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Investigation of the oxidative modification of glutathione peroxidase 5 in boar seminal plasma and its correlation with semen quality

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Recent studies suggested that physical semen characteristics and sperm morphology measurements are not always indicative of fertility and reproductive performance in boars, so accurate and predictive markers are still in need. Seminal plasma, the fluid that together with mammalian spermatozoa forms the semen, is a complex mixture of secretions originated from epididymis and male accessory sexual glands. Many studies have found that seminal plasma proteins play critical roles in sperm fertilizing ability. The present study was conducted to reveal the correlations among seminal plasma proteins, their post-translational modifications (PTMs) and semen quality by using proteomic analysis. Semen samples were collected from 12 adult boars and subjected to evaluation of semen quality, then categorized into good and poor groups based on sperm morphology. Three proteins spots showed significantly altered expression level based on two-dimensional gel electrophoresis and LC-ESI-Q-TOF MS/MS analysis were identified as IgG Fc-binding protein, glutathione peroxidase 5 (GPX5) and spermadhesin (porcine seminal protein-I, PSP-I). Bioinformatic tools were applied to find the oxidative modifications on these proteins, especially 4-hydroxy-2-nonenal (HNE) and 2-propenal (acrolein). Among the above proteins, GPX5 was found to contain both modifications. GPX5 was reported to be an antioxidant enzyme which may protect sperm membranes from oxidative damage. However, in the current study, the expression level of GPX5 was significantly higher in the poor sperm morphology group. We proposed and designed experiments to prove that the HNE modifications may inactivate GPX5, though expressed in higher level, thus resulted in poor semen quality (sperm morphology).

Biography

Yu-Min Yang has completed her Bachelor's degree from Department of Biotechnology and Animal Science, National Ilan University, Taiwan. She is currently studying Master's program in the same department, and is estimated to obtain her Master's degree in this July.

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