（学位第３号様式）

学 位 論 文 要 旨

氏　名	Yamato Mizobe
題　目	Studies on noninvasive selection of human embryos with high implantation potential for assisted reproductive technology （生殖補助医療のための高い着床能を有するヒト胚の非侵襲的選抜に関する研究）

Assisted reproductive technology (ART), in which sperm, oocytes and embryos are manipulated *in vitro*, represents the most promising mode of treatment for human infertility. The mean age of patients seeking ART is increasing, and both the number and quality of oocytes collected are known to decrease as patient ages increase. To prevent multiple pregnancies, which occur more frequently with ART than with natural pregnancy, the Japan Society of Obstetrics and Gynecology suggests that only one embryo should be transferred per attempt in ART. Therefore, it is important to produce as many embryos as possible from collected oocytes, to enable selection of the best embryo for transfer. Because oocytes with fragile oolemmae (fragile oocytes) are often observed during intracytoplasmic sperm injection (ICSI), which is a principal technique in ART, their potential for fertilization and development has now been examined. The results showed that the frequency of fertilization after ICSI into fragile oocytes was lower than that of oocytes with a normal oolemma (normal oocytes). However, the embryos produced from fragile oocytes had the same developmental potential as embryos derived from normal oocytes, indicating the eligibility of fragile oocytes for ART. To establish a noninvasive system for selection of embryos with a high implantation potential, the relationship between the first and second division patterns of embryos and their subsequent development *in vitro* and *in vivo* was evaluated. The results showed that high pregnancy rates were most likely with transfer of blastocysts derived from embryos that formed two cells during the first division and four cells during the second division (regardless of the presence or absence of fragmentation), and that completed the first and second divisions within 25.90 h and 37.88 h after culture, respectively (early cleaved embryos). To improve the selection system, the relationship between the compaction and blastocyst-formation times of early cleaved embryos and the pregnancy rates after transfer was evaluated. The results showed that selection of early cleaved embryos that completed compaction within 79.93 h after culture, and transfer at the blastocyst stage, improved pregnancy rates. In conclusion, a noninvasive selection system has been established for human embryos with a high implantation potential, based on early cleavage patterns and the time of completion of compaction. This system would enable many infertile patients to have their own children.