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Key Lectures

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Can personalized medicine help infertility treatment?

Sheikhha MH.

Biotechnology Research Center, International Campus, Shahid Sadoughi University of Medical Sciences and Health Services, Yazd, Iran.

Email: sheikhha@yahoo.com

Different surveys showed that the rate of infertility is above 10% in many parts of the world. This means that becoming pregnant can be a stressful process for many couples, and they have to seek assisted reproductive technology (ART) and use different drugs to help them for having a baby. It is shown that there are differences in response to different drugs in these individuals. It is proved that these differences are genetically determined. Individualized or personalized medicine is defined as using genetic information to select the most appropriate choice of pharmacological therapy. Personalized medicine is based on polymorphic DNA sequence variations. If a polymorphism occurs in the coding or regulatory regions of a gene, it can alter the function, activity, or level of expression of that gene. Using the new advanced methods of genetics testing such as automated analysis of genome-wide single nucleotide polymorphisms allows identifying polymorphisms in genes involved in drug metabolism, transport and receptors. In ART, the efficiency of the protocol is a problem that needs to be solved. If we can utilize genome sequencing as a routine clinical approach to create an individual's own

pharmacogenomics profile, therefore we can provide valuable information to help infertility specialists to use the optimal drug dosage for ART. So far, significant progress has been made toward personalizing the entire ART process, including diagnosis, treatment planning, and embryo identification. In fact, reproductive medicine is among one of the first subjects that used the concept of personalized medicine even before its popularization. The application of personalized medicine in ART starts in fact when the studies showed that the causes of infertility are various, and factors influencing the success rates of ART are complicated. In fact, there are variations in different individuals regarding their oocyte and embryo grading, endometrial condition, and semen analysis. Therefore, different steps of reproductive medicine need to be personalized, such as the diagnosis of infertility causes and transfer of the healthy embryo. One of the most important areas of using personalized medicine in reproductive medicine is discovering and validating genomic, protein, and metabolite biomarkers. To overcome the concept of "one size does not fit all" we should consider patients' specific molecular profiles. Finally, the main difference in personalized medicine between ART and the other subjects is that in reproductive medicine, the matter is "personalized" to not only one individual but in three different individuals; the mother, father, and embryos. Another complication of ART is that we have to apply the personalization in different biological systems including; the egg, sperm, embryo, and uterus, as different systems may be involved in etiology of infertility in different subjects.