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Eicosapentaenoic acid supplementation during pregnancy improved the insulin signaling pathway in the cardiac muscles of infants of diabetic mothers

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Background & Aims: Infants of diabetic mothers (IDM) also have abnormal circulatory organs. When we investigated the insulin signalling pathway in a newborn rat heart, we observed abnormalities in the Akt/mTOR pathway. However, we have previously reported that an abnormal insulin signalling in the hearts of IDM improved by feeding the pregnant mothers a fish oil-rich diet. In the present study, we aim to clarify that eicosapentaenoic acid (EPA) improves the insulin signalling in the hearts of IDM.

Materials & Methods: Pregnant diabetic rats were first administered streptozotocin and then fed via gastric tube EPA (IDM/EPA) or water (IDM). Infants of normal mothers were designated control infants (control). To examine the changes in insulin signaling in the cardiac muscles of IDM, we isolated the heart.

Results: No differences were observed in blood glucose levels on postnatal day 4 among all infants. Phosphorylation levels of Akt473 and FOXO1 significantly decreased in IDM compared with those in control. Phosphorylation levels of Akt473 and FOXO1 in IDM/EPA significantly increased compared with those in IDM. The expression level of mTOR decreased in IDM compared with that in control. When EPA was administered, the expression level of mTOR increased in IDM/EPA compared with that in IDM. Furthermore, the ratio of GLUT-4 to insulin-stimulated translocation in PNCC decreased in IDM compared with that in control; however, it increased in IDM/EPA.

Conclusion: EPA in fish oil may improve the impaired signalling pathway in the cardiac muscles of IDM, which occurs because of hyperglycemic diabetic mothers.

Biography

Ritsuko Kawarada received PhD in graduate school of medicine from Gunma University and MA and BA in graduate school of nutrition from Kagawa Nutrition University in Japan. In the past research, we studied effect of a high-fat diet on diabetic mother rats and their offspring through three generations. Our current research investigates effect of eicosapentaenoic on cardiac muscle of infants of diabetic mother rats.

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