

Abstract

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Male fertility is linked to the selenoprotein phospholipid hydroperoxide glutathione peroxidase.

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BACKGROUND: The selenoprotein phospholipid hydroperoxide glutathione peroxidase (PHGPx) accounts for almost the entire selenium content of mammalian testis. PHGPx is abundantly expressed in spermatids as active peroxidase but is transformed to an oxidatively inactivated protein in mature sperm, where it is a major constituent of the mitochondrial capsule in the midpiece. Male infertility in selenium-deficient animals, which is characterized by impaired sperm motility and morphological midpiece alterations, is considered to result from insufficient PHGPx content.

METHODS: We studied the relationship between sperm PHGPx, measured as rescued activity, and human fertility. Sperm specimens from 75 infertile men and 37 controls were analyzed for fertility-related parameters according to World Health Organization criteria. The PHGPx protein content was estimated after reductive solubilization of the spermatozoa by measuring the rescued PHGPx activity.

RESULTS: Rescued PHGPx activity of infertile men ranged significantly below that of controls (93.2 +/- 60.1 units/mg sperm protein vs. 187.5 +/- 55.3 units/mg) and was particularly low in oligoasthenozoospermic specimens (61.93 +/- 45.42 units/mg; $P < 0.001$ compared with controls and asthenozoospermic samples). Rescued PHGPx activity was correlated positively with viability, morphological integrity, and most profoundly forward motility ($r = 0.35, 0.44, \text{ and } 0.45$, respectively). In isolated motile samples, motility decreased faster with decreasing PHGPx content.

CONCLUSION: In humans, PHGPx appears to be indispensable for structural integrity of spermatozoa and to codetermine sperm motility and viability. Because the content of PHGPx, irrespective of the cause of alteration, is correlated with fertility-related parameters, PHGPx can be considered a predictive measure for fertilization capacity.

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