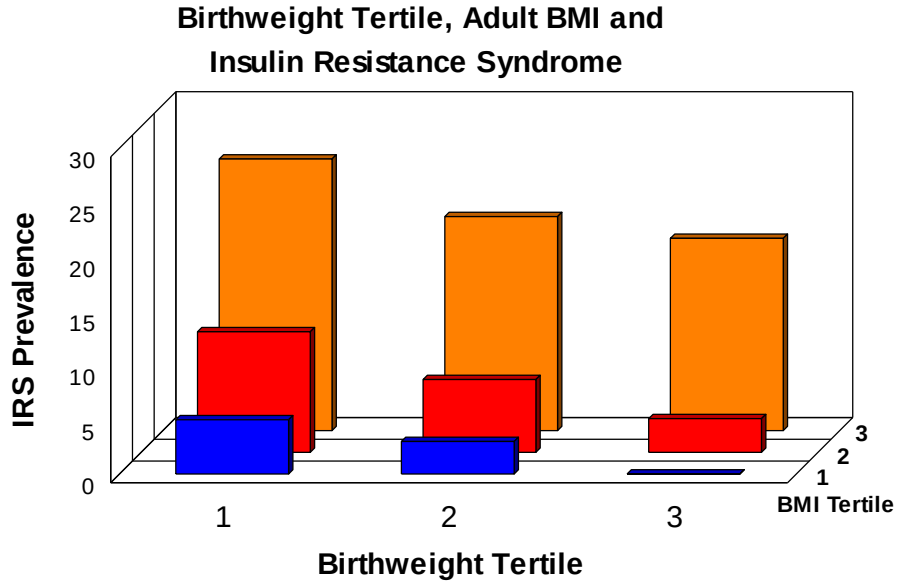


Early Life origins of disease:

Evidence from wide range of international studies



Valdez et al, Diabetologia 1992



Valdez at al, Diabetologia 1994

Metabolic changes already evident in childhood by 5 years of age

Case 6: M/ 59

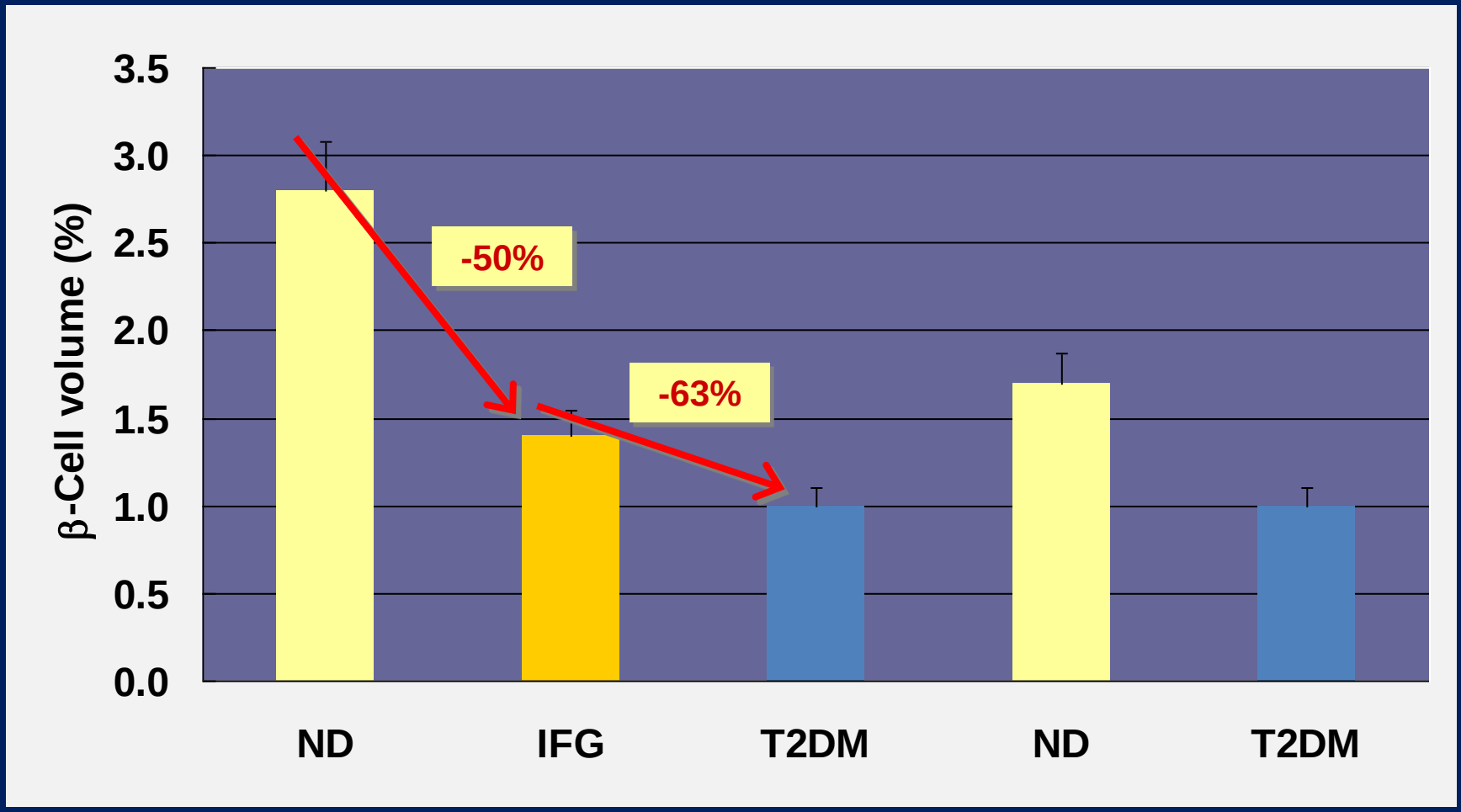
Collect Date :	18/01/11	06/05/11	20/10/11	10/04/12	19/09/12
Collect Time :	10:26	10:27	09:18	09:35	09:33
Arrive Date :	18/01/11	06/05/11	20/10/11	10/04/12	19/09/12
Arrive Time :	10:54	10:55	09:56	10:30	09:52
Request No. :	[redacted]				
Urgency :	--	--	--	--	--
HbA1C	6.8 H	6.6 H	6.1 H	5.9	5.9

Janumet 50/ 500 mg bd , (SFI)

Janumet 50/ 500 mg daily

HOMA	IRI	Beta
2010	1.9	25.45
2012	1.5	40.7

β-Cell mass in Type 2 diabetes

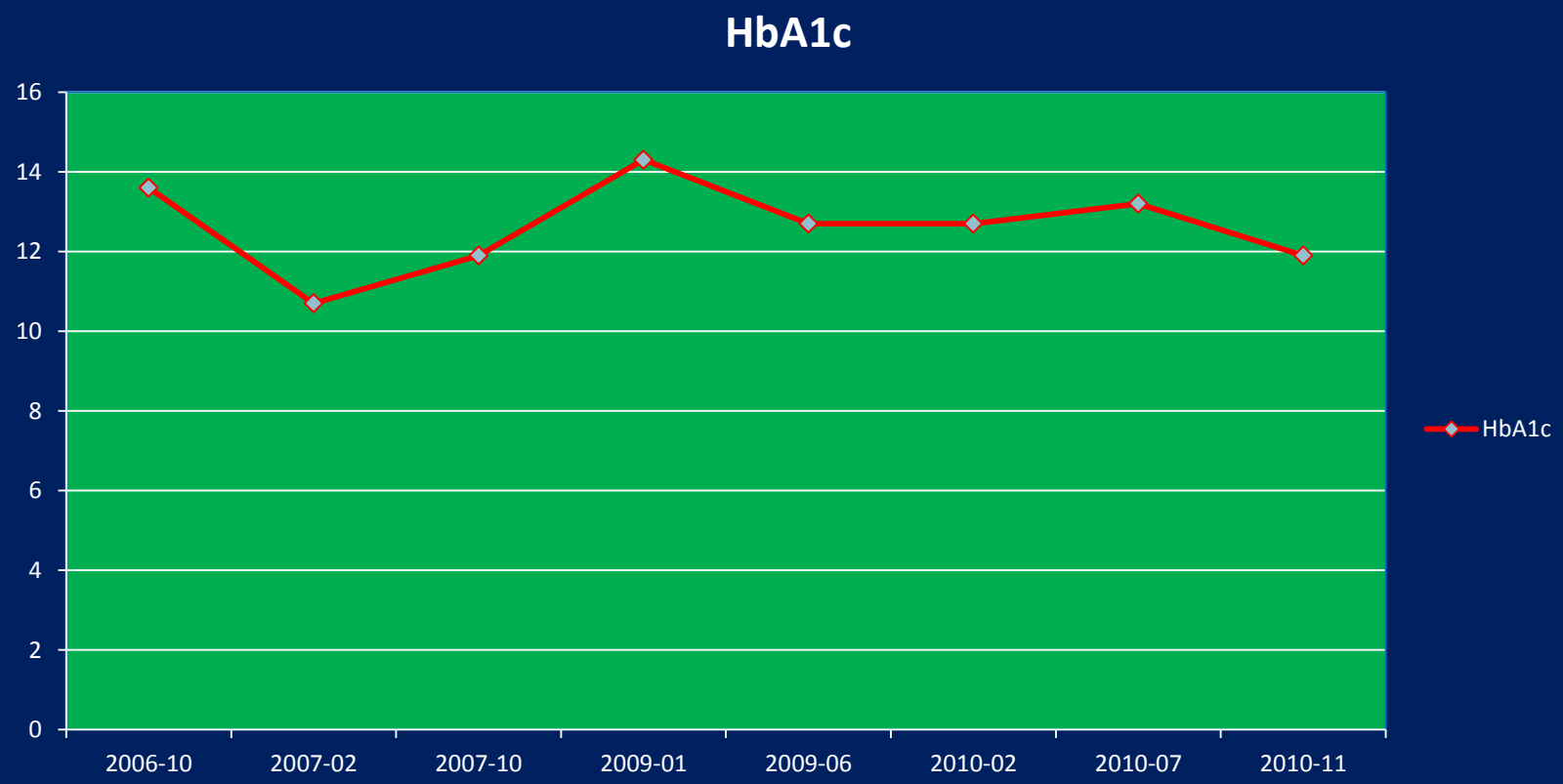


ND=non-diabetic; IFG=impaired fasting glucose; T2DM=Type 2 diabetes mellitus

Butler et al. *Diabetes.* 2003

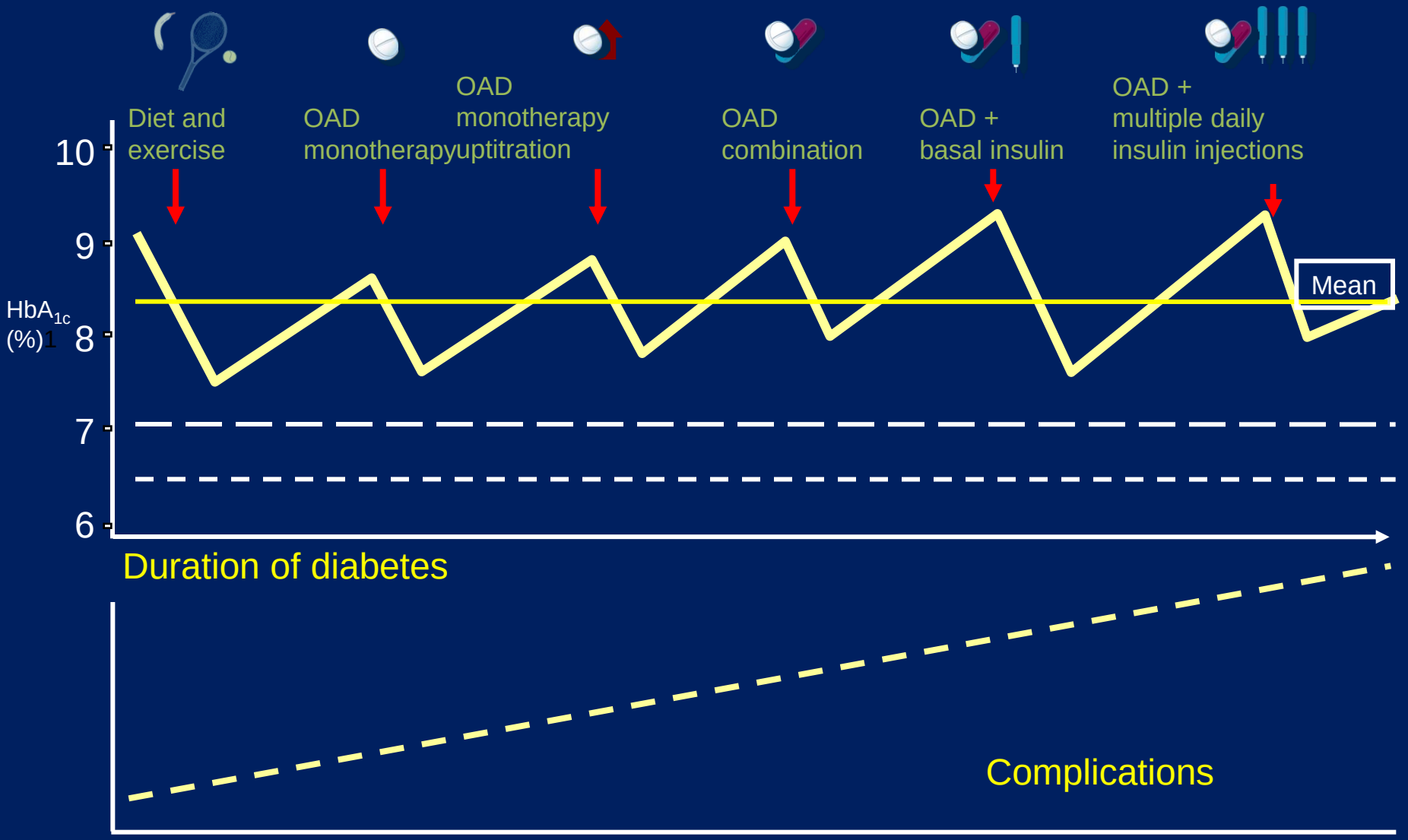
Case 7 : F/52

- 1999 GOPC , on diamicron 160 mg bd
  - metformin 500 mg bd
  - BW 50 kg , BMI 20
- 2006 UCH amaryl 4 mg bd, metformin 1gm bd
  - Refused insulin
- 2009 , Jan lantus, metformin 1 gm bd, amaryl 4 om 2 pm


HbA1c
16
14
12
10
8
6
4
2
0
2006-10
2007-02
2007-10
2009-01
2009-06
2010-02
2010-07
2010-11
HbA1c

Lantus

Stepwise strategy can delay patients achieving goals

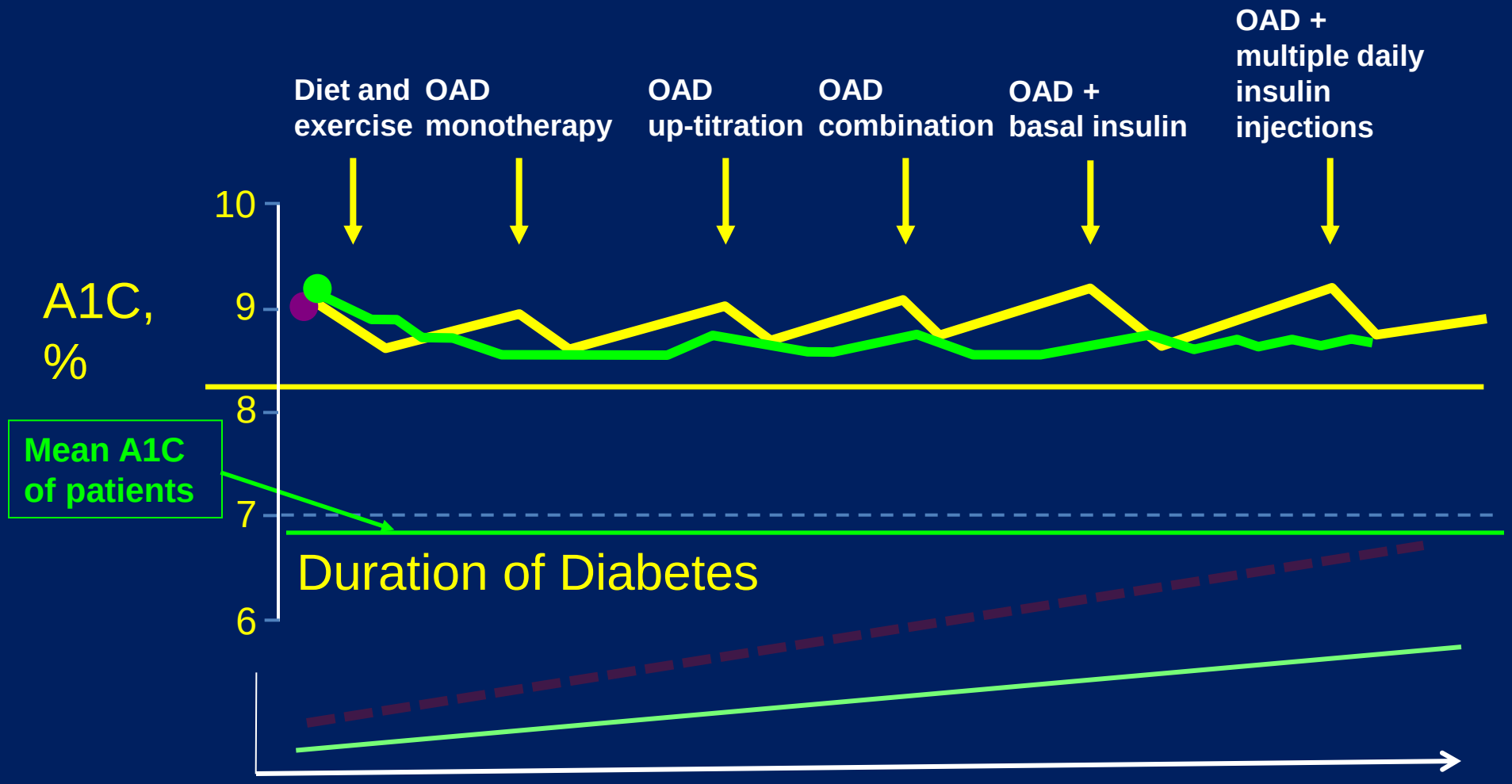


OAD = oral anti-diabetic

1Adapted from Campbell IW. *Br J Cardiol* 2000; 7:625–631.
2Stratton IM, *et al. BMJ* 2000; 321:405–412.

Earlier and More Aggressive Intervention May Improve Treating to Target Compared With Conventional Therapy

Published Conceptual Approach



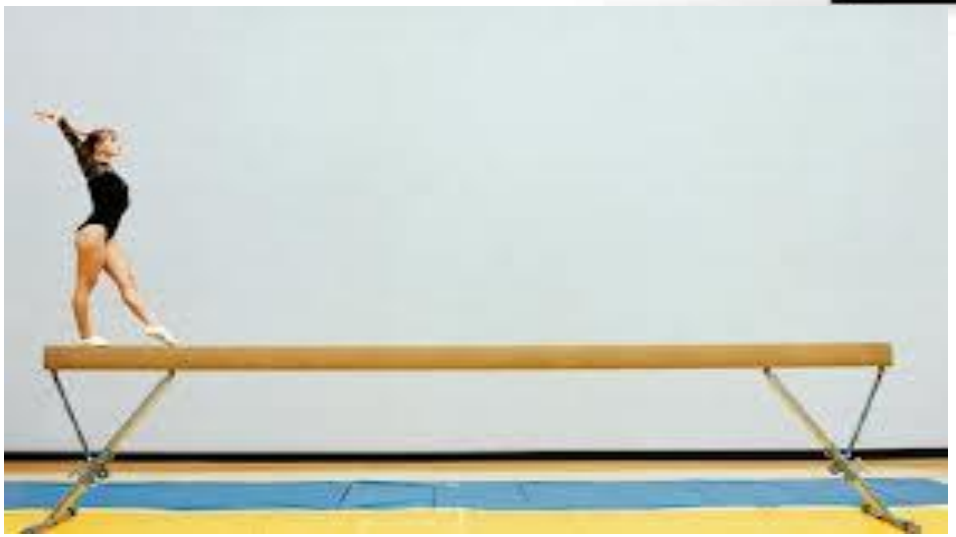
Adapted from Del Prato S et al. *Int J Clin Pract*. 2005;59:1345–1355.

HbA1c Balance



<7%

>7%..8%..9%



Thank you