THE ROLE OF PHENOLIC GLYCOLIPID-I IN DIAGNOSIS OF LEPROSY

Essay

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وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ

وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا

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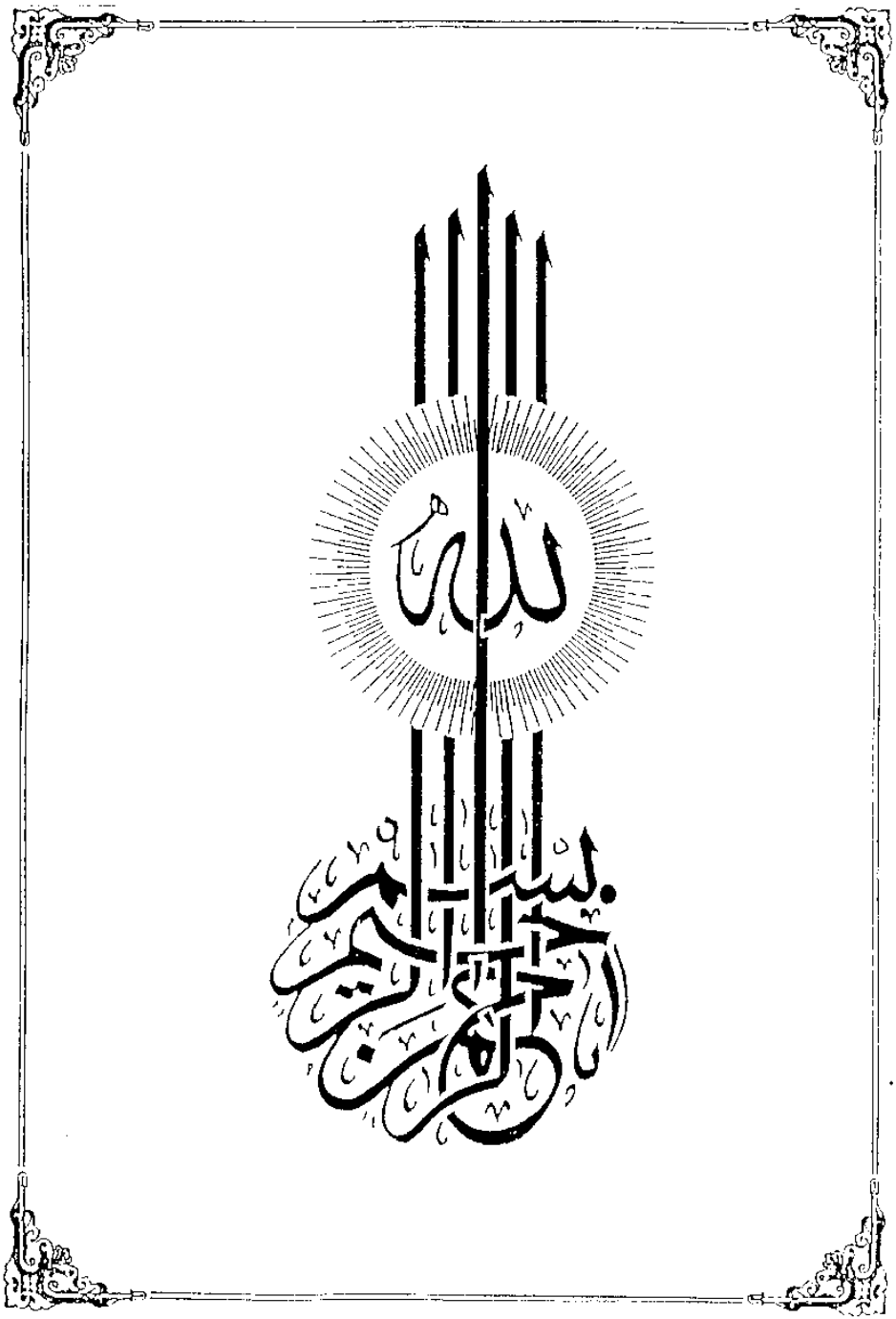

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INTRODUCTION AND AIM OF THE WORK

Leprosy is a chronic disease resulting from symptomatic infection with Mycobacterium leprae (M.leprae), which currently affects nearly 12 million persons worldwide. Leprosy is regarded as representing a spectrum of disease states in which the host response to the organism governs clinical manifestations . At one end of the spectrum is tuberculoid leprosy, in which skin lesions are paucibacillary and parameters of cell mediated immunity (CMI) are intact, and at the opposite end is lepromatous leprosy, in which macrophages and Schwann cells in skin lesions are packed with viable bacilli and M.leprae-specific CMI is poor *(Neill and Klebanoff, 1988).*

Ultrastructural studies have suggested that the cell wall of M.leprae has three layers; an electron dense innermost layer containing peptidoglycan; an electron transparent middle layer composed of long chain mycocerosyl fatty acyl groups and arabinogalactan, an abundant polysaccharide of M.leprae; and an outer layer composed largely of carbohydrates *(Rastogi et al., 1986).*

These carbohydrates include the terminal saccharides of the major phenolic glycolipids, the major glycolipid

ABBREVIATIONS

Acid Fast Bacilli	:	AFB
Bacterial Index	:	BI
Borderline Borderline	:	BB
Borderline Lepromatous	:	BL
Borderline Tuberculoid	:	BT
Bovine Serum Albumin	:	BSA
Cell Mediated Immunity	:	CMI
Enzyme Linked Immunosorbent Assay	:	ELISA
Lepromatous Leprosy	:	LL
Lipoarabinomannan	:	LAM
Lipomannan	:	LM
Multibacillary	:	MB
Mycobacterium	:	M
Paucibacillary	:	PB
Phenolic Glycolipid-I	:	PGL-I
Phenolic Glycolipid-II	:	PGL-II
Phenolic Glycolipid-III	:	PGL-III
Phenolic Glycolipid-I Synthetic Analog	:	$PGL\text{-}I_{SA}$
Polar Lepromatous	:	LLp
Polar Tuberculoid	:	TTp
Recombinant Interleukin 2	:	rIL-2
Subpolar Lepromatous	:	LL_s
Subpolar Tuberculoid	:	TT_s
Tuberculoid Leprosy	:	TT

ABBREVIATION

Acid Fast Bacilli

Bacterial Index

Borderline Borderline

Borderline Lepromatous

Borderline Tuberculoid

Bovine Serum Albumin

Cell Mediated Immunity

Erythema Nodosum Leprosum

Lepromatous Leprosy

Lipoarabinomannan

Lipomannan

Multibacillary

INTRODUCTION AND AIM OF THE WORK

moieties of M.leprae; the terminal sugars of lipoarabinomannan (LAM), the major complex lipopolysaccharide of M.leprae ; and lipomannan (LM) *(Gaylord and Brennan, 1987).*

Phenolic glycolipid-I (PGL-I) contains the M.leprae-specific and unique terminal disaccharide, 3,6-di-o methyl - B-D- glucopyranosyl (1---4) 2,3 -di-o - methylrhamnopyranoside. This lipid is found in large amount in leprosy infected tissues of humans and armadillos origin, and it has gained considerable interest for its antigenic properties *(Cho et al., 1986).*

The aim of our work is to clarify the role of phenolic glycolipid-I specificity and sensitivity in diagnosis of leprosy.

REVIEW

OF LITERATURE

CHAPTER (I)

LEPROSY : AN OVERVIEW

LEPROSY : AN OVERVIEW

Leprosy is a chronic infectious disease of man caused by the intracellular microorganism M.leprae . It affects almost all parts of the body, but primarily the peripheral nerves and skin. This disease is still a public health problem in developing countries.

Approximately 1.6 billion people live in areas where the estimated prevalence of the disease is above 1 per 1000 persons, and all of them may be considered at risk of contracting the disease ***(Soebono and klatser , 1991).***

It has been known for a long time that people exposed to leprosy do not necessarily catch the disease. The majority of people exposed effectively resist infection with M.leprae even in highly endemic areas. It is now thought that as many as 200 individuals become infected with M. leprae for each case that is detected or develops overt disease ***(Abe et al., 1980).*** In those people unable to mount an adequate immune response to infection with M.leprae, the incubation period varies, usually in the range of 2 to 4 years but it may be 30 to 40 years ***(Ayliffe, 1992).***

AETIOLOGY

Leprosy is caused by M.leprae which are obligate intracellular bacteria. ***(Schlesinger and Horwitz, 1991),*** that multiply mainly inside the macrophages of the skin and Schwann cells of the nerves ***(Neill and klebanoff, 1988).***

The organism is strongly acid-fast, rod shaped with parallel sides and rounded ends. In infected tissues, the organism commonly occurs in clumps or globi which may become very large containing hundreds of bacteria ***(Draper,1983).***

M.leprae grow at 30-33 $\overset{\circ}{c}$ and do not produce toxins which would damage their host cells and they grow slowly by division every 12 days, thus avoiding the rapid killing of the cells in which they have made their home ***(Colston, 1992).***

They cannot be grown in vitro. Humans are not the only natural host of M.leprae but also armadillos are recognized as a large natural reservoir of M.leprae ***(Truman et al., 1986).***

CLASSIFICATION

There are many systems for classification of leprosy. They include :

(1) ***Madrid classification (1953)*** which classified leprosy patients into: Lepromatous, Tuberculoid, Indeterminate and Borderline.

(2) ***Indian Leprologists Association (1955)*** which classified leprosy patients into:

1. Lepromatous (L)
2- Tuberculoid (T)
3. Maculoanaesthetic (MA)
4. Polyneuritic (P)
5. Borderline (B)
6. Indeterminate (I)

(3) ***Ridley-Jopling classification (1966)*** which classified leprosy patients into five groups :

1- Tuberculoid (TT)
2- Borderline Tuberculoid (BT)
3- Borderline Borderline (BB)
4- Borderline Lepromatous (BL)
5- Lepromatous (LL)

(4) ***World Health Organization (WHO) classification (1982)*** which classified leprosy patients into two groups,