EVALUATION OF OCCUPTIONAL EXPOSURURE TO ETHYLENE OXIDE (ETOx) AND ITS EFFECTS ON WORKERS IN THE FIELD OF MEDICAL PRODUCTS STERILIZATION

By

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A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Science
Department of Basic Science

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2010

Abstract

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Degree : M.Sc. in Environmental Science, Basic Science Department, Institute of Environmental Studies & Research, Ain Shams University.

Ethylene oxide gas (EtO) represents an important hazardous industrial gas for the contact workers during the sterilization of the medical products. More recent work has focused on aspect of its harmful effects on exposed persons. Thus, the studying of the immunological parameters in exposed blood persons may help to predict the bad effects and these parameters like: immunoglobulin G (IgG) concentration and the clusters of differentiation subsets (CDs). Also, studying the hematological changes can give a good mirror of the general health of these contact persons; these parameters like: hemoglobin concentration (Hb), platelets count (PLT) and total leukocyte count (TLC). Finally, the hazardous effects of gas exposure may be clarified in studying the cancer incidence probability; studying of the p53 gene mutations is considered one of the further steps to know how to control these bad effects.

Acknowledgement

First and foremost thanks to GOD for helping me to fulfill this work.

I would like to express my sincere appreciation and deepest gratitude to **Prof. Dr. Mahmoud Ahmed Ibrahim Hewehy,** Prof. of Public Health, Basic Science Department, Institute of Environmental Studies and Research, Ain Shams University. for his kind supervision, continuous encouragements and generous attitude.

In the mean time I would to express my deepest gratitude to **Dr. El-Sayed El-Sayed El-Okda,** Lecturer of Occupational and Environmental Health, Faculty of Medicine, Ain Shams University for his great help assistance supported me to accomplish this study.

Also, I am so greatly indebted to **Dr. Aly Fahmy Mohamed El-Said**, General Manager of Applied Virology Research Sector, VACSERA for his supervision, Instructive Criticism, invaluable assistance and meticulous revision of all details of this Thesis.

Warms words of thanks to my **Father, Mother, Sister** for their love, Encouragement and for their cheerful spirit.

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List of Abbreviations

Btu	British Thermal Unit**.**
CA	Chromosomal aberrations.
CAD	Coronary Artery Diseases
CDs	Clusters of differentiation subsets.
CEA	Carcino embryonic antigen.
CNS	Central nervous system.
DNA	Deoxy ribonucleic acid.
ECH	Ethylene Chlorohydrins.
EDTA	Ethylene di-amine tetra acetic acid.
EG	Ethylene Glycol.
ELISA	Enzyme Linked Immunosorbent-Assay.
EtO	Ethylene oxide gas.
EPA	Environmental Protection Agency.
Fc	Fab fragments.
FCS	Flow cytometery system.
FSC	Forward angle scalter.
GC-MS	Gas chromatography- Mass spectrometry.
GST	Glutathione-s-transferase enzyme.
G-6-PD	Glucose-6- phosphate dehydrogenase enzyme.
HAS	Human Albumin Serum.
Hb	Hemoglobin concentration.
HE Val	Hemoglobin adducts N- (2- hydroxy ethyl) valine.
IFN	Inter-feron.
IgA	Immunoglobulin –A.
IgD	Immunoglobulin-D.

IgE	Immunoglobulin-E.
IgG	Immunoglobulin-G.
IgM	Immunoglobulin-M.
LD50	Lethal Dose 50.
NER	Nucleotide Excision Repair.
NLB	Nuclei lysis buffer.
OSHA	Occupational Safety And Health Agency.
ppm	Part per million.
PCV	Packed cell volume (hematocrite value).
PEL	Permissible exposure limit.
PK	Proteinase –K.
PLT	Platelets count.
RBC	Red blood cells.
RIA	Radio Immune Assay.
SCE	Sister- Chromatid exchanges.
S.D.	Standard Deviation.
SPSS	Statistical Package of Social sciences.
SSC	Side angle light scalter.
SSCP	Single Stranded Conformational Polymorphism.
STS	Soft Tissues Sarcoma.
TLC	Total Leukocyte count.
TWA	Time Weighted Average.
UDS	Unscheduled Deoxy ribonucleic acid synthesis.
WFI	Water For Injection.

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Introduction

Ethylene Oxide gas (EtO) is an important volatile industrial chemical. Its major importance in the heat -sensitive materials and products sterilization ***(Nakata et al ., 2004)***.

Although, EtO gas is a well-known sterilizing agent such as sterilizing bandages, sutures, surgical implements, oxygenators and tubing applied to heart surgery, the residual levels of EtO gas and ethylene glycol (EG), may be hazardous to the patients. Therefore, it must be removed by the aeration process *(**Jordy et al., 2000 and Dias et al., 2009).***

The Ethylene oxide (EtO) gas is toxic to humans due to its epoxide forms hydroxyethyl adducts with macromolecules such as hemoglobin and DNA, so the gas is mutagenic in vivo and in vitro and carcinogenic in experimental animals ***(Marczynski et al., 2006).*** Also in human , due to its capability of increasing the incidence of leukemia and/or lymphoma in the exposed persons *(**Vincent et al ., 2007)**.*

Concurrently, EtO gas may cause reproductive failure if exposed personals were exposed in large quantities ***(Mendes et al., 2007 and Nancy et al., 2007)***.