

Mini-Symposium on Germ Cell Production

Preface

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Germ cells are only selected as cells, which can transfer its germ plasm to descendants after fertilization. In mammals, both maternal and paternal genomes are required to accomplish normal development to term, suggesting that the function of female and male genomes are definitely different. The mechanism, by which female and male germ line cells are differentiated to competent germ cells, oocytes and sperm, during development, is not fully understood. Recent studies have been focusing on particular molecules, which regulate differentiation of germ-line cells and functions of competent germ cells. Results from these studies have provided further insight into differentiation of primordial germ cells, mitotic-meiotic transition, complex cell-to cell interactions in gonads, and epigenetic modifications of chromatin, etc. Together with the progress in the basic studies, on the other hand, technology for producing germ cells *in vitro* has been rapidly developed during the last decade and applied for breeding/reproduction of livestock and experimental animals, and also assisted reproductive technology in

human.

This Mini-Symposium adopts a point of issue on germ cell production *in vitro* and its functional regulation. The first three papers introduce recent topics; 1) genomic imprinting during gametogenesis (Dr. Hata and Sasaki), which governs genomic competence to support normal development, 2) production of sperm from ES cells *in vitro* (Dr. Noce), in which "vasa" play a key role for differentiation into male germ cells, and 3) production of oocytes from primordial germ cells *in vitro* (Dr. Obata), which allows to see whole process of oogenesis *in vitro*. In the second session, two papers are invited to introduce advanced systems for oocyte development and maturation *in vitro* in large animals (Dr. Miyano) and human (Dr. Yoshimura), which clearly show differences of the feature of germ cells in species, and its possibilities in the future and the remaining problems. Readers are reminded that the aim of this symposium is to integrate our understanding on recent progress of germ cell production *in vitro*. I appreciate all authors for their excellent contributions to this section of JMOR.