# Gestione della terapia ipoglicemizzante nel post-operatorio

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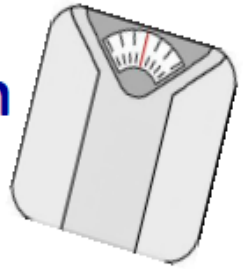
# ANTI-HYPERGLYCEMIC THERAPY

- Therapeutic options: Lifestyle

- Weight optimization



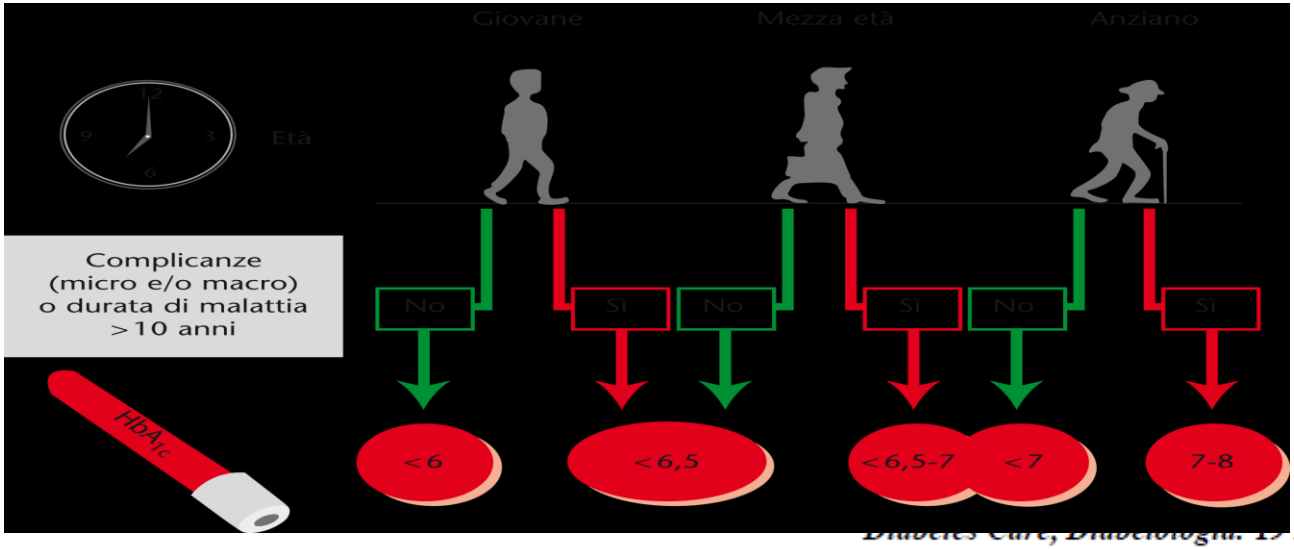
- Healthy diet

- Increased activity level

*Diabetes Care, Diabetologia.* 19 April 2012

# ANTI-HYPERGLYCEMIC THERAPY

- **Glycemic targets**
  - **HbA1c < 7.0%** (mean PG ~150-160 mg/dl [8.3-8.9 mmol/l])
  - Pre-prandial PG <130 mg/dl (7.2 mmol/l)
  - Post-prandial PG <180 mg/dl (10.0 mmol/l)
  - **Individualization** is key:





# ANTI-HYPERGLYCEMIC THERAPY

- **Therapeutic options:**

***Oral agents & non-insulin injectables***

- Metformin
- Sulfonylureas
- Thiazolidinediones
- DPP-4 inhibitors
- GLP-1 receptor agonists
- Meglitinides
- α-glucosidase inhibitors
- Bile acid sequestrants
- Dopamine-2 agonists
- Amylin mimetics

*Diabetes Care, Diabetologia.* 19 April 2012

| Class | Mechanism | Advantages | Disadvantages | Cost |
|---|---|---|---|---|
| **Biguanides** | • Activates AMP-kinase<br>• ↓ Hepatic glucose production | • Extensive experience<br>• No hypoglycemia<br>• Weight neutral<br>• ? ↓ CVD | • Gastrointestinal<br>• Lactic acidosis<br>• B-12 deficiency<br>• Contraindications | Low |
| **SUs / Meglitinides** | • Closes KATP channels<br>• ↑ Insulin secretion | • Extensive experience<br>• ↓ Microvasc. risk | • Hypoglycemia<br>• Weight gain<br>• Low durability<br>• ? Ischemic preconditioning | Low |
| **TZDs** | • PPAR-γ activator<br>• ↑ insulin sensitivity | • No hypoglycemia<br>• Durability<br>• ↓ TGs, ↑ HDL-C<br>• ? ↓ CVD (pio) | • Weight gain<br>• Edema / heart failure<br>• Bone fractures<br>• ? ↑ MI (rosi)<br>• ? Bladder ca (pio) | High |
| **α-GIs** | • Inhibits α–glucosidase<br>• Slows carbohydrate absorption | • No hypoglycemia<br>• Nonsystemic<br>• ↓ Post-prandial glucose<br>• ? ↓ CVD events | • Gastrointestinal<br>• Dosing frequency<br>• Modest ↓ A1c | Mod. |

**Table 1. Properties of anti-hyperglycemic agents** *Diabetes Care, Diabetologia.* 19 April 2012 |

| Class | Mechanism | Advantages | Disadvantages | Cost |
|---|---|---|---|---|
| **DPP-4 inhibitors** | • Inhibits DPP-4<br>• Increases GLP-1, GIP | • No hypoglycemia<br>• Well tolerated | • Modest ↓ A1c<br>• ? Pancreatitis<br>• Urticaria | High |
| **GLP-1 receptor agonists** | • Activates GLP-1 R<br>• ↑ Insulin, ↓ glucagon<br>• ↓ gastric emptying<br>• ↑ satiety | • Weight loss<br>• No hypoglycemia<br>• ? Beta cell mass<br>• ? CV protection | • GI<br>• ? Pancreatitis<br>• Medullary ca<br>• Injectable | High |
| **Amylin mimetics** | • Activates amylin receptor<br>• ↓ glucagon<br>• ↓ gastric emptying<br>• ↑ satiety | • Weight loss<br>• ↓ PPG | • GI<br>• Modest ↓ A1c<br>• Injectable<br>• Hypo w/ insulin<br>• Dosing frequency | High |
| **Bile acid sequestrants** | • Bind bile acids<br>• ↓ Hepatic glucose production | • No hypoglycemia<br>• Nonsystemic<br>• ↓ Post-prandial glucose<br>• ↓ CVD events | • GI<br>• Modest ↓ A1c<br>• Dosing frequency | High |
| **Dopamine-2 agonists** | • Activates DA receptor<br>• Modulates hypothalamic control of metabolism<br>• ↑ insulin sensitivity | • No hypoglyemia<br>• ? ↓ CVD events | • Modest ↓ A1c<br>• Dizziness/syncope<br>• Nausea<br>• Fatigue | High |

**Table 1. Properties of anti-hyperglycemic agents** *Diabetes Care, Diabetologia.* 19 April 2012

| Class | Mechanism | Advantages | Disadvantages | Cost |
|---|---|---|---|---|
| **Insulin** | • Activates insulin receptor<br>• ↑ peripheral glucose uptake | • Universally effective<br>• Unlimited efficacy<br>• ↓ Microvascular risk | • Hypoglycemia<br>• Weight gain<br>• ? Mitogenicity<br>• Injectable<br>• Training requirements<br>• "Stigma" | Variable |

**Table 1. Properties of anti-hyperglycemic agents** *Diabetes Care, Diabetologia.* 19 April 2012

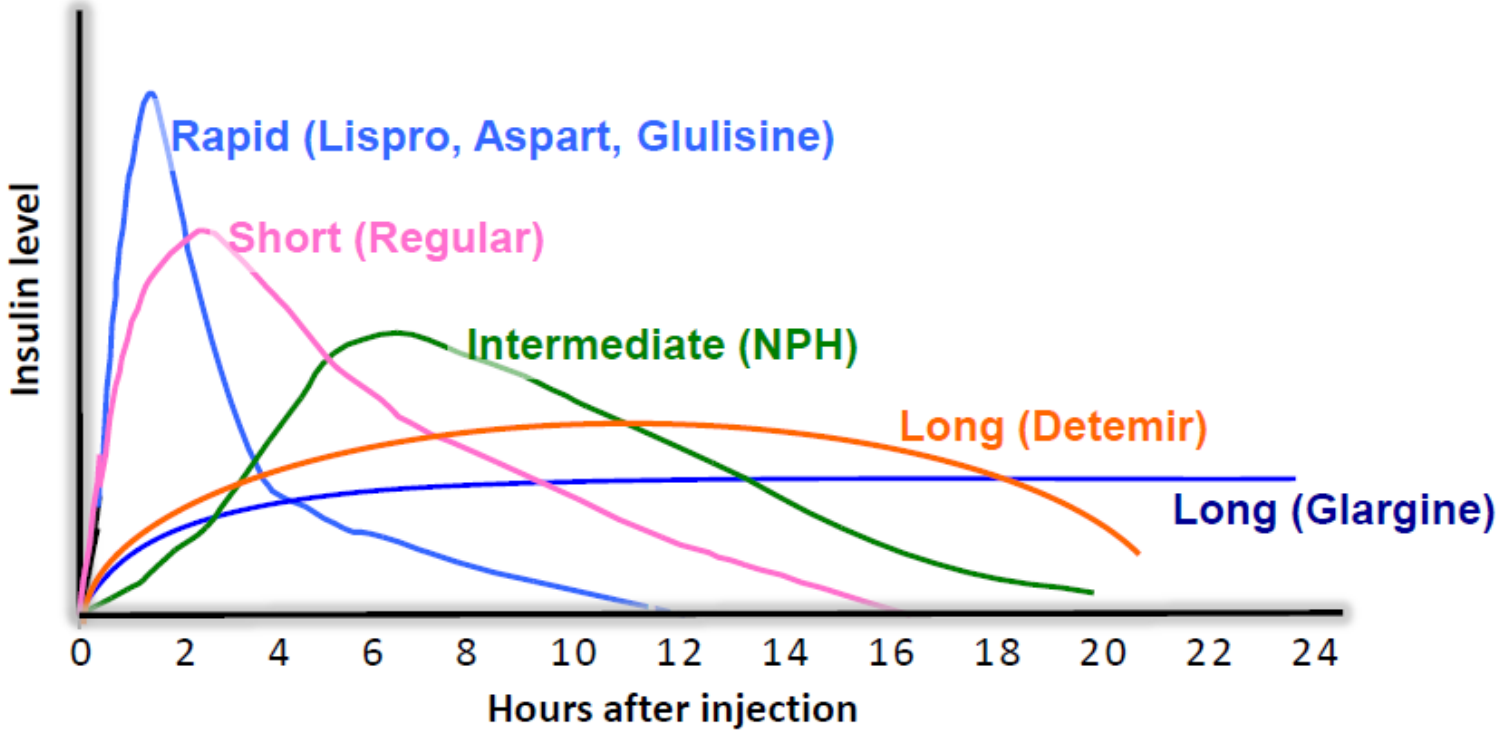
# ANTI-HYPERGLYCEMIC THERAPY

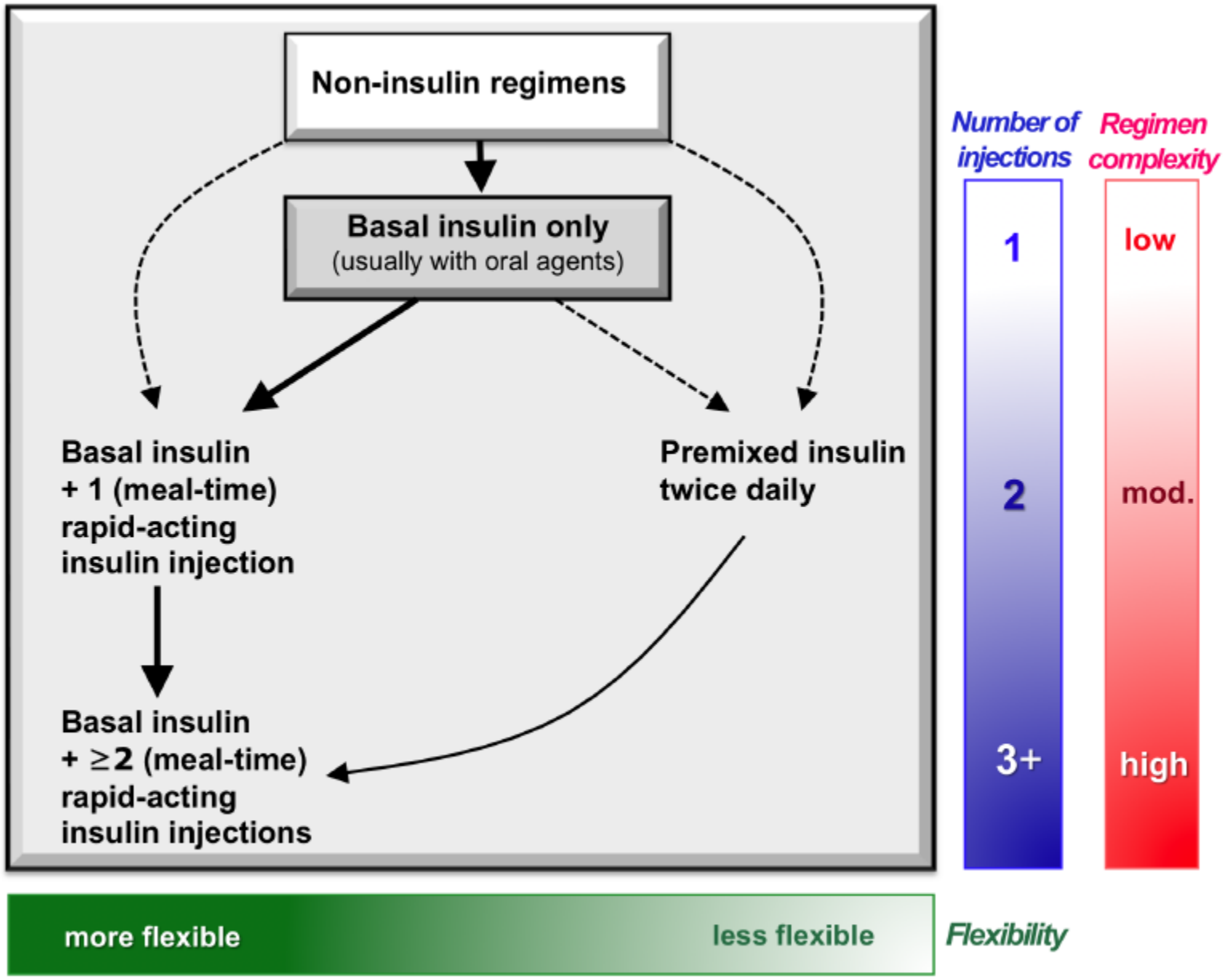
- Therapeutic options: Insulin
  - Neutral protamine Hagedorn (NPH)
  - Regular
  - Basal analogues (glargine, detemir)
  - Rapid analogues (lispro, aspart, glulisine)
  - Pre-mixed varieties

*Diabetes Care, Diabetologia.* 19 April 2012

# ANTI-HYPERGLYCEMIC THERAPY

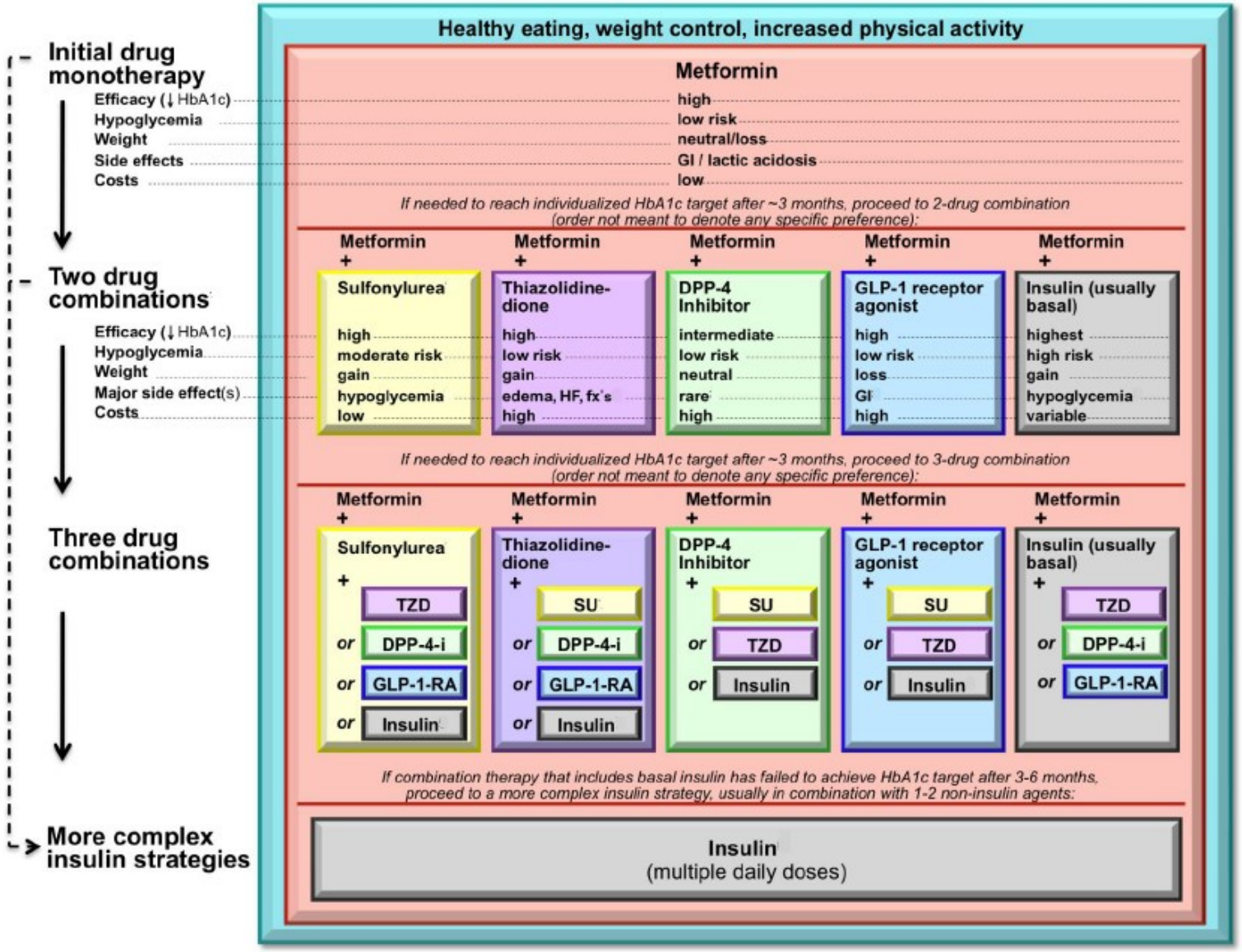
- Therapeutic options: Insulin






# Sequential Insulin Strategies in T2DM

*Diabetes Care, Diabetologia.* 19 April 2012

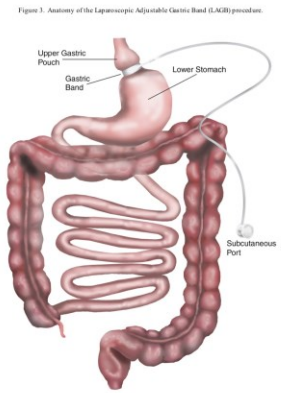



# T2DM Anti-hyperglycemic Therapy: General Recommendations

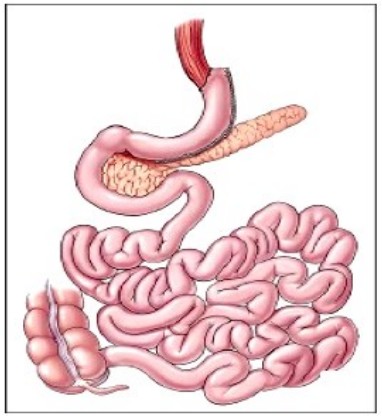
*Diabetes Care, Diabetologia.* 19 April 2012

# Tecniche chirurgiche bariatriche

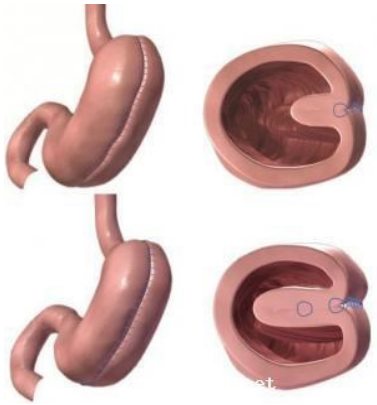
## Restrittive




Bendaggio Gastrico (AGB)

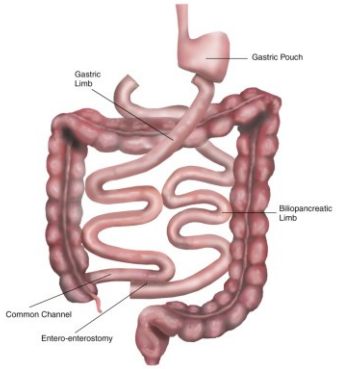


Sleeve Gastrectomy (SG)

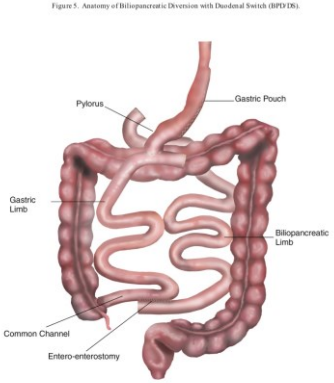


Plicatura Gastrica

## Malassorbitive

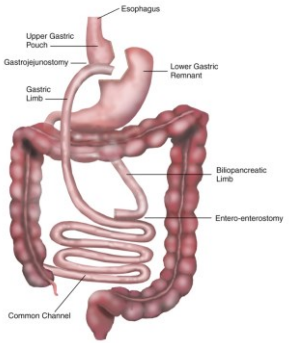



Diversione Bilio-Pancreatica (DBP)




Diversione Bilio-Pancreatica con switch duodenale (DBP+DS)

## Miste




By-Pass Gastrico Roux-en-Y (GBP)

# Meccanismi ipotizzati

- Alterazioni anatomomiche e funzionali indotte dall'intervento:
  - Alimenti indigeriti che dallo stomaco passano direttamente alle porzioni distali del tenue → aumento di GLP-1, PYY e ossintomodulina
  - Ridotta secrezione di GIP e Ghrelina (ruolo ancora non chiarito)
- Rapido bilancio calorico negativo (giorni)
- Effetto insulino-sensibilizzante del calo ponderale (long term)

OBES SURG (2009) 19:1646–1656
DOI 10.1007/s11695-009-9960-1

CLINICAL RESEARCH

# Prompt Reduction in Use of Medications for Comorbid Conditions After Bariatric Surgery

Jodi B. Segal · Jeanne M. Clark · Andrew D. Shore · Francesca Dominici · Thomas Magnuson · Thomas M. Richards · Jonathan P. Weiner · Eric B. Bass · Albert W. Wu · Martin A. Makary

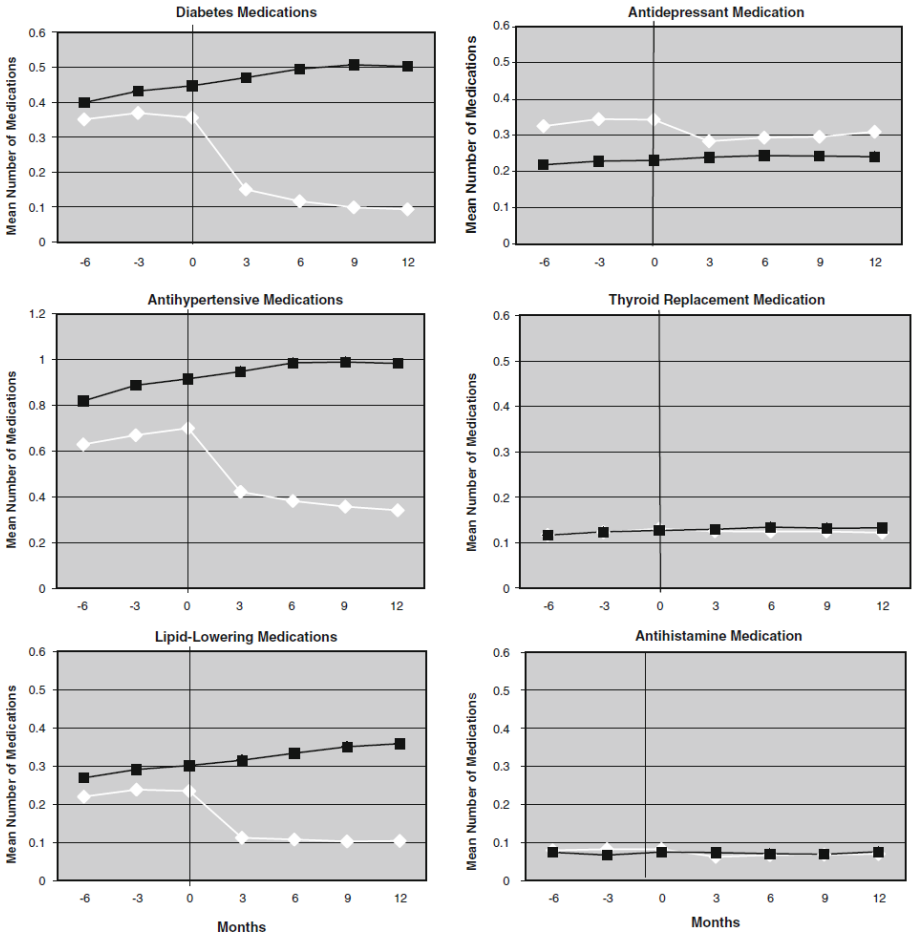



Fig. 1 *White diamonds* = surgical group, *black squares* = nonsurgical group of individuals predicted to be obese

# Medication Utilization and Annual Health Care Costs in Patients With Type 2 Diabetes Mellitus Before and After Bariatric Surgery

*Martin A. Makary, MD, MPH; Jeanne M. Clarke, MD; Andrew D. Shore, PhD; Thomas H. Magnuson, MD; Thomas Richards, MS; Eric B. Bass, MD; Francesca Dominici, PhD; Jonathan P. Weiner, DrPH; Albert W. Wu, MD, MPH; Jodi B. Segal, MD, MPH*

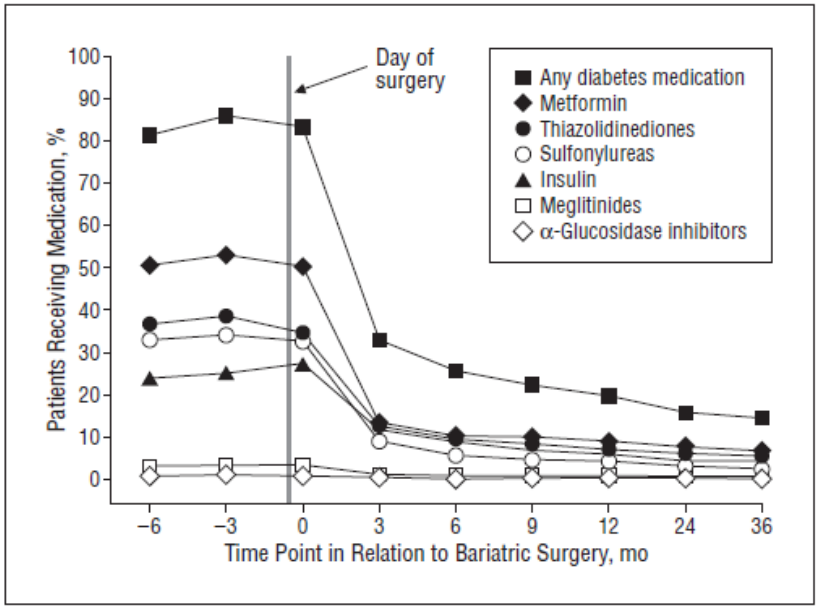
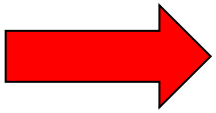



**Figure.** Use of diabetes medication before and after bariatric surgery.

# Terapia ipoglicemizzante dopo chirurgia bariatrica

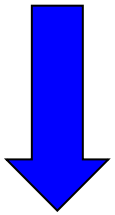
La gestione della terapia ipoglicemizzante dei pazienti affetti da diabete melllito dopo chirurgia bariatrica varia enormemente nei diversi centri.

Non esistono degli algoritmi di trattamento universalmente approvati e accettati….

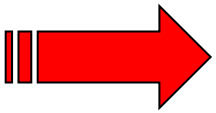


**LE NOSTRE "LINEE GUIDA" INTERNE**

# METFORMINA



**Reintrodurre alla dimissione la dose precedentemente assunta**



**Solo con GFR>50 ml (min/1.73 m2)**

Clinical Care/Education/Nutrition/Psychosocial Research
ORIGINAL ARTICLE

# Effect of Gastric Bypass Surgery on the Absorption and Bioavailability of Metformin

Raj S. Padwal, md, msc[1]
Raniah Q. Gabr, msc[2]
Arya M. Sharma, md, phd[1]
Lee-Ann Langkaas, lpn[3]
Dan W. Birch, md[4]
Shahzeer Karmali, md[4]
Dion R. Brocks, phd[2]

Aumento dell'assorbimento dopo RYGB :

•ritardando lo svuotamento gastrico per i cibi solidi aumenta l'esposizione del farmaco alla mucosa del piccolo intestino;
• marcata riduzione della produzione dell'acido gastrico (ambiente alcalino aumenta assorbimento di farmaci acidi come la metformina)
•Up-regolazione di OCT (organic cation trasnporters)
•adattamento del piccolo intestino che porta a iperplasia villosa

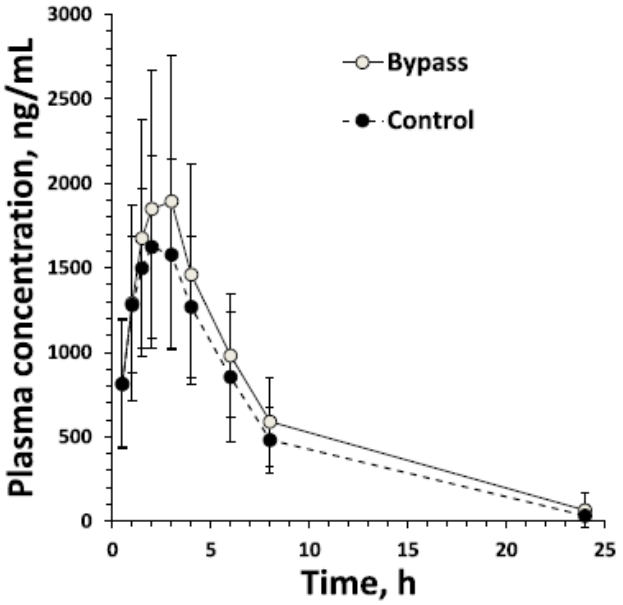
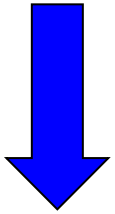


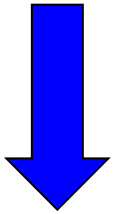

**Figure 1**—*Plasma concentration time curve.*

# SULFANILUREE



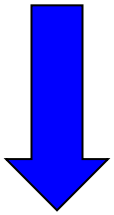
**Sospensione della terapia!!!!!!!!**

# GLITAZONI



**Reitrodurre dal giorno successivo alla dose precedentemente assunta**

# ANALOGHI GLP-1
# INIBITORI DDP-IV



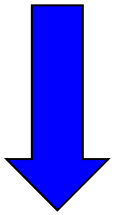
**Reintrodurre con la ripresa dell'alimentazione post-intervento**

**(solitamente il giorno successivo)**

# TERAPIA INSULINICA 1

## INSULINA BASALE

(Glargine, Detemir)



da non sospendere mai
di solito dose ridotta del 50% rispetto al pre-intervento.
Correggere secondo schemi di titolazione

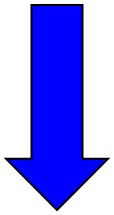
# Basalizzazione

| | |
|---|---|
| **Dose iniziale** | • 40-50% del fabbisogno insulinico giornaliero calcolato<br>• 0,2-0,4 U/Kg/die<br>• 10 U/die (dose prudenziale, pazienti anziani, fragili o in pazienti in terapia con ipoglicemizzante orale) |
| **Titolazione** | • Dose corretta se la glicemia a digiuno è più o meno uguale alla glicemia bedtime (ore 22)<br>• +/– 2 U ogni 2-3 giorni se glicemia a digiuno >150/<100 mg/dl |
| **Gestione** | Non sospendere l'insulina basale se la glicemia bedtime è bassa:<br>1. se glicemia bedtime > 130 → somministra basale prescritta<br>2. se glicemia bedtime 100-130 → somministra spuntino + basale prescritta<br>3. se glicemia bedtime <100 → spuntino e/o eventuale riduzione basale (circa 2 unità) (controllo h 02:00)<br>4. se glicemia bedtime <70 → trattamento ipoglicemia "bedtime" ed eventuale riduzione basale (controllo h 02:00) |

# TERAPIA INSULINICA 2

**insulina rapida umana**
(Actrapid/Humulin R)

**analogo ultrarapido**
(Humalog-Lispro; Apidra-Glulisina; Novorapid-Aspart)



Reintrodurre in terapia se glicemie preprandiali >200 mg/dL generalmente a una dose ridotta del 50% rispetto alla dose pre-intervento.
Adeguare secondo schemi di correzione

# Tabelle di correzione della dose di insulina prandiale secondo la glicemia preprandiale

| □ *algoritmo basso dosaggio* | | □ *algoritmo medio dosaggio* | | □ *algoritmo alto dosaggio* | | □ *algoritmo personalizzato* | |
|---|---|---|---|---|---|---|---|
| *≤50 U insulina/die* | | *50-90 U insulina/die* | | *>90 U insulina/die* | | | |
| **Glicemia pre-prandiale** | **Unità da aggiungere** | **Glicemia pre-prandiale** | **Unità da aggiungere** | **Glicemia pre-prandiale** | **Unità da aggiungere** | **Glicemia pre-prandiale** | **Unità da aggiungere** |
| **70-90** | **- 1** | **70-90** | **- 2** | **70-90** | **- 2** | **70 - _____** | **- _____** |
| **150-199** | **1** | **150-199** | **1** | **150-199** | **2** | **150-199** | |
| **200-249** | **2** | **200-249** | **3** | **200-249** | **4** | **200-249** | |
| **250-299** | **3** | **250-299** | **5** | **250-299** | **7** | **250-299** | |
| **300-349** | **4** | **300-349** | **7** | **300-349** | **10** | **300-349** | |
| **>349** | **5** | **>349** | **8** | **>349** | **12** | **>349** | |

Sig……..

**Tabelle di correzione della dose di insulina prandiale secondo la glicemia pre-prandiale**

| *algoritmo medio dosaggio* | |
|---|---|
| *50-90 U insulina/die* | |
| **Glicemia pre-prandiale** | **Unità da aggiungere** |
| **70-90** | **- 2** |
| **150-199** | **1** |
| **200-249** | **3** |
| **250-299** | **5** |
| **300-349** | **7** |
| **>349** | **8** |

**Tabella per la basalizzazione (LANTUS)**

| | |
|---|---|
| **Titolazione** | •Dose corretta se la glicemia a digiuno è più o meno uguale alla glicemia bedtime<br>•+/– 2 U ogni 2-3 giorni se glicemia a digiuno >150/<100 mg/dl |
| **Gestione** | Non sospendere l'insulina basale se la glicemia bedtime è bassa:<br>1.se glicemia bedtime >130 → somministra basale prescritta<br>2.se glicemia bedtime 100-130 → somministra spuntino + basale prescritta<br>3.se glicemia bedtime <100 → spuntino e/o eventuale riduzione basale (circa 2 unità) (controllo h 02:00)<br>4.se glicemia bedtime <70 → trattamento ipoglicemia "bedtime" ed eventuale riduzione basale (controllo h 02:00) |

**Digiuno per esami**

| | |
|---|---|
| **La sera precedente** | se Lantus → mantieni la dose. Valuta riduzione della dose se glicemie <70 mg/dl nelle 24 ore precedenti il giorno dell'esame |
| **Il giorno del digiuno** | correggere le iperglicemie con analogo rapido (Humalog) secondo algoritmo |

**TRATTAMENTO DELL'IPOGLICEMIA (<70 mg/dl)**

**Somministrare 15 grammi di zucchero pari a:**
4 zollette di zucchero o tre bustine di zucchero o ½ succo di frutta zuccherato (100 ml)
150 ml (1 bicchiere) di coca cola, aranciata o altra bibita zuccherata

**Ricontrollare la glicemia dopo 15 minuti.** Ripetere il trattamento fino a glicemia >70 mg/dl.
**Per glicemia <40 mg/dl e ipoglicemie "bedtime"** far assumere anche 15-20 gr di carboidrati a più lento assorbimento: 25-30 gr di pane, crackers, fette biscottate oppure 300 ml di latte.

OBES SURG (2012) 22:90–96
DOI 10.1007/s11695-011-0543-6

CLINICAL RESEARCH

# Can a Protocol for Glycaemic Control Improve Type 2 Diabetes Outcomes After Gastric Bypass?

Wiebke K. Fenske · Dimitri J. Pournaras · Erlend T. Aasheim · Alexander D. Miras · Nicola Scopinaro · Samantha Scholtz · Carel W. le Roux

**Table 1** Daily insulin titration schedule in insulin-requiring type 2 diabetes after gastric bypass surgery

| Start with dose equivalent to the insulin required in the previous 24 h prior to discharge and adjust it daily | |
|---|---|
| Self-monitored fasting glucose values | Adjustment of insulin dosage (IU/day) |
| ≥12 mmol/L (220 mg/dL) | 6 ↑ |
| >10 mmol/L (180 mg/dL) | 4 ↑ |
| >8 mmol/L (144 mg/dL) | 2 ↑ |
| ≥7 mmol/L (120 mg/dL) | 1 ↑ |
| 5.5–6.9 mmol/L (100–120 mg/dL) | No change in insulin dosage |
| <5.5 mmol/L (100 mg/dL) | 2 ↓ |
| <4.5 mmol/L (81 mg/dL) | 4 ↓ |
| <4.0 mmol/L (72 mg/dL) | 6 ↓ |

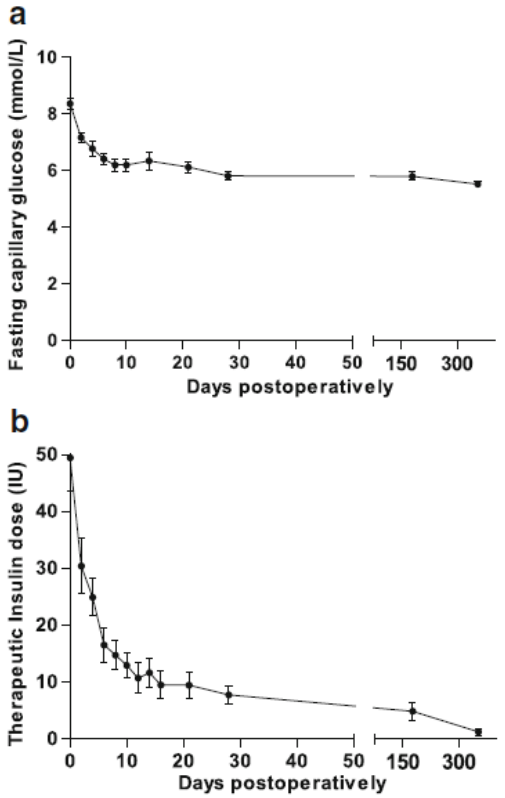



**Fig. 1** Fasting plasma glucose levels (a) and therapeutic insulin doses in units per day (b) during protocol-driven insulin management in 50 patients over a period of 379±4.5 days. Data are presented as mean ± SEM of fasting capillary concentration and daily insulin dose

# Remissione del diabete

## COMPLETA

- HbA1c < 6%
- Glicemia a digiuno < 5.6 mmoL/L (100 mg/dL)

per almeno un anno senza assunzione di alcuna terapia ipoglicemizzzante

## PARZIALE

- HbA1c < 6.5%
- Glicemia a digiuno 5.6-6.9 mmoL/L (100-125 mg/dL)

per almeno un anno senza assunzione di alcuna terapia ipoglicemizzzante

Diabetes Care 2009; 32:2133-5

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Bariatric Surgery versus Conventional Medical Therapy for Type 2 Diabetes

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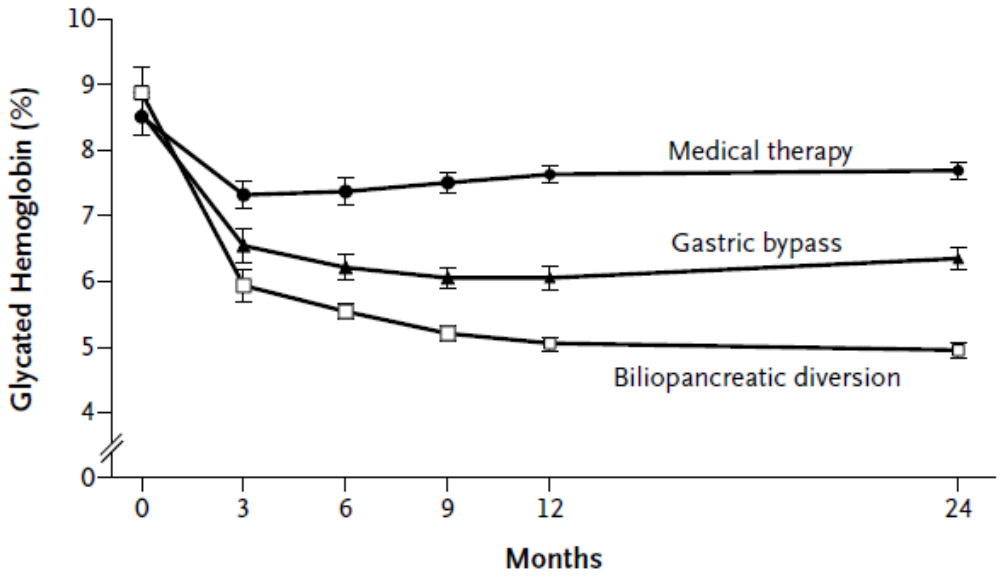


**Figure 2. Glycated Hemoglobin Levels during 2 Years of Follow-up.**

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**Table 2. Average Absolute Values and Percentage Changes at 2 Years.***

| Variable | Medical Therapy (N=18) | Biliopancreatic Diversion (N=19) | Gastric Bypass (N=19) | P Value† | | | |
|---|---|---|---|---|---|---|---|
| | | | | Overall | Biliopancreatic Diversion vs. Medical Therapy | Gastric Bypass vs. Medical Therapy | Gastric Bypass vs. Biliopancreatic Diversion |
| Glucose (mmol/liter) | 7.83±1.66 | 3.89±0.67 | 5.69±3.07 | <0.001 | <0.001 | 0.005 | 0.03 |
| Change from baseline (%) | −14.37±11.93 | −56.23±10.01 | −37.81±33.75 | | | | |
| Glycated hemoglobin (%) | 7.69±0.57 | 4.95±0.49 | 6.35±1.42 | <0.001 | <0.001 | 0.003 | 0.001 |
| Change from baseline (%) | −8.39±9.93 | −43.01±9.64 | −25.18±20.89 | | | | |
| Cholesterol (mmol/liter) | | | | | | | |
| Total | 4.91±0.87 | 2.77±0.81 | 4.27±0.77 | <0.001 | <0.001 | 0.31 | <0.001 |
| Change from baseline (%) | −16.82±11.60 | −49.25±11.52 | −6.83±27.03 | | | | |
| High-density lipoprotein | 1.05±0.20 | 1.08±0.16 | 1.47±0.31 | <0.001 | 0.61 | <0.001 | 0.01 |
| Change from baseline (%) | 6.03±6.25 | 12.98±20.66 | 29.66±18.21 | | | | |
| Low-density lipoprotein | 2.98±0.83 | 1.25±0.71 | 2.20±0.72 | <0.001 | <0.001 | 1.00 | <0.001 |
| Change from baseline (%) | −20.31±15.24 | −64.63±15.93 | −17.21±36.21 | | | | |
| Triglycerides (mmol/liter) | 1.91±0.39 | 0.96±0.32 | 1.15±0.48 | <0.001 | <0.001 | 1.00 | 0.001 |
| Change from baseline (%) | −18.28±7.84 | −56.79±16.70 | −21.17±41.23 | | | | |
| Blood pressure (mm Hg) | | | | | | | |
| Systolic | 134.44±10.97 | 129.21±8.04 | 132.11±10.45 | 0.32 | 1.00 | 1.00 | 0.40 |
| Change from baseline (%) | −11.15±12.71 | −14.55±12.63 | −9.02±7.51 | | | | |
| Diastolic | 87.28±9.32 | 82.37±4.21 | 84.21±4.79 | 0.13 | 0.23 | 1.00 | 0.24 |
| Change from baseline (%) | −7.14±11.51 | −13.06±8.97 | −7.30±9.42 | | | | |
| Weight (kg) | 128.06±19.77 | 89.53±17.84 | 84.29±13.35 | <0.001 | <0.001 | <0.001 | 1.00 |
| Change from baseline (%) | −4.74±6.37 | −33.82±10.17 | −33.31±7.88 | | | | |
| Excess weight lost (%) | 9.29±12.94 | 69.36±17.60 | 68.08±12.70 | <0.001 | <0.001 | <0.001 | 1.00 |
| Body-mass index | 43.07±6.44 | 29.19±4.90 | 29.31±2.64 | <0.001 | <0.001 | <0.001 | 1.00 |
| Change from baseline (%) | −4.73±6.37 | −33.82±10.17 | −33.31±7.88 | | | | |
| Waist (cm) | 116.33±12.14 | 103.53±16.94 | 98.58±13.06 | <0.001 | <0.001 | <0.001 | 1.00 |
| Change from baseline (%) | −7.69±7.80 | −20.70±8.34 | −19.91±8.44 | | | | |

* Plus–minus values are means ±SD.

† P values for the overall comparisons were calculated with the use of analysis of variance. P values for the comparisons between each of the two surgical procedures and medical therapy and for the comparison between the two types of surgery were calculated with the use of the Bonferroni method in post hoc analyses.

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# Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes

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**Table 2. Primary and Secondary End Points at 12 Months.***

| End Point | Medical Therapy (N=41) | Gastric Bypass (N=50) | Sleeve Gastrectomy (N=49) | P Value | | |
|---|---|---|---|---|---|---|
| | | | | Gastric Bypass vs. Medical Therapy | Sleeve Gastrectomy vs. Medical Therapy | Gastric Bypass vs. Sleeve Gastrectomy |
| Glycated hemoglobin | | | | | | |
| ≤6% — no. (%) | 5 (12) | 21 (42) | 18 (37) | 0.002 | 0.008 | 0.59 |
| ≤6% with no diabetes medications — no. (%) | 0 | 21 (42) | 13 (27) | <0.001 | <0.001 | 0.10 |
| Baseline — % | 8.9±1.4 | 9.3±1.4 | 9.5±1.7 | | | |
| Month 12 — % | 7.5±1.8 | 6.4±0.9 | 6.6±1.0 | <0.001 | 0.003 | 0.23 |
| Change from baseline — percentage points | −1.4±1.5 | −2.9±1.6 | −2.9±1.8 | <0.001 | <0.001 | 0.85 |
| Body weight — kg | | | | | | |
| Baseline | 104.4±14.5 | 106.7±14.8 | 100.6±16.5 | | | |
| Month 12 | 99.0±16.4 | 77.3±13.0 | 75.5±12.9 | <0.001 | <0.001 | 0.50 |
| Change from baseline | −5.4±8.0 | −29.4±8.9 | −25.1±8.5 | <0.001 | <0.001 | 0.02 |
| High-density lipoprotein cholesterol | | | | | | |
| Percent change from baseline | 11.3±25.7 | 28.5±22.7 | 28.4±21.9 | 0.001 | 0.001 | 0.98 |
| Triglycerides | | | | | | |
| Median percent change from baseline (interquartile range) | −14 (−40 to 3) | −44 (−65 to −16) | −42 (−56 to 0) | 0.002 | 0.08 | 0.17 |
| High-sensitivity C-reactive protein | | | | | | |
| Median percent change from baseline (interquartile range) | −33.2 (−71 to 0) | −84 (−91 to −59) | −80 (−90 to −63) | <0.001 | <0.001 | 0.59 |

* Plus–minus values are means ±SD. Post-randomization data were not available for nine patients in the medical-therapy group and one patient in the sleeve-gastrectomy group. P<0.05 for the comparisons with baseline values in all listed categories. To convert the values for cholesterol to millimoles per liter, multiply by 0.02586. To convert the values for triglycerides to millimoles per liter, multiply by 0.01129.

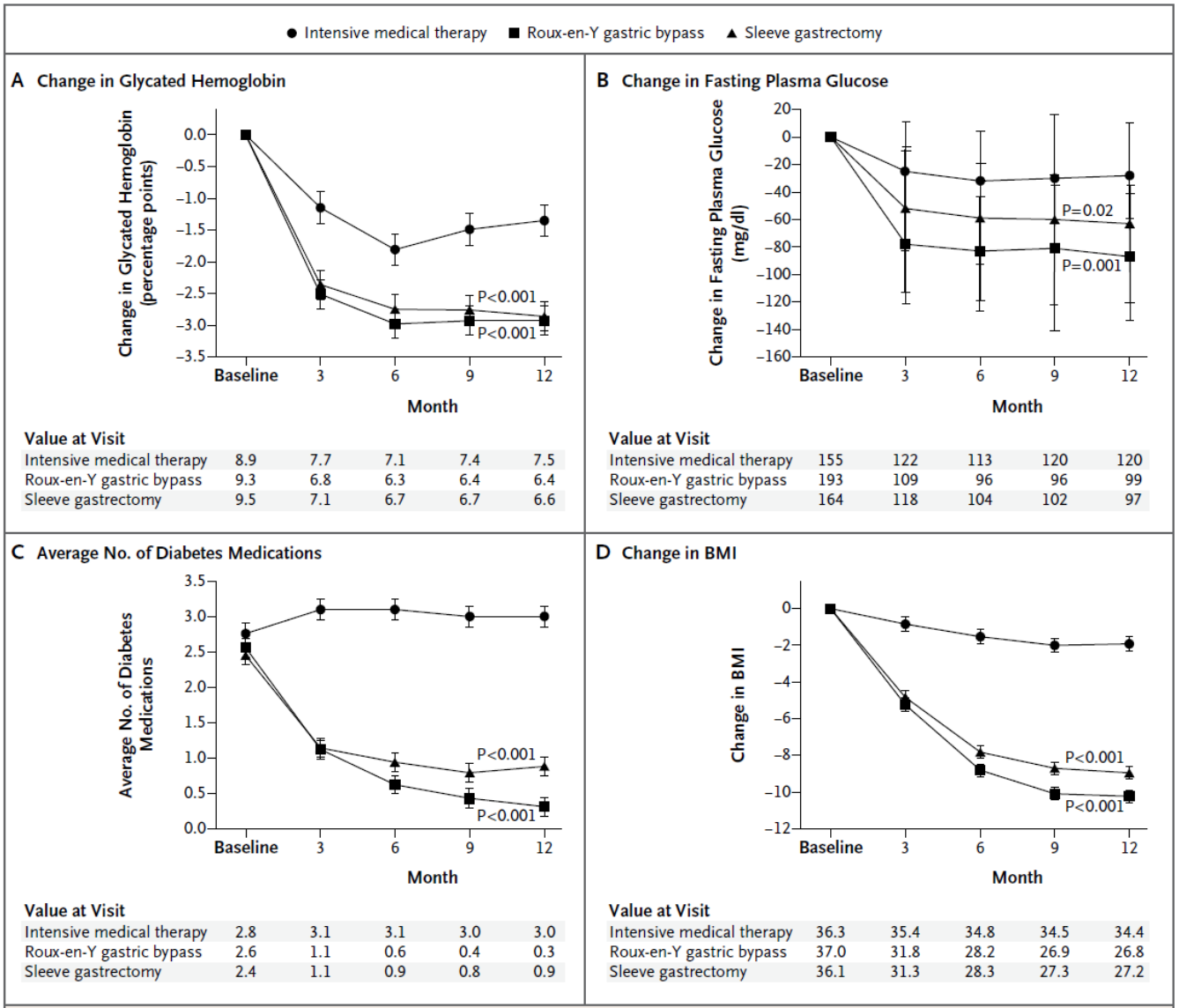


**Figure 1. Changes in Measures of Diabetes Control from Baseline.**

Values for change in glycated hemoglobin (Panel A), change in fasting plasma glucose (Panel B), the average number of diabetes medications (Panel C), and change in body-mass index (BMI) (Panel D) were plotted at 3, 6, 9, and 12 months. Least-square means and standard errors from a repeated measures model are plotted for glycated hemoglobin, average number of medications, and BMI; medians and interquartile ranges are plotted for fasting plasma glucose. P values are for the comparison between each surgical group and the medical-therapy group and were calculated from a repeated-measures model that considers data over time.

# Guidelines for Glycemic, BP, & Lipid Control

| | American Diabetes Assoc. Goals |
|---|---|
| **HbA1C** | **< 7.0%** *(individualization)* |
| **Preprandial glucose** | **70-130** mg/dL (3.9-7.2 mmol/l) |
| **Postprandial glucose** | **< 180** mg/dL |
| **Blood pressure** | **< 130/80** mmHg |
| **Lipids** | **LDL:** **< 100** mg/dL (2.59 mmol/l)<br>**< 70** mg/dL (1.81 mmol/l) (with overt CVD)<br>**HDL:** **> 40** mg/dL (1.04 mmol/l) ♂<br>**> 50** mg/dL (1.30 mmol/l) ♀<br>**TG:** **< 150** mg/dL (1.69 mmol/l) |

HDL = high-density lipoprotein; LDL = low-density lipoprotein; PG = plasma glucose; TG = triglycerides.

ADA. *Diabetes Care.* 2012;35:S11-63

# GRAZIE PER L'ATTENZIONE!!!!!