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## JOURNAL ARTICLE

# Antioxidant potential of human serum albumin: role in the recovery of high quality human spermatozoa for assisted reproductive technology

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Human serum albumin (HSA) is being considered as an alternate media for sperm enrichment in assisted reproductive technology (ART) because of recent concern with the use of Percoll. In this study, we compared HSA and Percoll for 1) sperm recovery, 2) reactive oxygen species scavenging potential, and 3) effects on total oxidative stress to spermatozoa. The spermatozoa-enriched fractions obtained from Percoll (80%:40%) and HSA (12%) were monitored for sperm motility, viability, hypoosmotic swelling test (HOST), and adenosine triphosphate (ATP) levels. The effect of superoxide anions ( $O_2^-$ ) on donor human spermatozoa was observed in the presence of either HSA or Percoll media. A combination of luminol and the Cypridina luciferin analog 2-methyl-6-(4-methoxyphenyl)-3,7-dihydroimidazo(1,2- $\alpha$ )pyrazin-3-one hydrochloride was used as a highly sensitive chemiluminescence probe in our hypoxanthine and xanthine oxidase-based assay for  $O_2^-$ . Sperm membrane total oxidative stress was determined by measuring levels of the prostanoid 8-iso-Prostaglandin F<sub>2</sub>alpha (8-iso-PGF<sub>2</sub>alpha). Significant differences in sperm parameters between the Percoll-enriched spermatozoa (motility 60%±4%, viability 56%±6%, and HOST 73%±7%) and those enriched with HSA (motility 84%±5%, viability 85%±4%, and HOST 84%±3%;  $P < 0.01$ ) were observed. Adenosine triphosphate levels were significantly higher, by almost 50%, in samples processed with HSA than with Percoll ( $P=0.03$ ). The dismutation rate of  $O_2^-$  in HSA (slope -6.8) was significantly lower than in Percoll (slope -87.0;  $P < 0.01$ ). Sperm motility and ATP levels decreased at a slower rate after treatment with  $O_2^-$  in the presence of HSA when compared to Percoll; moreover, spermatozoa in HSA regained partial motility after 2 hours, whereas spermatozoa in Percoll were immobilized. No significant differences in 8-iso-PGF<sub>2</sub>alpha levels in spermatozoa enriched by either HSA or Percoll were observed. We conclude that the HSA sperm enrichment procedure improves the recovery of higher quality spermatozoa compared to Percoll and, because of its antioxidant properties, may be useful in processing high leukospermia semen samples for ART purposes.

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