

## Lymphoid System: cells of the immune system

### Answer Sheet

Q1 Which areas of the lymph node have most CD3 staining?

A1 Most CD3 staining is present in the paracortex (T cell areas). This is towards the outside of the lymph node, between the lymphoid follicles.

Q2 Are there any CD3+ cells in the germinal centres? If so, why are these CD3+ cells present here?

A2 Occasional CD3+ T lymphocytes are present within germinal centres. These T lymphocytes are interacting with B lymphocytes, to provide the "help" necessary for the B lymphocytes to become activated, proliferate and switch the class of antibody that they secrete.

Q3 At high power, which parts of the cells seem to express CD3 (nucleus or cytoplasm/ membrane)?

A3 CD3 is present on the plasma membrane. However, with the resolution of light microscopy, it is only possible to say that immunostaining for CD3 cannot be seen in the nucleus.

Q4 Which areas of the lymph node have most CD20 immunostaining?

A4 CD20 immunostaining of B cells is seen in lymphoid follicles / germinal centres.

Q5 Where do you see CD68 positive cells in the lymph node?

A5 CD68+ cells are present at the centres of lymphoid follicles, these are macrophages. There are scattered CD68+ cells throughout the paracortex (T cell areas) and the sinuses of the lymph node, these are dendritic cells.

Q6 Associated with B cell areas, specialised macrophages are present. Where can you see these?

A6 CD68+ macrophages are present in the germinal centres of lymphoid follicles.

Q7 What is the main function of these specialised macrophages?

A7 These macrophages phagocytose dying (apoptotic) B lymphocytes that have not survived the process of affinity maturation (somatic hypermutation followed by selection for B lymphocytes with high affinity immunoglobulin receptors for antigen).

Q8 In T cell areas, CD68+ cells are present. What are these likely to be? What is their main function?

A8 These are dendritic cells, a specialised type of antigen presenting cells, able to activate naïve T lymphocytes (i.e. T lymphocytes which have never previously responded to antigen).

Q9 At high power, can you see any differences in morphology (shape) between the CD68+ cells in T cell areas and those elsewhere in the lymph node? Explain any differences you see?

A9 In the paracortex, CD68+ cells have long dendritic (branch-like) processes, which maximise their surface area for contact with T lymphocytes. The CD68+ cells at the centres of lymphoid follicles are round or oval, without dendritic processes. These macrophages are specialised for phagocytosis and do not need to maximise their surface area.

Q10 Some CD68+ cells are present in the sinuses of the lymph node. Where have these come from and what is their function?

A10 The CD68+ cells in the lymph node sinuses have come from peripheral tissues or other lymph nodes in a chain of nodes. They are in the process of entering the lymph node from peripheral tissues and are bringing antigen into the lymph node in order to present it to T lymphocytes.

Q11 What process takes place in the cortex? Which immunostain supports this?

A11 Positive selection (mediated mainly by thymic epithelium identified by the cytokeratin immunostain) is believed to be the main process occurring in the cortex. Although thymic epithelium is present both in the cortex and in the medulla, it is believed to carry out its main function, that of positive selection, in the cortex.

Q12 What process takes place in the medulla? Which immunostain supports this?

A12 Negative selection (mediated mainly by dendritic cells) is believed to be the main process occurring in the medulla. The dendritic cells stain positively for CD68+ and the majority of these cells are present in the medulla, where they are thought to mediate negative selection (some can be seen in the cortex as well). CD3+ cells are present in both the cortex and medulla, as CD3 and the T cell receptor are

expressed throughout the processes of positive and negative selection. This is because T cells are selected on the basis of the affinity of their T cell receptor and CD3 helps carry signals from the T cell receptor into the T lymphocyte.

Q13 What are the different functions of mature CD4+ T cells and CD8+ T cells? How could you distinguish between them in tissues?

A13 CD3+ mature T cells can be classified into CD4+ (helper) T cells and CD8+ (cytotoxic) T cells by immunostaining with antibodies against CD4 & CD8.

## **Process Identification & Report writing**

### **Appendix: abnormal - 79.558**

This slide shows a transverse section of a vermiform appendix, which is much larger than normal. The lumen contains a fibrino-purulent exudate, containing many neutrophils, which appear to stream from ulcerated areas in the lining mucosa. Neutrophils infiltrate the submucosa, spreading into the muscle where fluid exudate separates individual muscle fibres. Dilated blood vessels surrounded by inflammatory cells are seen under the serosa.

**Image Map:** [A AI AC AP 30](#)

**The pathological process is acute inflammation of the appendix or acute appendicitis.**

Appendix 79.558

