

POLY (ADP-RIBOSE) POLYMERASE (PARP) HOMOLOGUES IN HUMAN EJACULATED SPERM AND ITS CORRELATION WITH SPERM MATURATION

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Introduction: Sperm DNA damage plays an important role in the pathogenesis of male infertility. Poly (ADP-ribose) polymerases (PARP) help in identifying region of DNA breaks for recruitment of the DNA base excision repair mechanism. PARP is also essential for the maintenance of genomic integrity and survival in response to genotoxic insults. PARP cleavage has been reported as an apoptosis or necrosis marker in other cell types. However its presence on ejaculated sperm is unclear.

Objectives: To investigate the presence of PARP and evaluate its function in ejaculated spermatozoa.

Methods: Semen specimens from 18 healthy fertile donors and 12 infertile males. Ejaculated spermatozoa were subjected to sperm fractionation with double layer density gradient, protein extraction, detection, immunoblotting, and mass spectrometry. Semen samples were exposed to PARP inducer staurosporine, or hydrogen peroxide with or without PARP inhibitor 3-aminobenzimide. Annexin V assay was examined for apoptosis.

Results: We detected ~75, ~63 and ~60 kDa PARP homologues. These were identified as PARP-1 (~75 kDa), PARP-9 (~63 kDa) and PARP-2 (~60 kDa) respectively. Western blot analysis showed a positive correlation between the amount of PARP protein and sperm maturity. PARP proteins (75, 63 and 60 kDa) were evaluated after inducing apoptosis by hydrogen peroxide and staurosporine exposure.

Conclusions: Presence of PARP homologue i.e. PARP-1 (~75 kDa) suggests its role in preventing DNA damage and repair. PARP-2 may have a role in prevention of oxygen oxidative stress and chemically (staurosporine) induced sperm apoptosis. Additional studies are needed to delineate the role of PARP-9 in sperm physiology. Our results indicate an active role of PARPs in preventing apoptosis in human spermatozoa.