UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualifications:-

B.Sc. *B.Sc. (Intercal)*

Immunology C315: Inflammation and Immunity

COURSE CODE	:	**IMMNC315**
UNIT VALUE	:	**0.50**
DATE	:	**12-MAY-04**
TIME	:	**14.30**
TIME ALLOWED	:	**2 Hours 30 Minutes**

TURN OVER

C315 INFLAMMATION AND IMMUNITY

Candidates must answer **Sections A, B and C**. Please answer each section in a separate book.

The fraction of the total marks allocated to each section is as follows:

Section A: 60/180
(**essay**, 1 out of 3)

Section B: 60/180
(**short answers**, 3 out of 6)

Section C: 60/180
(one question out of one)

TURN OVER

SECTION A

Choose **ONE** question from the list below:

1. Describe how a neutrophil travels from the lumen of a blood vessel into an inflammatory site, and outline what it does when it gets there.

2. Innate immunity is more useful than adaptive immunity. Discuss.

3. Describe the mechanisms that are involved in the control of new blood vessel formation (angiogenesis) in health and disease.

SECTION B

Write short notes on **THREE** of the following:

1. What type of proteases are found in the complement system. Give four examples of how these proteases are activated, and of the substrates on which they act.

2. Briefly describe the kinin system, including its receptors. What are the effects of this system on the endothelial cell and inflammation.

3. Briefly compare the way in which NK cells and $CD8^+$ T cells recognise a virally infected target cell.

4. Describe the key experiments which have provided evidence for positive selection of thymocytes, and for the role of peptides in this process.

5. The difference between multiphoton confocal microscopy and conventional microscopy. Are there any drawbacks to multiphoton confocal microscopy?

6. The role of different extracellular matrix components in wound healing.

CONTINUED

SECTION C

Answer **ALL** the questions, based on data from the paper.

This paper examines the role of complement receptor 1-related protein y (Crry), which is expressed on erythrocytes.

Figure 1

Questions

1. Approximately how many erythrocytes are there in a mouse? What assumptions have you made to calculate this number?

2. What is the role of (a) Crry (b) DAF in regulating the survival of erythrocytes?

3. What is the role of (a) Crry (b) DAF in regulating C3 deposition after opsonisation?

4. Which data demonstrate why Crry single knockout mice are not viable?

Figure 2

Questions

5. Draw a diagram of the pathway responsible for the elimination of Crry/DAF/$C3^{-/-}$ erythrocytes in the absence of opsonisation.

6. What extra information comes from the use of FcRgamma knockout compared to Ig knockout mice as recipients?

7. What is the effect of opsonisation on the elimination of Crry/DAF/$C3^{-/-}$ erythrocytes?

8. Which receptor(s) may be involved in erythrocyte clearance? How could you demonstrate this?

9. Paroxysmal nocturnal haemoglobinuria (PNH) is caused by lack of DAF and CD59 on clones of haematopoietic cells, which results in spontaneous complement deposition on red cells. What is the common structural feature of these two molecules? Suggest the mechanism that leads to the loss of DAF and CD59 expression.

10. Autoimmune haemolytic anaemia (AIHA) is a loss of red blood cells triggered by the presence of anti-red cell antibodies. Would you propose (a) blood transfusion (b) anti-CD20 antibody for the treatment of AIHA? Why?

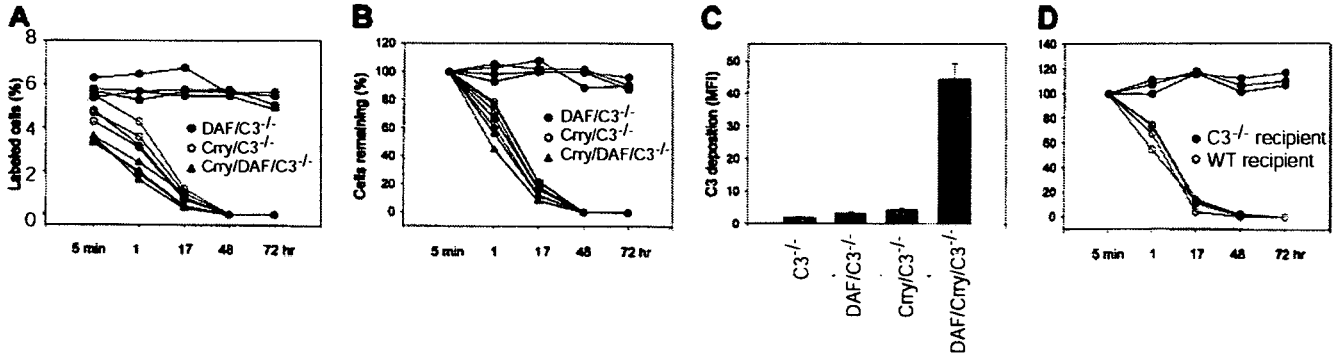

Figure 1 Legend Panel A. Erythrocytes from Crry/C3 double knockout mice (Crry/C3$^{-/-}$), or decay-accelerating factor/C3 double knockout mice (DAF/C3$^{-/-}$), or Crry/DAF/C3 triple knockout mice (Crry/DAF/C3$^{-/-}$) as shown, were labelled with biotin and transfused into C57Bl/6 recipient mice (3x10^8 cells/mouse). At the time shown the percentage of biotin labelled erythrocytes in blood samples from the transfused mice was determined. Panel B. Clearance kinetics calculated from Panel A by assuming the 5 min value is 100%. Panel C. Erythrocytes from the mice shown were opsonised with 34-3C, an anti-erythrocyte mouse IgG2a monoclonal antibody, treated with mouse serum for 30 minutes, then stained with a FITC-conjugated goat anti-mouse C3 antibody. Panel D. Biotin labelled erythrocytes from Crry/DAF/C3$^{-/-}$ knockout mice were transfused into C57Bl/6 or C3 knockout (C3$^{-/-}$) mice. At the time shown the percentage of biotin labelled erythrocytes in blood samples from the transfused mice was determined.

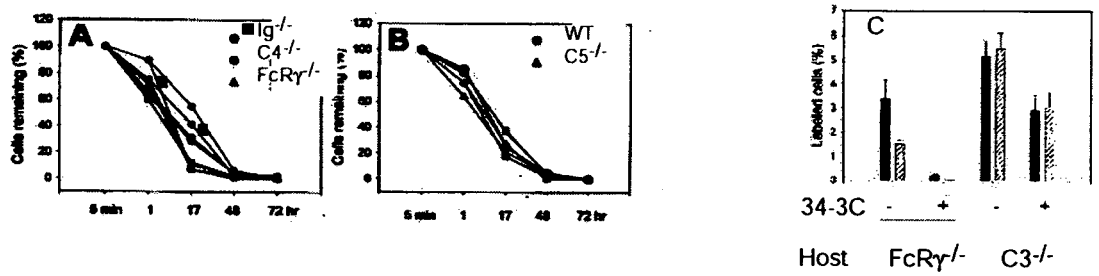

Figure 2 Legend Panels A and B. Erythrocytes from Crry/DAF/C3$^{-/-}$ mice were labelled with biotin and transfused into C57Bl/6 or Ig knockout, or C4 knockout, or FcRgamma knockout, or C5 knockout recipient mice (3x10^8 cells/mouse). Clearance kinetics are shown, as in Figure 1B, calculated by assuming the 5 min value is 100%. Panel C Erythrocytes from Crry/DAF/C3$^{-/-}$ mice were labelled with biotin, then either opsonised or not as shown, and transfused into FcRgamma knockout, or C3 knockout recipient mice (3x10^8 cells/mouse). The percentage of biotin-labelled erythrocytes at 5 minutes (black bars) and 3 hours (hatched bars) is shown.

END OF PAPER