# INTRODUCTION AND AIM OF THE WORK

## Introduction

It is reasonably well accepted that the standard parameters for semen analysis such as count, motility, forward progression, morphology and agglutination have significant limitations as indicators of fertility (Glass and Ericsson, 1979). Although these are representatives of the characteristics of spermatozoa, they give inadequate information about the fertilizing capacity of the spermatozoa (Templeton et al., 1982). Therefore, it would be worthwhile to develop a technique that measures the functional integrity of the sperm membrane and that can be readily applied clinically (Jeyendran et al., 1984).

The sperm hypo-osmotic swelling test evaluates the fertilizing ability of the human sperm which swells under hypo-osmotic condition due to influx of water. It has been shown that this swelling phenomenon reflects the functional activity of the sperm membrane and that it seems to be a useful indicator of the fertilizing capacity of human spermatozoa. Normally, 60% of sperm are swollen (Van Der Ven et al., 1986).

For the evaluation of the hypoosmotic swelling test in relation to zona-free hamster ovum penetration test, a good correlation ($r = 0.90$, $P < 0.001$) existed between the percentage of spermatozoa that showed swelling under hypoosmotic conditions

in a semen specimen and the ability of apermatozoa from that sample to undergo capacitation and penetrate denuded hamster oocytes (Jeyendran et al., 1984). In a series of large number (270) of semen samples Chan et al., (1985) observed that their results could not demonstrate any significant correlation between the ability of sperm to swell in the hypoosmotic condition and the ability of sperm to penetrate zona-free hamster ova in vitro. Chan et al., (1987) and Chan et al., (1988) supported this view and believed that the percentage of sperm swollen after hypoosmotic treatment was also found to be of little value in predicting the fertilizing capacity of sperm in vitro.

As denuded hamster oocyte lacks the zona pellucida, the zona - free hamster egg test does not always reflect the ability or inability of spermatozoa to fertilize intact oocytes (Gould et al., 1983).

Acrosin is a tryspin-like serine proteinase which is associated with the inner acrosomal membrane of mammalian spermatozoa. This enzyme seems to play multiple important biological functions at the molecular level of the fertilization process. Evidence obtained in non-human species suggests that acrosin enables sperm penetration through the zona pellucida of the oocyte (Srivastava et al., 1986). In addition, possible roles of acrosin include causing or facilitating the acrosome reaction (Lui & Meizel, 1979), facilitating sperm passage

through the vitelline (Wolf, 1977), enhancing sperm migration in the female reproductive tract by the release of kinins from kininogens (Fritz et al., 1973) and degrading sperm protamines and causing the dispersion of sperm chromatin in the egg cytoplasm (Marushige and Marushige, 1975a, 1975b).

Also studies of human spermatozoa in the available literature gave multiple evidence that acrosin may play important role in fertilization in human. Cryopreserved human spermatozoa, which are usually less fertile than freshly ejaculated sperms, contain reduced acrosin levels (Goodpasture et al., 1981a). Spermatozoa from the first fraction of split human jaculates which are accepted generally to be more fertile than those of later fractions, also possess higher level of acrosin activity (Goodpasture et al., 1982). Ejaculates obtained from symptomatic men of infertile couples possess much lower level of acrosin activity than ejaculates from asymptomatic men (Goodpasture et al., 1982). Also Mohsenian et al., (1982) reported that acrosin activity is significantly lower in spermatozoa from patients with unexplained infertility compared with men of known fertility.

All these suggestive evidences of the role of acrosin in fertilization of man were proved definitely by an excellent study carried out by Elce et al., (1986). These authors found that monoclonal anti-bovine acrosin antibody which binds to human acrosin at a conformationlly determined epitope, did

inhibit the dissolution of hamster zona pellucida by purified human acrosin.

All the previous reports suggested that the study of acrosin activity of human spermatozoa seems to be an important topic to go deeply in for better understanding of fertilization in man.