IVM (In vitro maturation)

Nobel prize laureate Prof. Robert Edwards, the pioneer of IVF, thought that recovery of immature oocytes followed by in vitro maturation (IVM) would be a potentially useful treatment for women with infertility. IVM is a technique that differs from conventional in vitro fertilization (IVF) treatment. Controlled ovarian hyperstimulation is not indispensable for IVM, and then immature oocytes are collected and cultured in vitro until they reach the metaphase II (MII; mature) stage. IVM was first used successfully in humans in 1991 in an unstimulated donor cycle by Cha et al. in Korea, and the first successful clinical use of IVM in patients with polycystic ovary syndrome (PCOS) occurred in 1994 by Trounson et al. in Australia. There is no universal protocol for clinical protocol for IVM. Administration of FSH for a few days or no stimulation at all during follicular phase followed by 10,000 IU HCG or no HCG, with immature oocyte retrieval 36 hours after HCG (if administrated). The collected immature oocytes such as germinal vesicle (GV) or metaphase I (MI) stage are cultured in IVM culture media (for example. human tubal fluid medium that is supplemented with FSH 7.5 IU/mL, HCG 100 IU/mL, growth hormone 1 IU/mL, and 10% patient serum) for 20 to 28 hours. If there are MII oocytes at retrieval, they are inseminated on the same day. All oocytes matured are then inseminated with the use of intracytoplasmic sperm injection (ICSI). Either cleaved embryo or blastocyst from IVM is transferred as well as IVF. Success rate is a major concern about IVM comparing to IVF. The pregnancy rate was 21.9%–29.9% in patients with PCOS at beginning. The success rate of IVM has been improving recently. Pregnancy and delivery rates of 32%–44% and 22%–29%, respectively, are reported. Live birth rate in single blastocyst transfers after IVM in PCOS patients was reported as high as 42.4% per oocyte collection. No difference in clinical pregnancy rates between IVM and IVF in the most recent analysis in PCOS patients was reported in a retrospective case control study of 121 subjects who underwent 178 treatment cycles of IVM, but the cumulative pregnancy rate was lower in IVM compared to IVF. However, the clinical pregnancy rate of IVM in regular cycling patients has been reported to be lower than that in PCOS patients. The most advantageous point of IVM is safety such as no ovarian hyperstimulation syndrome (OHSS), other than anything. Moreover, low cost, simple and convenience are beneficial not only for patients, but also for medical personnel. On the other hand, there have been some concerns raised about the effects of IVM on the health of resulting offspring. However, data for the period 1999–2004 show similar complication and malformation rates in babies born after IVM and IVF procedures. More recent published data also indicated a normal pregnancy course for after IVM compared with IVF cycles, normal growth and development in 196 babies born from IVM cycles,

and the delivery of 1,421 healthy infants following immature oocyte retrieval and IVM. Overall, based on the available data, it would appear that IVM is a simple, convenient, and cost effective technique that is associated with a good success rate in selected patients, such as those with PCOS. Data are also reassuring about the safety of IVM, although treatment of more patients with the use of this technique is required before definitive statements can be made in this regard. There seems to be barriers for infertility specialists to the use of IVM, such as concerns about difficulty of immature oocyte retrieval, success rate, neonatal normality, and availability of other strategies to reduce OHSS. There should be sufficient clinical data and instructional information for more IVF specialists about IVM to overcome these barriers. Therefore, our clinical experience of IVM for 17 years is presented in this symposium along with the theme of "ART Next Generation" for this conference. We have performed 1115 cycles of IVM retrievals with clinical pregnancy rate of 22% per transfer and 100 babies (1999-2014) born so far. There were no OHSS cases reported in spite of that the majority of patients were PCOS. More detail will be presented at the conference. Anyhow, the goal of all ART is to help patients fulfill their most desire to take home a baby. IVM is a new frontier of ART in ART next generation, please step forward to choose IVM as a main treatment option of ART with courage for the patient, especially for PCOS cases.