BIOTERRORISM

Essay
submitted in partial fulfillment for the Master Degree in
Clinical Pathology

By

Rania Mohanny Mikhail Khalil
M.B.B.Ch

Supervised By

Professor Doctor / Amira Mohamed Mokhtar
Professor of Clinical Pathology
Faculty of Medicine Ain-Shams University

Professor Doctor / Omnia Abu El-Makarem Shaker
Professor of Clinical Pathology
Faculty of Medicine Ain-Shams University

Faculty of Medicine
Ain-Shams University
2005

الإرهاب البيولوجي

رسالة
مقدمة توطئة للحصول علي درجة الماجستير في الباثولوجيا الإكلينيكية

مقدمة من

الطبيب/ رانيا مهني ميخائيل خليل
بكالوريوس الطب و الجراحة
كلية الطب- جامعة عين شمس

تحت إشراف

الأستاذ الدكتور / أميرة محمد مختار
أستاذ الباثولوجيا الإكلينيكية
كلية الطب- جامعة عين شمس

الأستاذ الدكتور / أمينة أبو المكارم شاكر
أستاذ الباثولوجيا الإكلينيكية
كلية الطب- جامعة عين شمس

كلية الطب
جامعة عين شمس
2005

Acknowledgement

Praise and peace be to ***ALLAH****, who has guided us to this, never could it be done without the help of* ***ALLAH****.*

I would like to express my deepest gratitude and appreciation to ***Prof. Dr. Amira Mokhtar,*** *professor of clinical pathology, faculty of medicine, Ain Shams University for her generous supervision, continuous encouragement and unlimited help. She gave me much of her precious time and experience through all aspects of this work.*

No words can explain my profound gratitude and sincere thanks to ***Dr. Omnia Abu El-Makarem,*** *professor of clinical pathology, faculty of medicine, Ain Shams University for her kind and continuous guidance, valuable suggestions and unfailing support.*

I owe much to my parents and my husband for their extended love, care and support.

Rania Mohanny Mikhail
Cairo – 2005

Contents

	Page
Introduction and aim of work	1
Anatomical and physiological considerations.	4
Scrotum	4
Testis	6
Epididymis	19
Pathology of Testicular Tumors:	23
Molecular Biology	23
Classification	25
Epidemiology	27
Etiology	30
Pathogenesis and Natural History	32
Diagnosis of testicular Tumors:	34
Clinical manifestations.	34
Clinical Staging.	36
Staging systems	43
Prognosis.	47
Clinical Variants of testicular tumors in Adults.	48
Testicular tumors in children.	81
Treatment of testicular Neoplasms (Adults & Children)	92
Chemotherapy in management of testicular Neoplasms.	124
Surgery in the treatment of testicular tumors.	138
Fertility Issues in patients with	151
	156
	165

testicular tumors. *Summary and conclusions.* *References.* *Arabic summary.*	

LIST OF ABBREVIATIONS

US	United States
B. anthracis	Bacillus anthracis
CDC	Centre for disease control and prevention
HEPA	High efficiency particulate air filters
LRN	laboratory response network
DFA	Direct fluorescent antibody
ELISA	Enzyme linked Immunosorbent assay
PCR	Polymerase chain reaction
MMWR	Morbidity mortality weekly report
ACEI	angiotensin converting enzyme inhibitor
EM	Electron microscopy
LM	Light microscopy
F. tularensis	Francisella tularensis
VHF	Viral hemorrhagic fever
EBO	Ebola virus
EHF	Ebola hemorrhagic fever
AHF	Argentine hemorrhagic fever
E. coli	Escherichia coli
HUS	Hemolytic uremic syndrome
Stx	Shiga like toxin
IHA	Indirect hemagglutination
PFGE	Pulsed-field gel electrophoresis
IFA	Indirect immunofluorescnce
ER	Endoplasmic reticulum
SEB	Staphylococcal enterotoxin B
ESR	Erythrocyte sedimentation rate
VEE	Venezuelan equine encephalitis
EEE	eastern equine encephalitis
WEE	western equine encephalitis
MRI	Magnetic resonance imaging
SEDIGFA	Silver Enhanced Dot Immunogold Filtration Assay

PPE	Personal protective equipment
NIOSH	National Institute Of Occupational Safety and Health
ETO	Ethylene oxide
SCBA	Self-contained breathing apparatus
USAMRID	US Army Medical Research Institute of Infectious Diseases

CONTENTS

List of figures.....…….

List of tables…… .. ……

List of abbreviations……. ……

INTRODUCTION AND AIM OF THE STUDY …

REVIEW OF LITERATURE

· ***Bioterrorism*****.....**

General features……

Historical aspect……

Classification……

· ***Biological weapons*****……..**

Category (A) :

- *Anthrax …….*
- *Botulism ……*
- *Plague ……*
- *Smallpox ……..*
- *Tularemia ……..*
- *Viral hemorrhagic fevers ……*

Category (B):

- *Brucellosis …….*
- *Epsilon toxin of Clostridium perfringens ..*
- *Escherichia coli serotype 0157:H7 ……*
- *Glanders (Burkholderia mallei) …….*

- *Melioidosis (Burkholderia Pseudomallei)..*
- *Psittacosis (Chlamydia Psittaci) ……*
- *Q fever (Coxiella burnetii) ……*
- *Ricin toxin (Plant toxin) ……*
- *Staphylococcal Enterotoxin B (SEB) ……*
- *Typhus fever (Rickettsia prowazekii) ……*
- *Viral encephalitis ……..*
- *Water safety threats (Vibrio cholera) ……*

Category (C):

- *Nipah virus ……...*
- *Hanta virus ……*

· ***Prevention and Control*** *……..*

- *Prepardness and response to biological attack….*

SUMMARY *……..*

REFERENCES *……*

ARABIC SUMMARY *……*

List of figures

No.	**Comment**	Page
1	Bacillus anthracis cycle	**15**
2	Lesion of cutaneous anthrax	**19**
3	Bacillus anthracis gram- stain	**24**
4	Malachite green spore stain for Bacillus anthracis	**25**
5	Bacillus anthracis gamma phage lysis on sheep blood agar	**26**
6	Direct fluorescent antibody staining of Bacillus anthracis cells	**27**
7	McFadean capsule reaction	**28**

List of tables

No.	Comment	Page
1	Differentiation of types of bio - terrorism	5
2	Levels of protection for a hazardous chemical incident	110

Introduction

As we enter the 21st century, the threats of biological warfare and bioterrorism appear to be more than before. After the September 11, 2001 attacks on the world trade center and distribution of anthrax spores via the USA postal service, every country in the world is now living under the shadow of an unknown yet already enemy biological weapons. Every individual has suddenly become very vulnerable to this new weapon, which can strike any body at any time without any warning ***(Pal and Chattopadhyay, 2002).***

Historical evidence suggests that biological weapons have been used for many centuries, despite the international agreements to ban such weapons, namely the 1925 Geneva Protocol and the 1975 biological and toxin weapons convention, there is no effective international mechanism for challenging either the development or the use of biological weapons ***(Spencer and Lightfoot, 2001).***

The use of microorganisms as agents of biological warfare is considered inevitable for several reasons including ease of production and dispersion, ability to cause high rates of morbidity and mortality and difficulty in diagnosis ***(Broussard, 2001).*** Biological weaponeers now have the frightening ability to alter the genetic makeup of pathogens rendering them resistant not only to available antibiotic therapy, but also to the currently effective vaccines and in dark corners of some fringe groups, bioweaponeers are searching for the capability of designing pathogens that target specific races ***(Wenzel, 2002).***

Biological agents that have been identified as posing the great threat are Variola major (smallpox), Bacillus

anthracis (anthrax), Yersinia pestis (Plague), Clostridium botulinum toxin (Botulism), Francisella tularensis (Tularemia), Ebola hemorrhagic fever and Marburg hemorrhagic fever and others ***(Broussard, 2001).***

Knowledge of the principle clinical presentation of victims of biological warfare or bioterrorism is essential to all physicians. This knowledge may contribute to the early recognition of a cluster of patients, an epidemic, an unusual disease, quick referral to emergency department leading to early diagnosis, and rapid notification of the ministry of health. All these and the institution of appropriate measures will ultimately contribute to the survival of individual patients and at risk populations ***(Yinnon et al., 2002).***

Aim of the study:

The aim of this study is to spot a light on different microorganisms used as weapons in bioterrorism.

Bioterrorism

General Features:

Bioterrorism is defined as "the international use of micro-organisms or toxins derived from living organisms to produce death or disease in humans, animals or plants".

From the public and private health perspective, bioterrorism can be defined as the deliberate release of pathogens or their toxins into a civilian population with the intent to cause illness or death. In addition to humans, agricultural animals and plants must also be considered as potential targets of bioterrorism ***(Snyder and Weissfeld, 2003).***

Bioterrorism utilizes specific terms, many of which are used interchangeably. As defined above, bioterrorism (biological-warfare) refers to indiscriminate targeting of the masses (e.g. battlefield or civilian population), whereas the term biocrime or biothreat is used when a bioterrorist which may be one individual who acts alone or a state or non state non-sponsored group, targets a specific group or individual. The bioterrorism associated cases of anthrax that occurred in the United States (U.S.) in October and November 2001 represent a biocrime because the primary targets were U.S. politicians and the media rather than the U.S. civilian population. Thus a biocrime is a criminal act involving the use of biological agents as weapons, and a biothreat is characterized as a suspected but unconfirmed release of a biological agent(s) i.e., microbial pathogens and/or toxins which have been previously considered or used in biological warfare and recent terrorist events ***(Gilchrist et al., 2000).***