POLYMORPH NUCLEAR LEUCOCYTE PHAGOCYTOSIS IN RENAL DISEASES

THESIS

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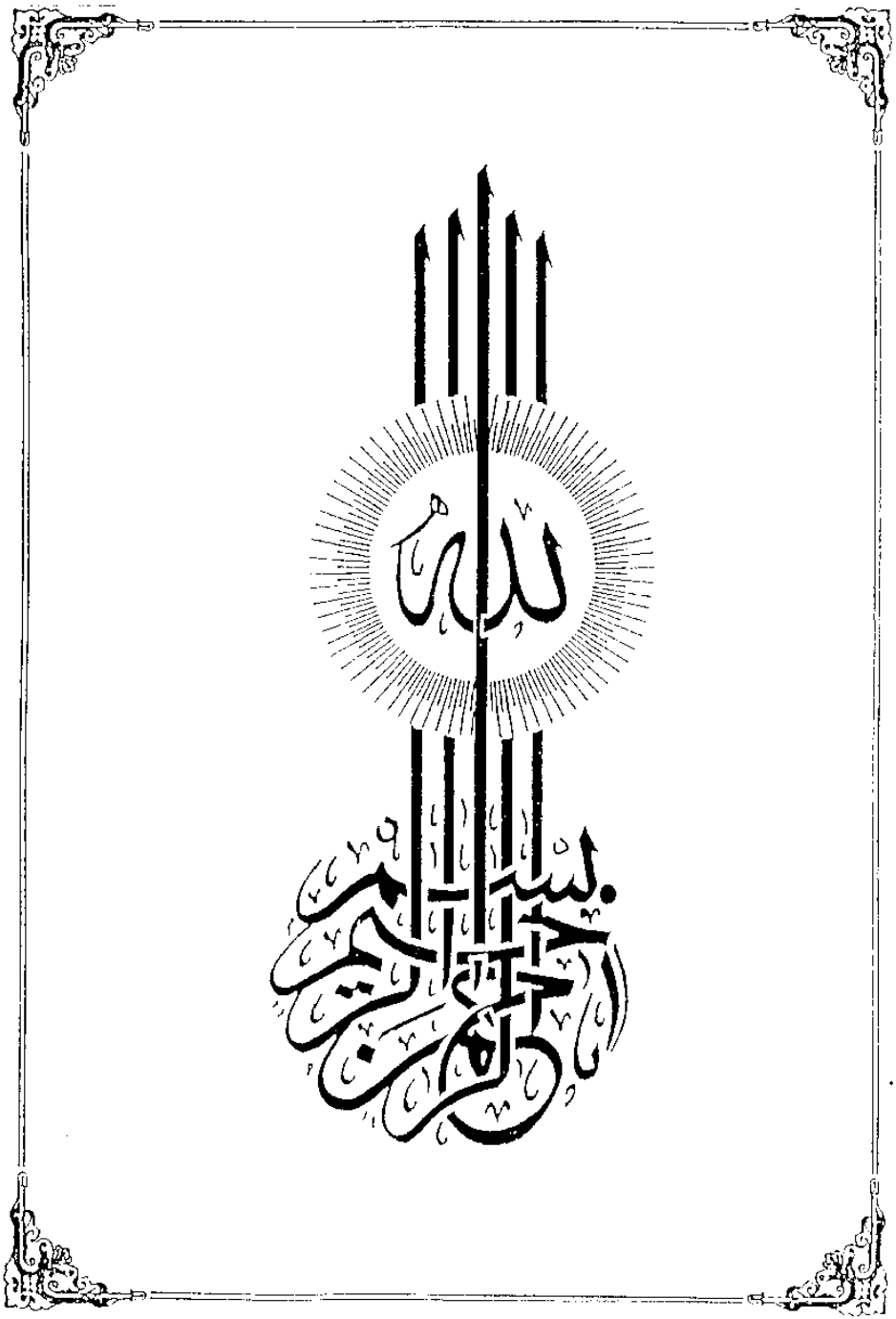

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Abbreviations used

PNL = Polymorphnuclear leucocytes.

NBT = Nitro blue tetrazolium test.

CRF = Chronic renal failure.

CGN = Chronic glomerulonephritis.

CPN = Chronic pyelonephritis.

PI = Phagocytic index.

PBS = Phosphate buffer saline.

INTRODUCTION
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One of the most important defence mechanisms in the body is phagocytosis which plays an important role in early stages of bacterial infections. Phagocytosis is prominant activity of neutrophils, monocytes, macrophages and to lesser extent oesinophils phagocytic processes are chemotaxis, recognition and partical ingestion, degranulation and peroxide formation which are inter related steps occurring to same degree at the some time in any given foeus of infection Winkels Teen,1973 .

Owing to the vital importance of the process of phagocytosis a lot of work has been done to study and evaluate the power of leucocytes to phagocytoses under normal and adverse conditions. Infection is among the most important dangers in chronic renal failure, and although regular dialysis and Transplantation improve the health of these patients and prolong their longivity they do not regain full health and are still susceptible to infections.

Several factors concerned with the deficient immune response have been studied including lymphopenia

associated with thymic atrophy and T-cell dysfunction. Neutrophil function has not been well studied, so the aim of our work is to study the phagocytic power of the polymorph-nuclear leucocyte in patients having chronic renal diseases. Many methods are applied for studing this function:

a) Measuring the uptake of candida albicans by neutrophils over a brief period of time. (Wlkinson 1977).

b) Measuring leucocyte candidical ability Xanthou et al., 1975 .

c) Studing of functional capacity of polymornuclear leucocyte using nitro blue tetrazolicem test Freeeman and King 1977 .

The present study is limited to the first approach aming of studing the phagocytic activity of neutrophil using the candida albicans.

REVIEW OF LITERATURE

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DEVELOPMENT, MORPHOLOGY, FUNCTION OF PHAGOCYTIC CELLS

Polymorphnuclear leucocyte are produced in the bone marrow from a common stem cell, where they stay for maturation for few days then flow into the circulation where their half life is 6-7 hours they can sarvive in a normal state in tissues for 4-5 days hence the total life span of neutrophils is very short 10-14 days. Mauer et al., 1960 .

During maturation in the bone marrow the polymorphs passes from the stem cell to myeloblast, promyelocyte, myelocyte, metamyelocyte then to band form and to segmented neutrophil. Kronkite and Fleidner 1964 .

The fully mature polymornuclear leucocyte has lobulated nucleus deep parplish in colour with Giemsa stain and contain course condensed chromatine. The cytoptasm is faint pink and contains specific granules. (Wintrobe et al., 1974).

When the mature cell migrate to tissues they remain active for 3-4 days Cline , 1975. Several humoral

factors regulate the polymorph nuclear leucocyte production Cline, 1975; Stossl, 1974; including a serum glycoprotein called colony stimulating factor which is a granulopoientin equivelant to erythropoietin. Foster; Mirand, 1970.

Neutrophils have two types of granules named primary and secondary according to their sequence of appearance during phases of maturation.

The primary granules are formed from the assembled protein synthetised in the neutrophil precarsors in the golgiregion. They are relatively large electron dense. and have an azur colour with giemsa stain. They contain hydrolytic enzymes myelo-peroxidase, lysosyme and cationic protein of low moleular weight. (Boulton , [illegible] et al., 1973 . The secondary granules develop during the process of maturation of nutrophils. They are smaller less electron dence with lighter colour. They contain alkaline phosphatase and lectoferrine, Baggiolini et al., 1970), which is a microbicidal protein Baggiolini , et al., 1970 .

The major function of neutrophilic granulecytes is to prevent or retard the invasion of infective agents and other foreign materials into the host enivornment.

This is accomplished by phagocytosis and digestion of material. Neutrophils release various substances into their environment and the may have secretory function Wintrobe 1975 , as well structural changes occur in the rigid immobile neutrophil precursers rendering them elastic and mobile in the mature form and thus could escape from the bone marrow under the influence of chemotactic factor of acute inflammation, (Lichtmain Maile 1972.

Monocytes:

Monocytes are produced from promonocyte in the bone marrow its nucleus indented or folded over with delicate pale staining, the chromation is in fine strands, the cytoplasm is numerous full of fine dust like lilac granules. The monocytes in the peripheral blood is probably the circulating counter part of the fixed tissue Macrophage, it is capable of phagocytosis on arrival at an area of inflammation where they becomes indistinguishable from macrophages of tissue origin. Maile , 1972 . It contains large amounts of lipase and may be this specifically endowed to combat those becilli that have a lipoid capsules. Maile 1972 .

Monocytes contain primary granules which stain azure by Giemsa stain and have perioxidase and lysosomal enzymes they also have secondary granules with unknown contents. When monocytes reach the tissues they lose their peroxidase containing granules. But continue to synthesize the lysomal enzymes in the cytoplasmic vesicles and become tissue marophages (Erwin 1974).

Monocytes has two distinct receptors sites (Muber 1968) . One for C_3 and other for IgG. The two receptors can act indenpendently or cooperatively when the cell act as phagocyte. Monocytes spend less time than neutrophile to mature but remain in the circulation for a longer time. In the early phase of inflammation the poly morphneuclear leucocytes prodominates but within 12 hours the monocytes become the predominant cell type in the inflammatory reaction, Meuret et al., 1973.

Macrophages:

They are large and have an irregular contour the motility is similar to that of monocyte. The cytoplasm

is abandent and neutral red bodies of variable size and colour are seen in variable numbers. Alveodar macrophages, peritonial macrophages, splenic macrophage and skin macrophages. (Gade Bursh 1980".

Eosinophils:

Show the same maturation phenomena as neutrophils. The nuclei usually larger than those of neutrophils and do not stain as deeply; the granules of eosinophils are distinguished by their large uniform size and bright yellowish red colour. Eosinophils are less capable of phagocytosis, in the course of which there is degranulation as in neutrophil (Miale 1972). They also exhibit, the chemotaxis product of eosinophilic granules causes disruption of mast cells and this may be significant reaction in inflammatory lesion. It was once thought the eosinophils contributed to allergic reaction as carriers of histamine but Miale 1972 , has shown that they actually have antihistaminic activity.