

'YES!'

a diet < 45 % carb may be OK for women with GDM...

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The crux of the matter

- **'glucose intolerance in pregnancy'**

WHO, 2013: 'Diagnostic Criteria & Classification of Hyperglycaemia First Detected in Pregnancy'

- **'carbohydrate intolerance in pregnancy'**

Han et al, 2017; '*Different types of dietary advice for women with GDM*'. Cochrane Database



Long history of low carb diets (<45% energy)

Jovanovic-Peterson et al, 1990:

- Carb restriction (<40%) = ↓ pp BGLs

Combs et al, 1992:

- Positive relationship between maternal glucose (esp. pp BGLs) and macrosomia

Major et al, 1998:

- <42% carb (vs >45% carb) = ↓ pp BGLs

Pederson (1952) hypothesis...

Maternal hyperglycaemia =
Fetal hyperglycaemia =
Fetal hyperinsulinaemia =
Fetal macrosomia

Jovanovic-Peterson et al. J Amer Coll Nutr 1990; 9:320-325

Combs et al. Diab Care 1992; 15: 1251-1257

Major et al. Obstet Gynecol 1998; 91:600-604



More recent studies

Cypryk et al, 2007:

- 30 women with GDM: high carb (60% cals) vs low carb (45% cals); 2 weeks
- ↓ pp BGLs for both groups

Moreno-Castilla et al, 2013:

- 152 women with GDM: high carb (55% cals) vs low carb (40% cals); 7-13 weeks
- No difference in need for insulin therapy
- No difference in obstetric and perinatal outcomes, nor GWG

Cypryk et al. Polish J Endocrin 2007; 58(4): 314-319

Moreno-Castilla et al. Diabetes Care 2013



Systematic Literature Reviews

- **Han et al, 2017:** *'Different types of dietary advice for women with GDM'*. Cochrane Library
- **Vercoza Viana et al, 2014:** *'Dietary intervention in patients with gestational diabetes mellitus'*.
- **Ha et al, 2017:** *'The effects of various diets on glycaemic outcomes during pregnancy.'*

- no clear differences between low carb vs high carb in GDM for LGA, SGA, perinatal mortality, macrosomia, need for insulin therapy, caesarean delivery
- Only 2 RCTs included...more research needed...



The debate in the US...

Carbohydrate Content in the GDM Diet: Two Views: View 1: Nutrition Therapy in Gestational Diabetes: The Case for Complex Carbohydrates

Teri L. Hernandez

DOI: 10.2337/diaspect.29.2.82 Published 1 May 2016

Vs

Research Article | From Research to Practice

Carbohydrate Content in the GDM Diet: Two Views: View 2: Low-Carbohydrate Diets Should Remain the Initial Therapy for Gestational Diabetes

Wadia R. Mulla

DOI: 10.2337/diaspect.29.2.89 Published 1 May 2016

<http://spectrum.diabetesjournals.org/content/29/2/82.full.print>
<http://spectrum.diabetesjournals.org/content/29/2/89.full.print>



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Uncertainty about macronutrient composition



What does 45% carb actually mean?

NRVs: Recommended Dietary Intakes (RDIs):

- Requirements for 150cm, sedentary pregnant woman

~ 9300 – 10,000kJ / day

➔ 260 – 280g carb/day

- 'Foundation Diet'
- More food for taller, more active women: 'Total Diet'
- Over-estimated?

Healthy eating during your pregnancy

ADVICE ON EATING FOR YOU AND YOUR BABY



www.eatforhealth.gov.au

<p>Vegetables and legumes/beans</p>	<table border="1"> <thead> <tr> <th colspan="2">Serves per day</th> </tr> <tr> <th>18 years or under</th> <th>19-50 years</th> </tr> </thead> <tbody> <tr> <td>Women</td> <td>5</td> </tr> <tr> <td>Pregnant</td> <td>5</td> </tr> <tr> <td>Breastfeeding</td> <td>5½</td> </tr> </tbody> </table>	Serves per day		18 years or under	19-50 years	Women	5	Pregnant	5	Breastfeeding	5½	<p>A standard serve of vegetables is about 75g (100-350kJ) or:</p> <ul style="list-style-type: none"> ½ cup cooked green or orange vegetables (for example, broccoli, spinach, carrots or pumpkin) ½ cup cooked, diced or canned beans, peas or lentils* 1 cup green leafy or raw salad vegetables ½ cup sweet corn ½ medium potato or other starchy vegetables (sweet potato, turn or cassava) 1 medium tomato <p>*preferably with no added salt</p>
Serves per day												
18 years or under	19-50 years											
Women	5											
Pregnant	5											
Breastfeeding	5½											
<p>Fruit</p>	<table border="1"> <thead> <tr> <th colspan="2">Serves per day</th> </tr> <tr> <th>18 years or under</th> <th>19-50 years</th> </tr> </thead> <tbody> <tr> <td>Women</td> <td>2</td> </tr> <tr> <td>Pregnant</td> <td>2</td> </tr> <tr> <td>Breastfeeding</td> <td>2</td> </tr> </tbody> </table>	Serves per day		18 years or under	19-50 years	Women	2	Pregnant	2	Breastfeeding	2	<p>A standard serve of fruit is about 150g (500kJ) or:</p> <ul style="list-style-type: none"> 1 medium apple, banana, orange or pear 2 small apricots, kiwi fruits or plums 1 cup diced or canned fruit (with no added sugar) <p>Or only occasionally:</p> <ul style="list-style-type: none"> 125ml (½ cup) fruit juice (with no added sugar) 30g dried fruit (for example, 4 dried apricot halves, 1½ tablespoons of sultana)
Serves per day												
18 years or under	19-50 years											
Women	2											
Pregnant	2											
Breastfeeding	2											
<p>Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties</p>	<table border="1"> <thead> <tr> <th colspan="2">Serves per day</th> </tr> <tr> <th>18 years or under</th> <th>19-50 years</th> </tr> </thead> <tbody> <tr> <td>Women</td> <td>7</td> </tr> <tr> <td>Pregnant</td> <td>8</td> </tr> <tr> <td>Breastfeeding</td> <td>9</td> </tr> </tbody> </table>	Serves per day		18 years or under	19-50 years	Women	7	Pregnant	8	Breastfeeding	9	<p>A standard serve (500kJ) is:</p> <ul style="list-style-type: none"> 1 slice (40g) bread ½ medium (40g) roll or flat bread ½ cup (75-100g) cooked rice, pasta, noodles, barley, buckwheat, semolina, polenta, bulgur or quinoa ½ cup (100g) cooked porridge ½ cup (50g) wheat cereal flakes ½ cup (50g) muesli 3 (25g) chocolate biscuits 1 (60g) crumpet 1 small (25g) English muffin or scone
Serves per day												
18 years or under	19-50 years											
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<p>Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans</p>	<table border="1"> <thead> <tr> <th colspan="2">Serves per day</th> </tr> <tr> <th>18 years or under</th> <th>19-50 years</th> </tr> </thead> <tbody> <tr> <td>Women</td> <td>2½</td> </tr> <tr> <td>Pregnant</td> <td>3½</td> </tr> <tr> <td>Breastfeeding</td> <td>2½</td> </tr> </tbody> </table>	Serves per day		18 years or under	19-50 years	Women	2½	Pregnant	3½	Breastfeeding	2½	<p>A standard serve (500-600kJ) is:</p> <ul style="list-style-type: none"> 65g cooked lean meats such as beef, lamb, veal, pork, goat or kangaroo (about 80-100g raw)** 80g cooked lean poultry such as chicken or turkey (100g raw) 100g cooked fish fillet (about 115g raw weight) or one small can of fish eggs 2 large (120g) cooked or canned legumes/beans such as lentils, chick peas or split peas (preferably with no added salt) 1 cup (150g) tofu 170g nuts, seeds, peanut or almond butter or tahini or other nut or seed paste (no added salt) <p>**weekly limit of 455g</p>
Serves per day												
18 years or under	19-50 years											
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<p>Milk, yoghurt, cheese and/or alternatives, mostly reduced fat</p>	<table border="1"> <thead> <tr> <th colspan="2">Serves per day</th> </tr> <tr> <th>18 years or under</th> <th>19-50 years</th> </tr> </thead> <tbody> <tr> <td>Women</td> <td>3½</td> </tr> <tr> <td>Pregnant</td> <td>3½</td> </tr> <tr> <td>Breastfeeding</td> <td>4</td> </tr> </tbody> </table>	Serves per day		18 years or under	19-50 years	Women	3½	Pregnant	3½	Breastfeeding	4	<p>A standard serve (500-600kJ) is:</p> <ul style="list-style-type: none"> 1 cup (250ml) fresh, UHT long life, reconstituted powdered milk or buttermilk 1 cup (120ml) evaporated milk 2 slices (40g) or 4 x 3 x 2cm cube (40g) of hard cheese, such as cheddar ¼ cup (50g) yoghurt 1 cup (250ml) soy, rice or other cereal drink with at least 100mg of added calcium per 100ml
Serves per day												
18 years or under	19-50 years											
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Pregnant	3½											
Breastfeeding	4											

Comparing to 'usual' intake in pregnancy (Aust)

Blumfield et al, 2012: *'Systematic review and meta-analysis of energy and macronutrient intakes during pregnancy in developed countries'*.

- Australian pregnant women, no GDM (n = 2557)

~9260 kJ / day

(+/- 1101 kJ)

~260g carb / day

= 45% energy



Daily intake ~260g carb / 45% energy

Breakfast: 1 cup Special K + ½ cup milk + 1 banana + 1 x grain toast

Morning Tea: 1 apple

Lunch: 2 x grain bread + salad + tinned tuna

Afternoon Tea: 1 x 200g tub yoghurt

Dinner: 1 ½ cups cooked pasta + meat-based sauce + vegetables

Supper: 1 cup milk

Food group serves

5 x vegies

2 x fruit

7-8 grains

3 ½ meat & alts

2 ½ dairy



What does 50-60% carb actually mean?

~ 9260kJ / day

→ **290 – 350g carb/day**



For some women, this is too much food! (330g carb)

Breakfast: 1 cup Special K + ½ cup milk + 1 banana + 1 x grain toast

Morning Tea: 6 x wholegrain crackers + cheese

Lunch: 2 x grain bread + salad + tinned tuna; 1 x apple

Afternoon Tea: 1 x 200g tub yoghurt + 1 slice grain bread

Dinner: 1 ½ cups cooked pasta + meat-based sauce + vegetables

Supper: 1 cup milk + 1 cup grapes



Feasibility of high carb diets?



'We can learn a lot from animals.'



High carb groups = poor 'compliance'!

Of the 2 RCTs in SLRs:

Moreno-Castilla:

- ✓ High carb group ate 75% of prescribed carb intake vs 94% in low carb group

Cypryk:

- ✓ More women in low carb group adhered to diet protocol vs high carb group



Moreno-Castilla et al. Diabetes Care 2013;
Cyrpyrk et al. Polish J Endocrin 2007; 58(4): 314-319

Can nutritional requirements be met with lower carb diets?

YES!

RDI for iron not met – but Foundation Diets don't meet it either!

What ~150g carb looks like: (RDIs met*, 9300kJ)

Breakfast: 2 x grain toast + margarine + cheese + 1 cup of milk

Morning Tea: 1 apple

Lunch: 100g salmon + salad + 2 Tbsp pumpkin seeds + olive oil/vinegar + 1 x grain bread

Afternoon Tea: 1 small banana + ¼ cup almonds

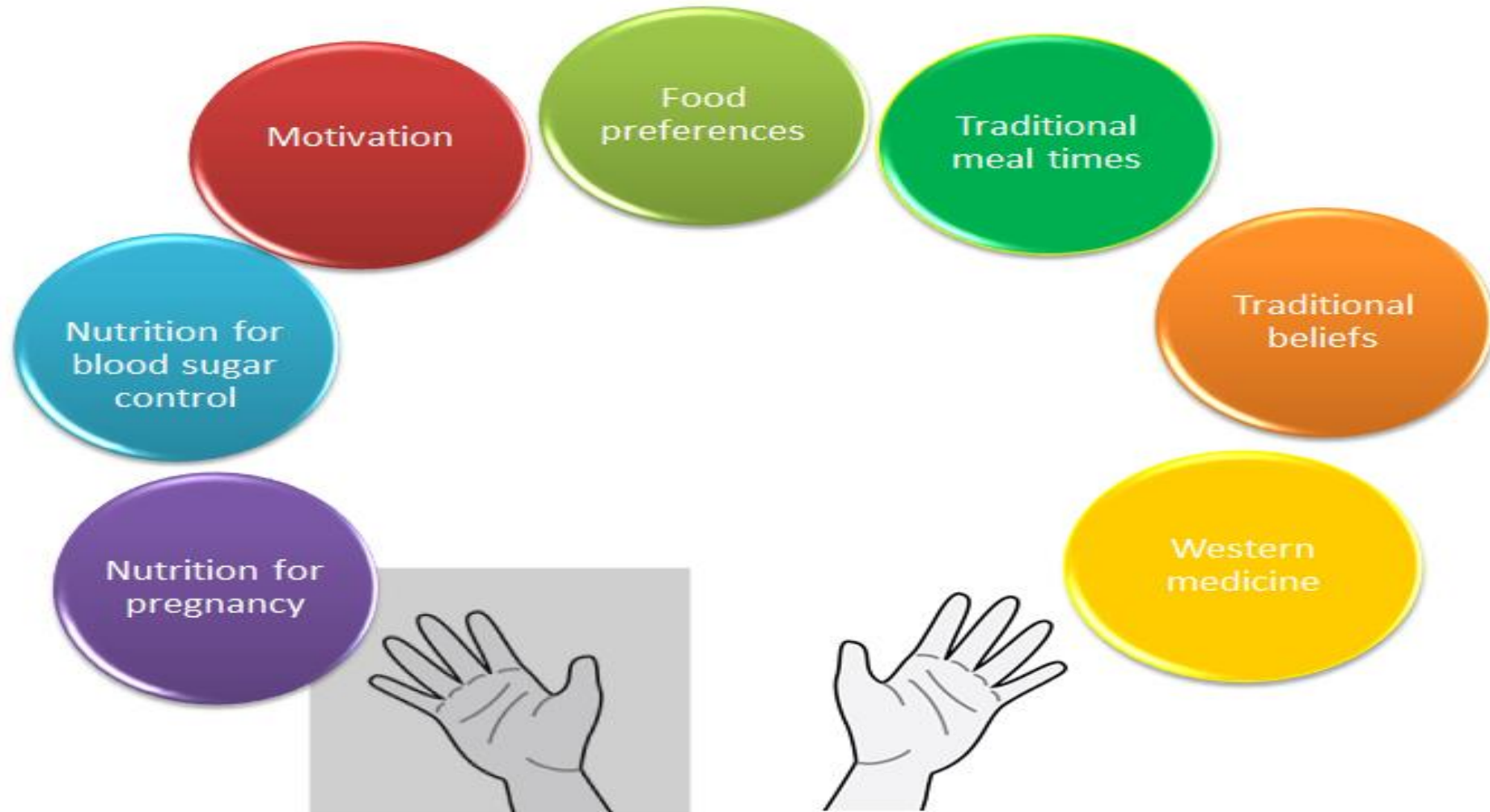
Dinner: 100g cooked beef + 2 cups vegies + olive oil/soy sauce + ½ cup cooked rice

Supper: ½ cup plain yoghurt

= ~26% carb

*RDI for iron not met – but Foundation Diets don't meet it either!

Research world vs reality = individual approach



What about ketosis during pregnancy?

