

Maternal high-protein diet impairs fetal growth via placental oxidative stress and reduced amino acid transport in mice

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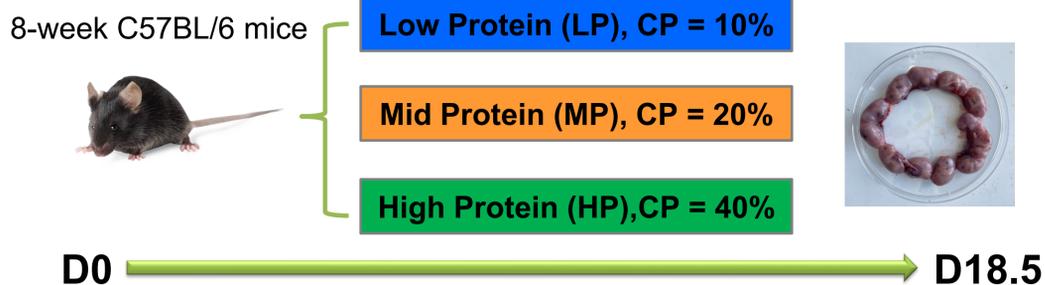
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INTRODUCTION & AIM

Maternal dietary protein intake plays a vital role in fetal development, placental function, and pregnancy outcomes. This study aimed to evaluate the effects of different level of maternal dietary protein on the reproductive performance in mice, with an emphasis on placental AA transporters and redox balance.

METHOD

A total of 45 female C57BL/6 mice were fed isocaloric purified diets containing 10% (low protein, LP), 20% (moderate protein, MP), or 40% (high protein, HP) protein from conception until gestational day (GD) 18.5. On GD18.5, tissue and blood were collected. The number of total and live litter size, as well as individual fetal and placental weights, were recorded.

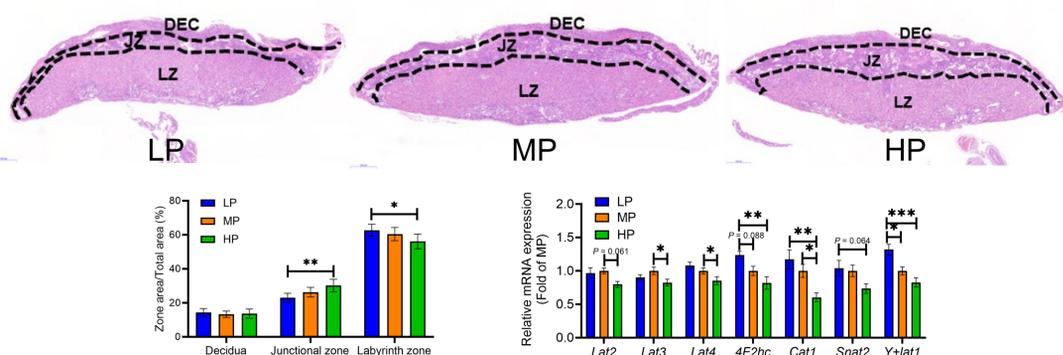


RESULTS & DISCUSSION

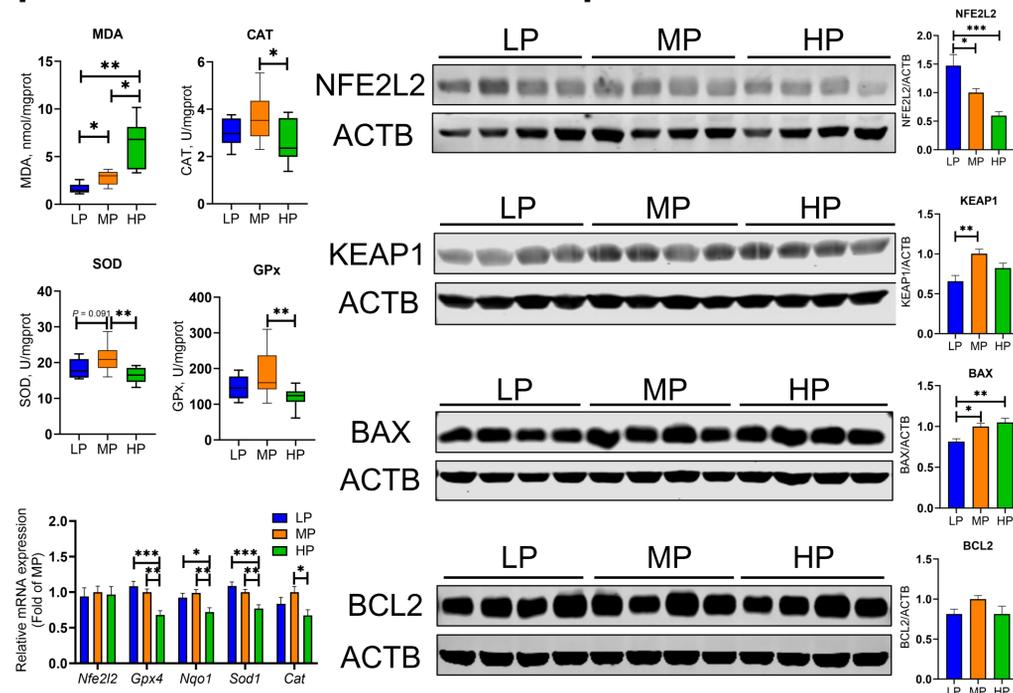
1. Effect of different protein levels on the reproductive performance in pregnant mice.

Items	Treatment groups ¹			SEM	P-value
	LP	MP	HP		
Total litter size	8.64	8.90	9.25	0.37	0.481
Live litter size	8.27	8.40	8.92	0.39	0.453
Uterus weight (g)	11.52	11.83	11.76	0.45	0.874
Weight gain during pregnancy (g)	13.54	14.75	13.90	0.47	0.219
Total litter weight (g)	9.03	9.43	9.33	0.37	0.752
Average fetal weight (g)	1.09 ^{ab}	1.13 ^a	1.05 ^b	0.02	0.013
Average placenta weight (g)	0.10	0.10	0.10	0.00	0.377
Placental efficiency	11.50 ^{ab}	12.06 ^a	10.55 ^b	0.30	0.005

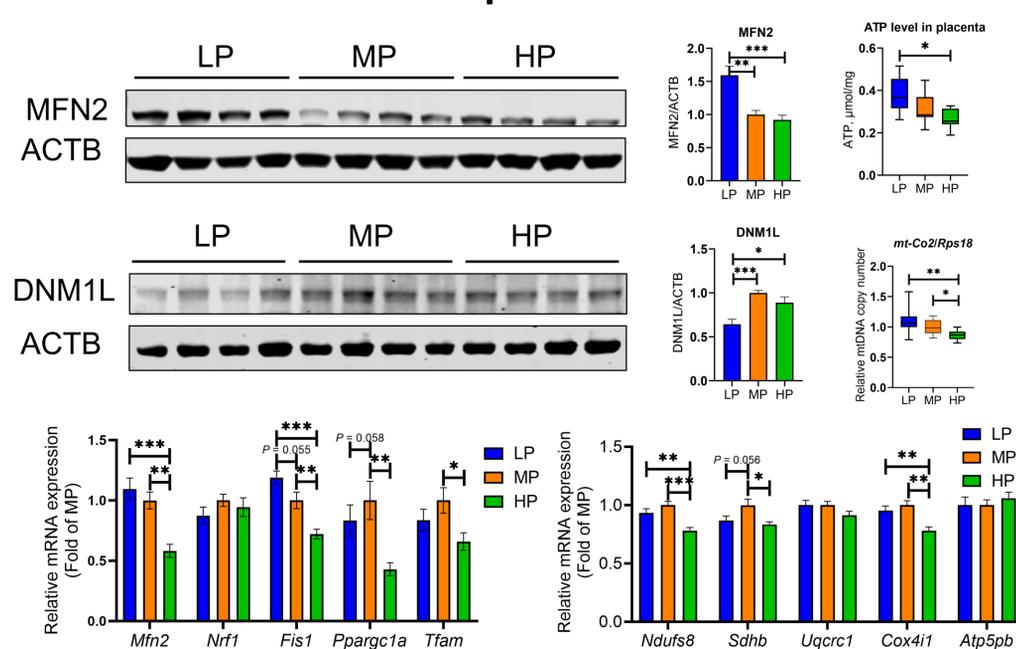
2. Effects of different maternal protein levels on placenta morphology and amino acid transporters.



3. Effects of different maternal protein levels on placental oxidative stress response of mice.



4. Effects of different maternal protein levels on mitochondrial function in placenta of mice.



CONCLUSION

In conclusion, although both protein deficiency and excess can disrupt physiological balance, our findings highlight that the excessive protein intake was associated with downregulation of placental AA transporters and heightened oxidative stress.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ACKNOWLEDGEMENTS

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