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The differential impact of maternal dietary macronutrient composition on offspring birthweight–results from the Danish National Birth Cohort

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There is limited evidence about the differential impact of the dietary macronutrient composition (carbohydrate [CHO], protein and fat) during pregnancy on offspring birthweight(1,2). The aim of our study was to explore the association between maternal dietary macronutrient intake in the second trimester and offspring birthweight.

The study included 63,755 mother-infant pairs within the Danish National Birth Cohort (DNBC)(3) in Denmark. Dietary data was collected in the food frequency questionnaires (FFQs) around the 25th week of gestation. Baseline information was collected from the participants at recruitment around the 12th week of gestation. Multiple linear regression models analysed the association between maternal macronutrient dietary intake in the second trimester and changes in birthweight. Both macronutrient models were mutually adjusted for energy contributing macronutrients. Model 1 was adjusted for confounders including pre-pregnancy body mass index (BMI), alcohol intake, smoking, parity, physical activity, dietary supplements, and competing exposures including gestational age at delivery, and sex of the offspring, and Model 2 was further adjusted for total micronutrient intakes (diet plus supplement) including calcium, iron, folate and vitamin B12.

Macronutrient[1] intake (increment)	Birthweight (g), Model 1			Birthweight (g), Model 2		
Trimester 2 n = 63,755	Birthweight[a]	95 % CI	*p* value	Birthweight[b]	95 % CI	*p* value
Total energy (600 kcal/d)	9	6 to 13	<0·001	0·09	−4 to 4	0·960
Carbohydrate (100 g/d)	16	10 to 23	<0·001	14	9 to 20	<0·001
Fat (30 g/d)	−22	−27 to −17	<0·001	−23	−27 to −18	<0·001
Protein (30 g/d)	21	14 to 29	<0·001	17	−9 to 25	<0·001

[1]Mutually adjusted for other energy contributing macronutrients [a]Adjusted for pre-pregnancy body mass index (BMI), alcohol intake, smoking, parity, physical activity, dietary supplements, gestational age at delivery, and sex of the offspring [b]Additional adjustment for total micronutrient intakes (calcium, iron, folate and vitamin B_{12}).

Results showed that each additional 100 g/day CHO and 30 g/day protein consumption in the second trimester were associated with higher birthweights of 14 g (95 % CI 9 to 20; P < 0·001) and 17 g (95 % CI −9 to 25; P < 0·001) respectively. Conversely, each additional 30 g/day fat consumption was associated with a lower birthweight of 23 g (95 % CI 18 to 27; P < 0·001). CHO and protein intakes in the second trimester are associated with improving birthweight, whereas fat is associated with limiting offspring weight gain. We advise an appropriate balance of dietary energy intake during pregnancy to optimise birthweight.

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