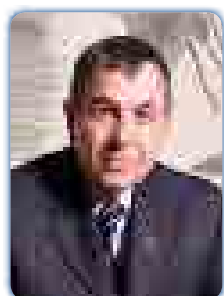


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M Zavos

University of Kentucky, Cyprus

The evolution and current status of sperm cryopreservation

Semen or sperm cryopreservation (commonly called sperm banking) is a procedure to preserve sperm cells. Semen can be used successfully indefinitely after cryopreservation which normally is kept at a very stable temperature of -196°C (liquid Nitrogen). For human sperm, the longest reported successful storage which yielded a successful pregnancy is 22 years. The cryopreservation procedure can be used for sperm donation where the recipient wants the treatment in a different time or place, or as a means of preserving fertility for men undergoing vasectomy or other treatments that may compromise their fertility, such as chemotherapy, radiation therapy or surgery. Cryopreservation extends the availability of sperm for fertilization; however, the fertilizing potential of the frozen-thawed sperm is compromised because of alterations in the structure and physiology of the sperm cell. These alterations, characteristics of sperm capacitation, are present in the motile population and decrease sperm life-span, ability to interact with the female tract, and subsequent fertilizing ability. The etiology of such alterations may represent a combination of factors, such as inherited sensitivity of the sperm cell to withstand the cryopreservation process and the semen dilution. Although the former is difficult to address, approaches that make-up for the dilution of seminal fluid may be sought. The aim of this work is to review aspects of sperm cryopreservation paralleled by events of capacitation and evaluate the possible roles of sperm membrane cholesterol, reactive oxygen species, and seminal plasma as mediators of cryopreservation effects on sperm function. As far as the methods of cryopreservation of human sperm, there are three main conventional freezing techniques used in sperm cryopreservation: Slow freezing, rapid freezing and vitrification. The slow freezing technique which consists of progressive sperm cooling over a period of 2–4 hours in two or three steps, either manually or automatically using a semi programmable freezer; The rapid freezing technique which requires direct contact between the straws and the nitrogen vapors for 8–10 min and immersion in liquid nitrogen at -196°C and lastly, the vitrification method which is the newest procedure to be followed and which renders very high cooling and warming rates (over $20,000^{\circ}\text{C}/\text{min}$) and short contact with concentrated cryoprotective additives (less than 30 sec over -180°C) and which also offers a possibility to circumvent chilling injury and to decrease toxic and osmotic damage. All three of those methods are clinically employed and some of their technical aspects will be evaluated and compared along with their implications on the outcome of clinical results.

Biography

M Zavos received his BS in Biology-Chemistry in 1970, his MS in Biology-Physiology in 1972 and Education Specialist in Science (EdS) in 1976 from Emporia State University in Emporia, Kansas. He earned his Ph.D in Reproductive Physiology, Biochemistry and Statistics in 1978 from the University of Minnesota in the Twin Cities, Minnesota. He received the distinguished Alumnus Award and the Graduate Teaching Award from Emporia State University and the Student Leadership Award from the University of Minnesota. He has numerous scientific collaborations nationally and internationally and his publications have appeared in eight languages. He is a Member of the American Society for Reproductive Medicine (ASRM), the American Society of Andrology (ASA), and the European Society for Human Reproduction and Embryology (ESHRE), the Middle East Fertility Society (MEFS), the Japanese Fertility Society, the International Society of Cryobiology Sigma XI, Gamma Sigma Delta and a number of other Scientific and Professional Societies. He has served on a large number of committees for the International Society of Cryobiology, ASRM, MEFS, ESHRE and others.

profzavos@gmail.com