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Introduction to the Immune System notes

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SESSION #5

GEM4- AUGUST 2006

8/8/06

INTRODUCTION TO THE IMMUNE SYSTEM

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IMPORTANT PEOPLE: LOUIS PASTEUR - SILK WORM

ELIE METCHNIKOFF - DROSOPHILA

IMMUNE SYSTEM → SENSES MICROBIAL MOLECULES. THE SIGNALS ARE PROCESSED LOCALLY AND AT DISTANCE

WHY DROSOPHILA?

- SHORT LIFE CYCLE
- GENETIC SYSTEM UNDERSTOOD
- FORWARD GENETICS
- REVERSE GENETICS

DROSOPHILA IMMUNE SYSTEM CAN SENSE: (BUT NOT NECESSARILY BIND)

- GRAM-POSITIVE BACTERIA
- " - NEGATIVE "
- VIRUSES

TLR

THERE ARE MANY "TOLL-LIKE" RECEPTORS THAT RECOGNIZE SIGNALS FROM BACTERIA, VIRUSES, PROTOZOA AND FUNGI
TLR INITIATE A SIGNALING CASCADE THAT ACTIVATE TRANSCRIPTION FACTORS

OTHER ORGANISMS (MICE & RATS) HAVE BEEN IMPORTANT TO STUDY THE STRUCTURE & FUNCTIONALITY OF HUMAN IMMUNE SYSTEM.

GI Host \longleftrightarrow MICROBIOME

STEADY STATE COMPLEX CROSS-TALK BETWEEN
EPITHELIAL CELLS AND THE MICROBIOME

- CONTRIBUTE TO TISSUE SHAPING AFTER BIRTH

THE HEMOPOIETIC SYSTEM OF MAMMALS

ERYTHROCYTES, PLATELETS, GRANULOCYTES, MACROPHAGES,
DENDRITIC CELLS, T-CELLS, NK CELLS, B-CELLS

CIRCULATE WITHIN THE
BLOOD VASCULAR BED

THE REST CIRCULATE

PHAGOCYTOSES (STEADY STATE)

- INVASIVE MICROBES

- APOPTOTIC CELLS \Rightarrow IMMUNO-SIGNALING CASCADES LEAD TO:

- CLEARANCE BY PHAGOCYTES
- SYNTHESIS OF COUNTER-INFLAMMATORY SIGNALS BY THE SAME PHAGOCYTES

PHAGOCYTOSIS (NON-STEADY-STATE)

- INVASIVE MICROBES

- APOPTOTIC CELLS POST CELL DEATH

MICROBES \Rightarrow IMMUNO-SIGNALING CASCADES LEAD TO:

- CLEARANCE OF MICROBES
- TRANSIENT TIGHTLY REGULATED ANTI-INFLAMMATORY

CELL LINEAGE: SENSE AND PROCESS INVASIVE MICRO-ORGANISMS