SUMMARY

Infertility, defined as the failure to conceive after a year of regular intercourse without contraception, is an important health problem affecting about 7% of the world population. Today, various assisted reproductive Technologies, including in vitro fertilization, embryo culture and embryo transfer, are commonly used in the treatment of infertility. Recent studies indicate that children born following infertility treatment are more susceptible to infections and allergic respiratory diseases like asthma when compared to naturally conceived children. However, there is no information in the literature concerning the effect of in vitro embryo culture performed under sub-optimal culture conditions on the number of basal cells in fetal tracheal tissue. Epithelial tissue covering the surface of the respiratory tract extending from the trachea to the lungs constantly renews itself. Basal cells that are present in the respiratory tract between the trachea and bronchioles and that are characterized by the expression of TRP63, cytokeratin 5 and 14 constitute the major cell population playing a role in this self-renewal process. Basal cells that function as stem cells with the ability of self-renewal realize this function by their ability to differentiate to Clara cells as well as to ciliated epithelial cells when necessary. The aim of the present thesis is to test whether or not *in vitro* embryo culture and embryo transfer performed under atmospheric concentrations of oxygen affects the number of tracheal basal cells in mouse fetuses. The present thesis had two study groups in total: One Control group and one Experimental group. Control group consisted of fetuses obtained from the mating of 8-12 weeks-old female mice with male mice of the same age. Female mice in the Control group did not receive PMSG and hCG that are regularly used in in-vitro fertilization studies for super-ovulation and ovulation induction. Experimental group consisted of fetuses that will be generated through embryo transfer of in vitro-developed blastocysts obtained with the culture of zygotes collected from the ampulla of the oviduct of super-ovulated female mice at 22 hours following the administration of hCG under atmospheric concentrations of oxygen for a period of 95 hours. Embryos scores will be determined in the Experimental group. In order to obtain fetuses for the Experimental group, a total of thirty blastocysts were transferred to three pseudo-pregnant mice. In both groups, pregnant mice were sacrificed on day 18 of gestation (18.5 d.p.c.) and fetuses were weighed individually and tracheal tissue samples were obtained. Triple-staining procedure was used to reveal general histological structure of the trachea. Immunofluoressence and

immunohistochemistry were used to reveal basal cells in the trachea. Surface area of the tracheal lumen along with the thickness of the epithelial layer was also measured in sections stained with immunohistochemistry. Data gathered from the present thesis revealed that fetuses in the Experimental group weighed significantly less compared to those of the Control group. The surface area of the tracheal lumen was significantly higher in the Control group, whereas the thickness of the epithelial layer did not differ between the two groups. The number of basal cells was significantly reduced in the Control group compared to the Experimental group, which constitute the most interesting finding of the present study. Evidence gathered from the present study suggests that this increase in the number of basal cells in the Experimental group is independent of the fetal weight and the surface area of the tracheal lumen. Further experiments are warranted in the light of the evidence gathered in the present study to determine whether or not the difference observed between the two groups as for the number of basal cells is due to cell proliferation and/or apoptosis or due to the differentiation of basal cells to ciliated as well as to secretoric cells.

Keywords: Fetal trachea, basal cell, p63, *in vitro* embryo culture and embryo transfer