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POSTNATAL DEVELOPMENT OF LYMPHOID FOLLICLES IN THE PEYER'S PATCHES OF MALE ALBINO RAT HISTOLOGICAL AND HISTOCHEMICAL STUDIES

Thesis

Submitted in Partial Fulfillment for the Requirements of the Master Degree in Histology

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DEDICATED

TO MY

PARENTS

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INTRODUCTION AND AIM OF WORK

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The Peyer's patches were described by Peyer in 1677 as groups of subepithelial lymphoid follicles located throughout the intestine (Owen and Jones, 1974a) more frequently in the distal part (Cornes, 1965). Together with the other gut-associated lymphoid organs they might be the mammalian equivalent of the bursa of Fabricius in birds (Fichtelius, 1967and 1968) which regulate the production of antibodies.

Peyer's patches like other lymphoid organs (Fossum, 1980 and Belside and Sainte-Marie, 1981) has several compartments each with its own cellular components and perform certain functions (Sobhon, 1971) and there were some sort of cooperation found between cells in these compartment in order to elicit the immune response (Sminia et al., 1983).

The central importance of mucosal immune system has been well recognized as the first line of defense against pathogens that are encountered after ingestion (McGhee and Kiyono, 1993 and 1998) where sampling of the intestinal antigens takes place in the Peyer's patches follicle dome. Thus certain modification must be found in the epithelium overlying the lymphoid follicles (Owen et al., 1981) and the underlying basal lamina (McClugage and Low, 1984) in order to perform certain immunological function.

The development of the lymphoid tissue within the small intestine depends largely upon antigenic stimulation which is apparent during the first day of life (Stepankova et al., 1998). Major species differences were found in postnatal development of Peyer's patches ranging from well

developed patches at birth in sheep (Reynolds and Morris, 1983) to gradual postnatal development in rat (Sminia et al., 1983).

The mucosal immune response including that of the gut is compromised by age (Schumcker et al., 1996) this is associated with structural changes within the lymphoid follicles of Peyer's patches (Cornes, 1965; Reynolds and Morris, 1983 and Pabst et al., 1988) and explain the increased incidence and severity of gastrointestinal infectious diseases in old age (Schmucker et al., 1996).

The aim of this work is to study the histological structures of Peyer's patches at different postnatal periods and to show the effect of aging on the development of Peyer's patches.

REVIEW OF LITERATURE

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Immune System:

Our environment contains a great variety of infection microbes e.g. viruses, bacteria, fungi, protozoa and multicellular parasites. These can cause disease and if they multiply uncontrolled they will kill their host. Most infections in normal individuals are short lived and leave little perminent damage. This is due to the immune system, which guard against the infection agents (Roitt et al., 1998). Since microorganisms come in different forms, a wide varity of immune responses are required to deal with each type of infections. In the first instance, the exterior defenses of the body represent an effective barrier to most organisms, and very few infectious agents can penetrate intact skin, however many gain access across the epithelia of the gastrointestinal and urogenital tracts. (Roitt et al., 1998).

Types of immunity:

Immunity is either natural or acquired

Natural immunity refers to devices that prevent antigen from entering the body such as integument and mucous membranes. It is mediated by an important group of leucocytes which has phagocytic activity such as macrophages, monocytes and polymorphonuclear leucocytes. The cell binds to microorganisms, internalize and kill them. They use primitive non-specific recognition systems allowing them to bind a variety of microbial products. (Kessel, 1998 and Roitt et al.,1998).

Acquired immunity refers to elimination of antigen in the body and it is carried out by another important set of leucocytes which is the lymphocytes, they can fight by releasing antibodies (a molecule which

specifically recognizes and binds to a particular antigen). On reexposure they remember the infectious agents and can prevent it from causing disease later, this is the secondary immune response which is usually more rapid than the primary response (Kessel, 1998 and Roitt et al., 1998). Acquired immunity has two types of immune reaction; firstly is the cellular immunity in which immune competent cells react against and kill microorganisms, foreign cells (as tumor cells and tissue grafts) and virus-infected cells. This type of immunity is dependent upon T-lymphocytes. The other type of immunity is humoral immunity, which is based on the formation of antibodies (Junqueira et al., 1998 and Kessel, 1998).

In fact there is interaction between the lymphocytes and phagocytes for example, some phagocytes take up antigens and show them to T-lymphocytes in a form they can recognize, a process, which is, called antigen presentation. In turn the T-lymphocytes release soluble factors (cytokines) which activate the phagocytes and cause them to destroy the pathogens they have internalize. In another interaction, phagocytes use antibodies released by B-lymphocytes to allow them to recognize pathogens more effectively (Roitt et al., 1998)

Cells of the immune system:

Many cells are adapted to carry out specialized functions in the immune response. Such as phagocytes e.g mononuclear phagocytes and polymorphonuclear leucocytes, the auxillary cells (Those cells of inflammation e.g basophils, mast cells, platelets), eosinophils which are specialized group of leucocytes that have ability to emerge and damage large extracellular parasite and lastly lymphocytes. (Kessel, 1998 and Roitt et al., 1998).