From the Editor's Desk

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Milestones in assisted reproduction and related technologies.

Part 1: Developmental biology, preimplantation development, spermatozoa preparation, embryo culture and transfer

Part 2: Sperm, oocyte and embryo cryopreservation.

Part 3: Preimplantation genetic diagnosis, testing and therapeutics

Part 4: Embryonic stem cell technology with special reference to ART

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The Journal of Reproductive Biotechnology and Biomedical Sciences (JRBBS) have compiled or have endeavoured to compile the milestones in IVF accomplished by individual workers or groups right from the early pioneering days to the present. This mammoth task took 3 workers about 7 to 15 years to compile with limited resources. It is still incomplete. We are certain we would have inadvertently left out some contributions. We may also have made inaccurate references which must be ameliorated. To complete this task, we invite all Embryologists and, ART laboratory and clinical practitioners to assist us fill in the missing gaps. If we have left out your contribution(s) irrespective of its stature or magnitude, whether minuscule or major, we want to hear about it. Please send us a short write up of no more than 100 words the nature of your contribution(s) that we have not included in the manuscripts published herein. Your submission(s) must be substantiated by evidence in the form of publication(s) or presentation(s). Likewise, we also invite criticisms, suggestions for amendments/ ameliorations. All suggestions and criticisms must be substantiated by evidence. Your contributions will be acknowledged in the next edition that we intend to publish separately once we have compiled the missing "milestones" or have ameliorated erroneous statements in the current manuscripts. All submissions must be sent by email to the email address: jrbf.online@gmail.com with a cc to: jaffarali.abdullah@gmail.com.

The subject/reference of your email must carry the following words "Inserts and amendments to the Milestones MS". Your submissions must can be made at anytime. There is no deadline as we intend keep updating the milestones manuscripts on regular basis.

We are in the process of compiling the "milestones" in IVM, micromanipulation and clinical aspects of the ART.

While researching for the preparation of the present manuscript, the authors were astounded to come across ancient writings

that described reproduction and embryogenesis, some of which are similar to current knowledge. It is curious and truly fascinating to the discerning mind that the ancients could have had knowledge of embryogenesis. Humankind's fascination with procreation dates back to thousands of years to the misty past which is apparent from the drawings, sculptures and figurines dating back to prehistoric times depicting expectant women or women in labour.

Apparently, embryo transfer and various forms of surrogacy abound in Hindu mythology and scriptures. Kavita Kane [Kane, 2017] narrated a number of instances in Hindu mythology of surrogacy and embryo transfers, and in one instance, possibly, of human cloning. These depictions are extremely intriguing. One example of embryo transfer relates to the birth of the seventh child, Balaram, of Devaki and Vasudev, in which Balaram, as an embryo, was transferred from the womb of Devaki to the surrogate Rohini, the first wife of Vasudev, to thwart the plans of Kamsa, brother of Devaki, to kill the child after its birth.

Even more fascinating is that of the pregnancy of Gandhari, the wife of the blind King Dhritarashtra. Following a year of pregnancy Gandhari delivered a mass of flesh which was cut accurately into 100 pieces by Rishi Vyasa (*Rishi means saint and/or wise person*) or was counted by him as consisting of 100 cells according to another account. Vyasa placed the 100 pieces of flesh or the cells 1 per jar in 100 jars. He then found another piece of flesh (or cell) which was also placed in another jar (jar no.101). All the 101 jars contained a nutrient concoction or solution (culture medium?). The 101 tissues or cells were grown for another year to term culminating in the births of 100 male brothers (known as the Kauravas – are they clones?) and one female child (Dushala). The female child was from the extra piece of flesh or cell that Vyasa found last (was Dushala cloned from her mother's tissue?). This suggests that some ancient cultures possessed an irrefutable knowledge since antiquity of the embryo, embryo transfer, surrogacy and possibly even cloning.

In more recent years, Keith L. Moore's work [Moore, 1986] on the translation of the verses of the Qur'an, the holy book of Islam, noted that the narration of some verses on human reproduction and embryology was astonishingly scientifically accurate and are comparable to current knowledge even though these statements originated in the 7th century AD. Moreover, at least one verse in the Qur'an (21:90) states that infertility is curable, suggesting that it is a pathological state which could be treated. This verse pertains to Prophet Zechariah. Embryo transfer and surrogacy has been alluded to in the scriptures of the Abrahamic faiths which are well recognized. Moore (1986) noted that the narration in the Qur'an on human reproduction is astonishingly accurate and is comparable to current knowledge.

Aside from the mythological references to ART and cloning, in conclusion, we believe, the present effort fulfilled, in part, its objective of documenting in a chronological sequence of events almost all the milestones that contributed to the development of laboratory assisted reproduction and related technologies, beginning from cellular and developmental aspects of the gametes, fertilization, embryo culture and thence all the way to embryo transfer and derivation and application of embryonic stem cells with special reference to ART, and cloning.

References

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2. Moore KL. A Scientist's Interpretation of References to Embryology in the Qur'an. J Islamic Med Assoc North Am. 1986; 18:15-17