Exceptional material requirement for reproduction in mouse oocytes

L. Yu[1]*, S.F. Wang[2]*, Q.Z. Zhai[3]*, Y.Q. Yao[3], F. Jiang[4] and Y.X. Lu[1]

[1]Department of Obstetrics and Gynecology,
First Affiliated Hospital of the General Hospital of the People's Liberation Army, Beijing, China
[2]Blood Transfusion Department,
The General Hospital of the People's Liberation Army, Beijing, China
[3]Department of Obstetrics and Gynecology,
The General Hospital of the People's Liberation Army, Beijing, China
[4]Department of Obstetrics and Gynecology, Tangdu Hospital,
Fourth Military Medical University, Xi'an, China

*These authors contributed equally to this study.
Corresponding author: Y.X. Lu
E-mail: yongxianlu2014@126.com

Genet. Mol. Res. 14 (4): 14356-14365 (2015)
Received May 13, 2015
Accepted August 21, 2015
Published November 13, 2015
DOI http://dx.doi.org/10.4238/2015.November.13.21

ABSTRACT. Limited information on oocytes and fertilization prevents the efficient therapy of patients with infertility. The most important reason for this lack of understanding is a deficiency in research dedicated to oocytes and fertilization. Currently, we are concerned with the role of nutrition in the process of oocyte development to better understand the relationship between nutrition and infertility. The aim of this study was to explore the relationship between some exceptional materials and infertility to elucidate the role of these materials in oocyte development. We used proteomic analysis to identify numerous nutrition-related proteins in three developmental stages: the germinal vesicle stage, the metaphase II-arrested stage, and the fertilized oocyte-zygote stage. Specific proteins were abundantly expressed during the three stages.

These proteins included astacin-like metalloendopeptidase, selenium-binding proteins, and other proteins involved in metabolic and signaling pathways. Other proteins were involved in the citrate cycle, the electron transport chain, the urea cycle, fatty acid metabolism, and the insulin signaling pathway. Almost all these proteins exhibited different expression levels in the three stages. The results of the present study provide a better understanding of the molecular mechanisms of early embryonic development and suggest new treatment methods for infertility.

Key words: Oocyte; Zygote; Protein; Nutrition; Fertilization

