CHAPTER – VI

SUMMARY
The effect of environmental cadmium on the male immune system and reproductive system has been a major area of concern for several years. The humans are exposed to various types of environmental contaminants at different stages of their life span; the majority of these are harmful. Cadmium (Cd) is considered to be one of the most toxic heavy metals. Exposure to cadmium as a result of industrial and environmental pollution leads to dangerous health hazards. Cadmium competes with zinc and provokes bioaccumulation. This is because of the close interaction between cadmium and zinc an essential micronutrient. It becomes difficult to remove cadmium which forms a ligand with metallothionein.

The study explains that the response to cadmium induced cellular stress result immunomodulatory effects as recorded in both \textit{in vivo} and \textit{in vitro} studies. Function of testicular macrophages was determined by studying various morphological study (morphological alteration, DNA fragmentation, scanning electron microscopy), cell function study (such as phagocytosis, chemotactic migration, intracellular killing), enzyme release assay(NO, MPO, lysozyme release and alkaline phosphatase release) and cytokine release was studied in both \textit{in vivo} and \textit{in vitro} was recorded and compared. Investigation elucidated by light microscopy were compared with the results of SEM observation and it reveals that cadmium exposure shows a structural changes occur which further interfere the cell function, enzyme release and cytokine release (both \textit{in vivo} and \textit{in vitro}). Therefore it can be concluded that intoxication of cadmium causes a deleterious adverse effect on testicular function which may leads to infertility.

To investigate further the extent of effect reproductive parameters (sperm count, sperm motility, sperm morphology), testosterone hormone level, study of seminal vesicle marker (fructose), oxidative stress parameter (LPO) and antioxidant
activity (SOD and catalase) were performed. It was found that the sperm count and sperm motility are both reduced and sperm morphology altered due to cadmium treatment.

It is the somatic cell of the testis like the macrophage that has been most directly implicated in regulating testicular immune privilege. The condition of immune privilege in the testis is maintained by a unique testicular environment that controls immune cell activity, inducing and maintaining peripheral tolerance and suppressing adaptive immunity in a tissue-localized manner. Cadmium exposure reverses this condition leading to immunocompliance of the macrophage mediated innate or nonspecific host response, augment inflammatory damage and subsequently, a loss of immune privilege. Intuitively, the latter becomes responsible for the semenological alterations and sperm functions. Hence, it can be summarized that the toxic potential of cadmium is overtly manifested in the testes and this may bear particular significance in heavy metal induced infertility.