National Qualifications 2022

X807/77/11

Biology
Supplementary sheet

THURSDAY, 19 MAY
1:00 PM – 4:00 PM

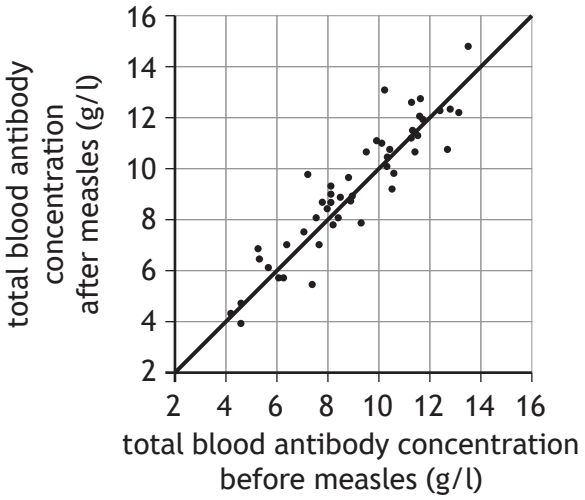
Supplementary sheet for question 1

1. Measles is a highly infectious disease, caused by the measles virus, which resulted in the death of approximately 110 000 individuals globally during 2017. It also causes suppression of the immune system; this can last for more than five years and results in further deaths from other infectious diseases.

A recent study investigated the levels of antibodies in the blood before and after measles infection. The total antibody concentration in the blood (total antibodies against **all** antigens to which individuals have been exposed) was measured in 50 children who became infected with the measles virus.

Measurements were taken before and after measles infection and are shown in **Figure 1**.

Figure 1



Antibody production is a dynamic process where individuals continuously produce new antibodies in response to exposure to new antigens.

In a second study, the authors investigated the diversity of antibodies present in the blood by testing for antibodies against around 400 human pathogens. The technique used detected antibodies still present in the blood as a result of current or past viral infections. The total antibody hits, defined as the number of diseases to which each child possessed antibodies, was recorded at the two time points: once before infection or vaccination, and once afterwards.

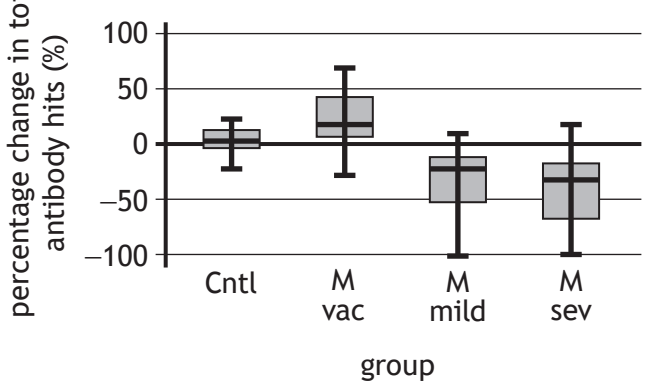
The children were split into four groups:

- Cntl: control with unvaccinated children who were not exposed to measles virus
- M vac: children vaccinated against measles
- M mild: unvaccinated children who contracted measles with mild symptoms
- M sev: unvaccinated children who contracted measles with severe symptoms.

1. (continued)

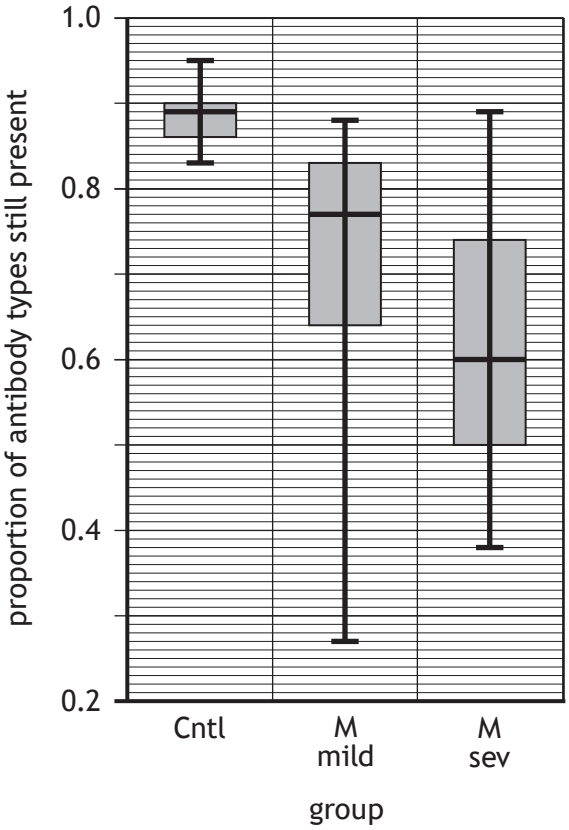
The percentage change in total antibody hits between the first and second time point was calculated and is shown in the box plot in **Figure 2**.

Figure 2



The retention of antibodies between the two time points was investigated. All types of antibodies present at the first time point were tested for again at the second time point, and the proportion of antibody types still present from one time point to the next was calculated and is shown in the box plot in **Figure 3**.

Figure 3



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