



IMPACT OF THE MEDITERRANEAN DIET FOR DIABETIC PREGNANT WOMEN

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Nutrients and Gestational Diabetes

- **Fat (High intake)** **GDM ↑**
 - Saturated Fat **Am J Clin Nutr 2004;79:479**
 - Animal Fat **Diabetologia 2001;44:972**
- **Carbohydrate (Low intake) GDM ↑** **Diabetes Care 2000;23:460**
 - Complex Carbohydrate **MGSD Study**
- **Fibre (Low intake)** **GDM ↑→** **Diabetes Care 2006;29: 2223**
- **Glycaemic load (High)** **GDM ↑→** **Diabetes Care 2006;29: 2223**



Foodstuffs and Gestational Diabetes

- **Eggs (High intake)** **GDM ↑** **Am J Epidemiol 2011;173:649**
- **Cholesterol (High intake)** **GDM ↑** **Diabetes & Metabolism 2007;33:25**
- **Meat (High intake)** **GDM ↑** **Diabetologia 2006;49:2604**
- **Processed meat** **GDM ↑** **Diabetologia 2006;49:2604**
 (High intake)



Patterns of eating and Gestational Diabetes

- **“Western” Diet Pattern** **High vs Low**
 - Risk of GDM **86% Higher**
 - Diabetologia 49:2604, 2006
- **Mediterranean Diet Index** **High vs Low**
 - Risk of GDM **24% Lower**
 - Am J Clin Nutr 96:289, 2012
- **Mediterranean Diet Index** **High vs Low**
 - Risk of GDM **34% Lower**
 - MGSD Study 2012



Nutritional needs and recommendations for pregnancy

- Adequate energy to obtain optimal weight gain
 - 300 Kcal/d increase 2nd and 3^d trimester
- Adequate protein
 - 1,1 g/kg/day
- **Carbohydrate 40-45% of energy**
- **Fruits, vegetables, monounsaturated fats**
- **At least 3 main meals and 3-4 snacks**
- **Bedtime snack**
- **Vitamins**
- **Folate and iron**



Recommended body weight increase during pregnancy

	BMI before pregnancy	Total BW increase (Kg)	BW increase after the 1st Trimester (Kg/week)
Low	< 18.5	12.5-18.0	0.5 (0.5-0.6)
Normal	18.5-24.9	11.5-16.0	0.5 (0.4-0.5)
Over-weight	25.0-29.9	7.0-11.5	0.3 (0.25-0.3)
Obese	≥ 30.0	5.0-9.0	0.25 (0.2-0.3)



Birth weight and disease

Newborns small for age - large for age

- **Perinatal events**
 - Mortality
 - Morbidity
- **Undernutrition of the mother**
- **In later life**
 - Obesity
 - Metabolic syndrome
 - CVD
 - DM
- **Overnutrition of the mother**
 - One hour pp glucose pivotal



Mediterranean Diet, foetal growth and preterm delivery

- **Mediterranean Diet “like” diet**
 - 90% decrease of the risk of preterm (<37w) delivery
 - Am J Obstet Gynecol 193:1292,2005
- **Mediterranean Diet Index High vs Low**
 - 70% decrease of the risk of preterm (<35w) delivery
 - Acta Obstet Gynecol 87:325,2008
- **Mediterranean Diet Index High vs Low**
 - No difference in the risk of preterm delivery
 - Acta Obstet Gynecol 87:325,2008



Mediterranean Diet, foetal growth and preterm delivery

- **Mediterranean Diet Index Low vs High**
 - Shorter gestation, 37 vs 39 weeks
 - Br J Nutr 102:744,2009
- **Mediterranean Diet Index High vs Low**
 - 50% decrease of the risk to deliver small for age newborn
 - Br J Nutr 107:135,2012
- **Mediterranean Diet Index Low vs High**
 - Lower birth weight
 - Lower placental weight
 - Br J Nutr 108:1399,2012



Mediterranean Diet, insulin resistance and DM incidence

- **Mediterranean Diet Index Low vs High**
 - **Newborns**
 - Higher insulinaemia
 - Higher insulin resistance
 - Risk for high glucose 3,4 times greater
 - Risk for higher HOMA 3,9 times greater
- Eur J Clin Nutr 66:1008,2012
- **In Women with prior GDM, DM incidence, 15 y follow-up:**
 - **Mediterranean Diet Index High vs Low**
 - Lowered risk for DM by 40%
 - **Healthy Eating Index High vs Low**
 - Lowered risk for DM by 57%
 - **DASH Diet adherence High vs Low**
 - Lowered risk for DM by 46%
- Arch Intern Med 172:1566,2012



Incidence of GDM according to the tertiles of the Mediterranean Diet Score

	Med Diet Score Low	p	Med Diet Score High	Odds Ratio
GDM_ ADA	12,3 %	,030	8,0 %	,62
GDM_ IADPSG	32,8 %	,004	24,3 %	,66



	Mediterranean Diet Score High (good)	Mediterranean Diet Score Low (bad)	p (2-tailed Sig.)
Fasting plasma glucose mmol/l	4,5 ± 0,1	4,6 ± 0,1	,169
Plasma glucose 1h post-load mmol/l	7,7 ± 0,1 *	8,0 ± 0,1	,016
Plasma glucose 2h post-load mmol/l	6,6 ± 0,1	6,8 ± 0,1	,066
Incremental glucose area mmol*min	255,6 ± 5,4 *	270,0 ± 7,8	,034
Total glucose area mmol*min	793,3 ± 7,0 *	823,1 ± 10,0	,016



	r-value Mediterranean Diet Score (all subjects)	r-value Mediterranean Diet Score (non-GDM subjects)
Fasting plasma glucose mmol/l	- 0,122 p = ,000	- 0,107 p = ,001
Plasma glucose 1h post-load mmol/l	- 0,116 p = ,000	- 0,118 p = ,000
Plasma glucose 2h post-load mmol/l	- 0,069 p = ,030	- 0,052 p = ,119
Incremental glucose area mmol*min	- 0,075 p = ,017	- 0,072 p = ,031
Total glucose area mmol*min	- 0,119 P = ,000	- 0,117 p = ,000



Relation of the Mediterranean Diet with the Incidence of Gestational Diabetes

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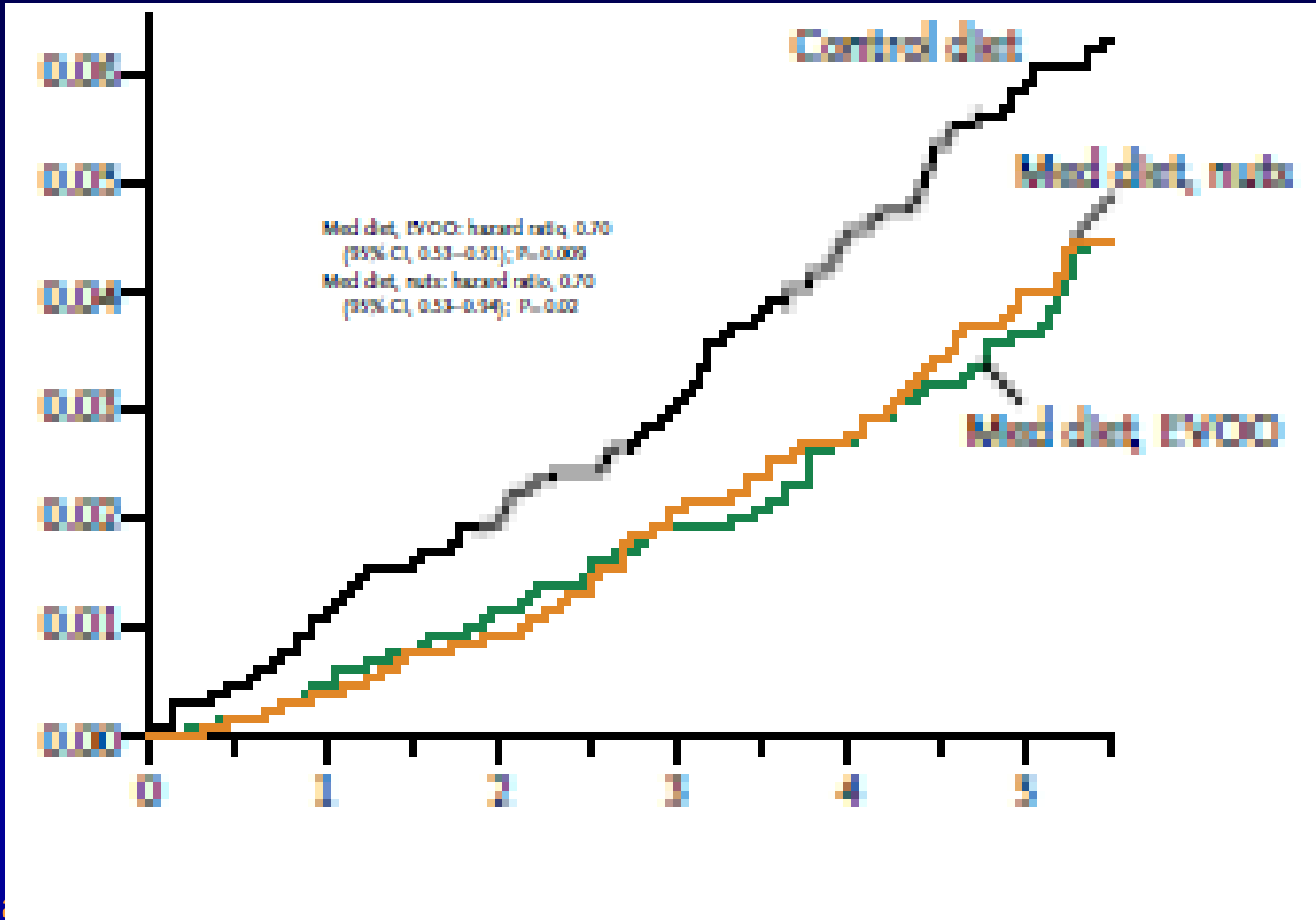
Meddiet and Incidence of DM The PREDIMED-Reus study

	Meddiet olive oil vs Control	Meddiet nuts vs Control	Both vs Control
DM HR	0.49 0.25 – 0.97	0.48 0.24 – 0.96	0.48 0.27 – 0.86

No significant changes in body weight or physical activity



Primary Prevention of Cardiovascular Disease with a Mediterranean Diet





Summary

- Adherence to the Mediterranean Pattern of Eating is associated with:
 - Less preterm deliveries
 - Better insulin and glucose concentrations in the newborn
 - Better insulin sensitivity in the newborn
 - Lower incidence of diabetes in women with prior Gestational Diabetes



The MGSD Nutrition Study

- Adherence to the Mediterranean Diet is associated with:
 - Lower incidence of Gestational Diabetes
 - Better glucose tolerance during pregnancy in the absence of diabetes