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JOURNAL ARTICLE

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Two-dimensional electrophoretic profile of human sperm membrane proteins

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The purpose of this study was to characterize highly enriched human spermatozoa membrane proteins by two-dimensional electrophoresis and computer image analysis. Sperm membrane proteins were extracted by detergent solubilization from three different preparations: 1) washed semen cells following centrifugation and three wash steps in Ham's F-10 medium (the standard sperm preparation, which is contaminated with seminal immature germ cells, white blood cells, and acellular

material), 2) the motile sperm fraction following centrifugation of diluted semen cells through a Percoll density gradient to enrich (> 98%) the viable mature sperm population, and 3) sperm membrane vesicles isolated from Percoll-purified motile mature sperm by nitrogen cavitation followed by differential centrifugation. The two-dimensional gel profiles of extracts of washed semen cells and motile spermatozoa contained more than 600 protein spots between pH 4 and 7 and apparent molecular mass ranging from 7.9 to 93.5 kDa. Only 73% of the major proteins in these two samples matched by computer image analysis. The highly enriched sperm membrane vesicle extract showed a much simpler protein pattern, with only 64 major protein spots, 61 of which could be matched with proteins detected in extracts from purified motile sperm. The isoelectric point and molecular weight coordinates of these major human sperm membrane proteins could serve as a foundation for systematic isolation and further characterization of human sperm antigens for studies of mechanisms of fertilization and the development of contraceptive vaccines.

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