



## *Virtual Microscopy Pilot Survey Report*

prepared by

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## Virtual Microscopy Pilot Survey

### Introduction:

A pilot Virtual Microscopy survey was sent to laboratories who had expressed interest in participating in a preliminary questionnaire earlier in the year. 114 of 120 laboratories who were sent the pilot survey returned results and we thank them for their participation.

### Purpose:

To evaluate two Virtual Systems, namely the Aperio System, using Aperio software from Scanscope and the .slide system, using the OlyVIA software from Olympus. Images for each system are produced from scanning the peripheral blood smears at magnification x60 oil.

Laboratories were asked to evaluate both systems and to indicate their preference.

Three case studies were selected from previous Morphology Surveys (stained peripheral blood are issued to subscribers that participate in the Morphology Program). These peripheral blood smears were scanned by the Aperio system and .slide (OlyVIA) system and the scanned images and software systems were sent on DVD to participating laboratories.

The participating laboratories were asked to load the software and attempt to make a diagnostic interpretation as well as describe the morphological features in each case. Laboratories were also asked to assess the individual cell lines from both systems using a grading system of 1 to 5 (1 = poor, 5 = excellent).

A questionnaire was also provided to obtain an overall assessment of both systems, with a series of questions about both systems using the same grading system as above. We also asked laboratories about the potential uses they see for the virtual microscope in the future.

### Results:

**PART A:** The first part of the exercise compared the virtual microscope survey results with the results from the same slides in the previous surveys. As only 114 laboratories participated in this exercise compared to over 500 laboratories in previous surveys, the numbers have been converted to percentages.

**PART B:** The second part of the exercise was an overall assessment of both systems in relation to image quality and loading and ease of use of the software.

## PART A

### CASE STUDY 1

86 year old male. Rapidly rising WCC.

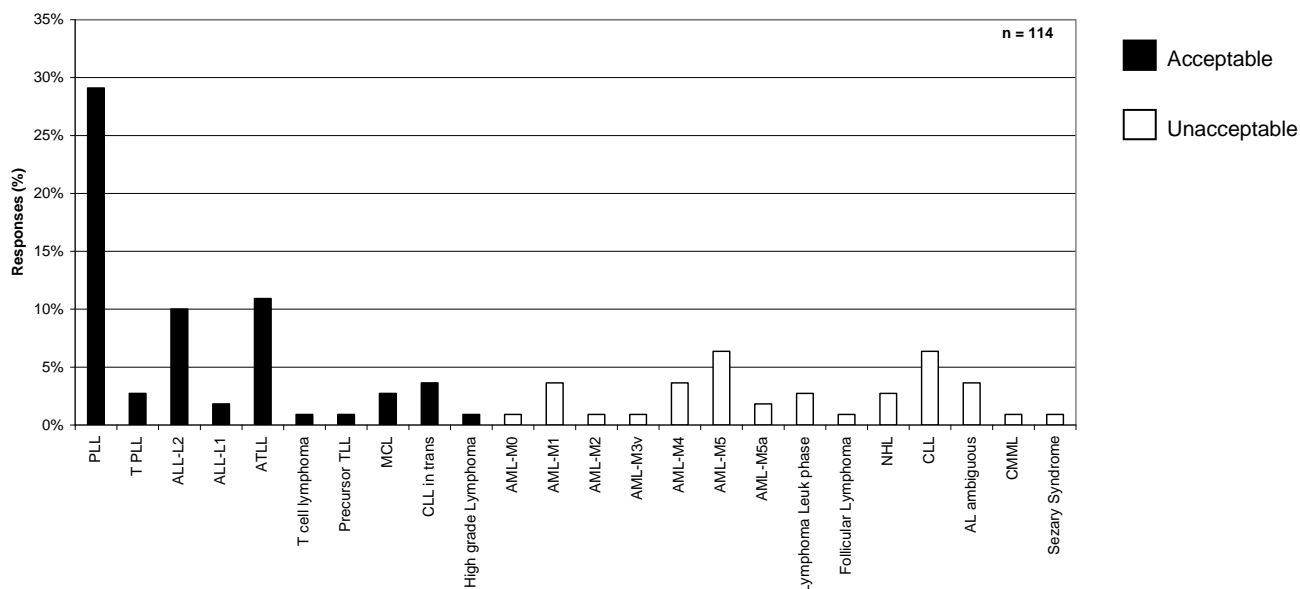
**WCC = 59.1 x 10<sup>9</sup>/L**

**Hb = 124 g/L**

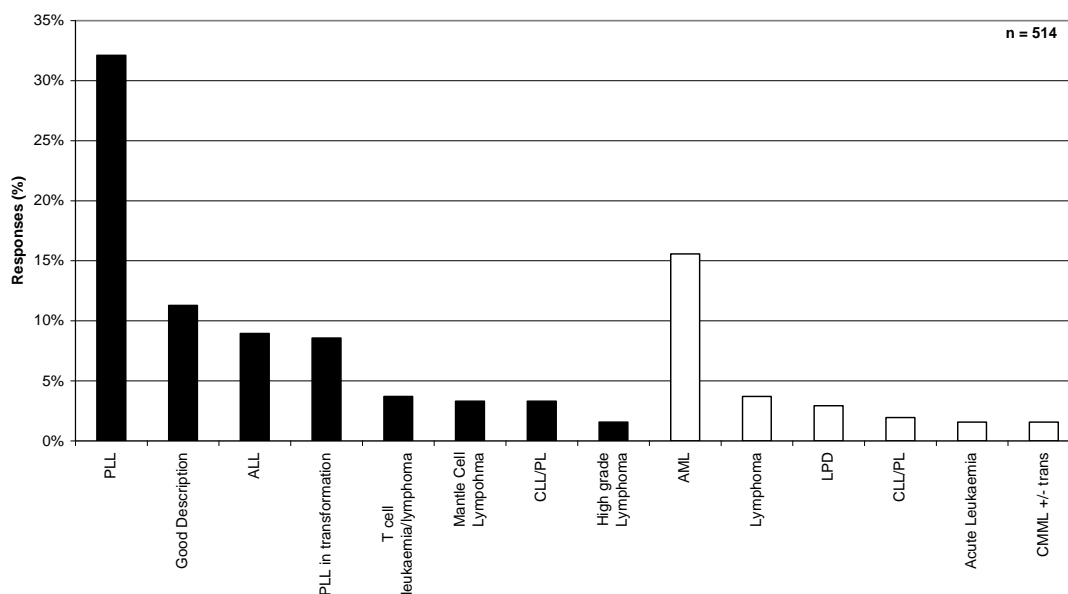
**MCV = 87 fL**

**PLT = 117 x 10<sup>9</sup>/L**

**Case 1 - Virtual Microscopy Diagnoses**

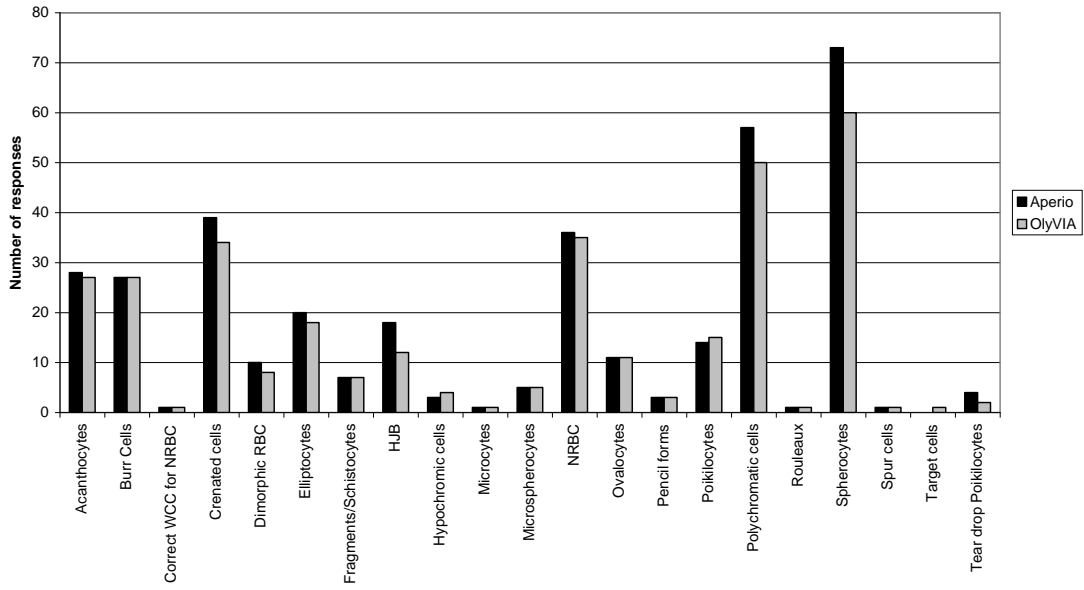


**Case 1 (MP5-02c) - Survey Diagnoses**

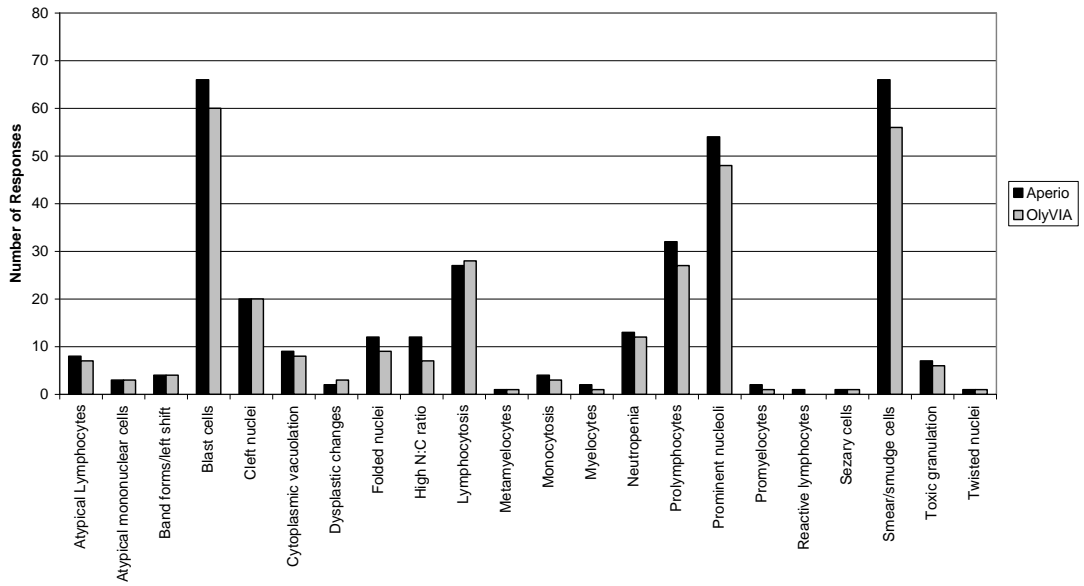


The actual diagnosis for case study 1 was Polymorphocytic Leukaemia (PLL) and this had been case MP5-02c in the 2005 Morphology Program. The actual diagnosis of PLL was returned by approximately 30% of participants in both submissions. A wider variety of responses from the virtual exercise were submitted compared to the original exercise (MP5-02c) as diagnoses were grouped by QAP for reporting of that survey. Of note, the various AML responses in the virtual exercise add up to 15-20%, similar to the results from the original exercise in the 2005 survey.

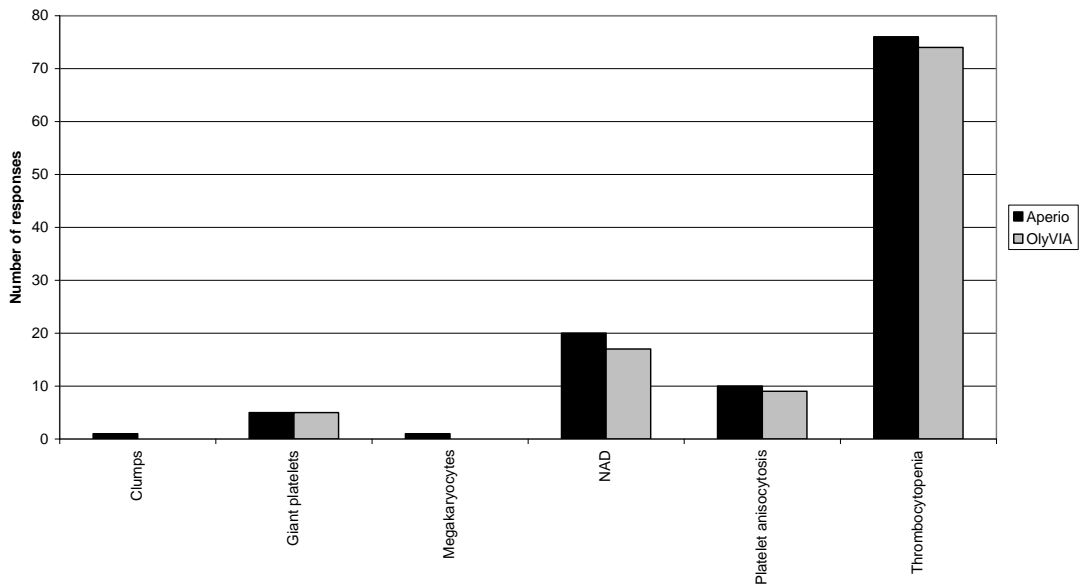
**CASE 1 - Red cell descriptions**



**CASE 1 - White cell descriptions**



**CASE 1 - Platelet descriptions**



## CASE 2

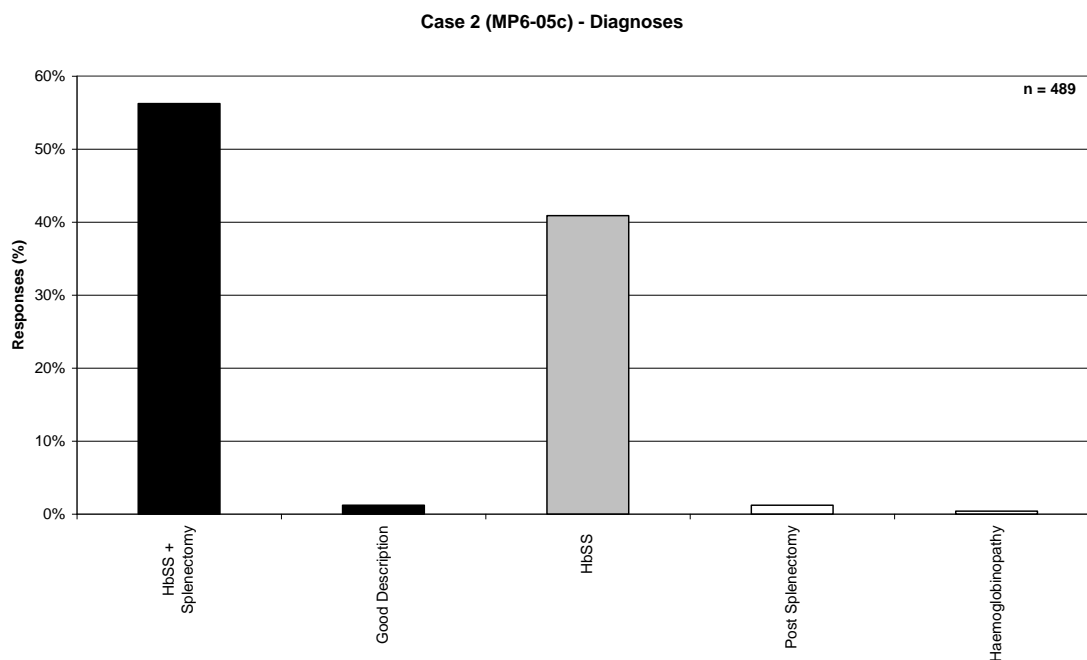
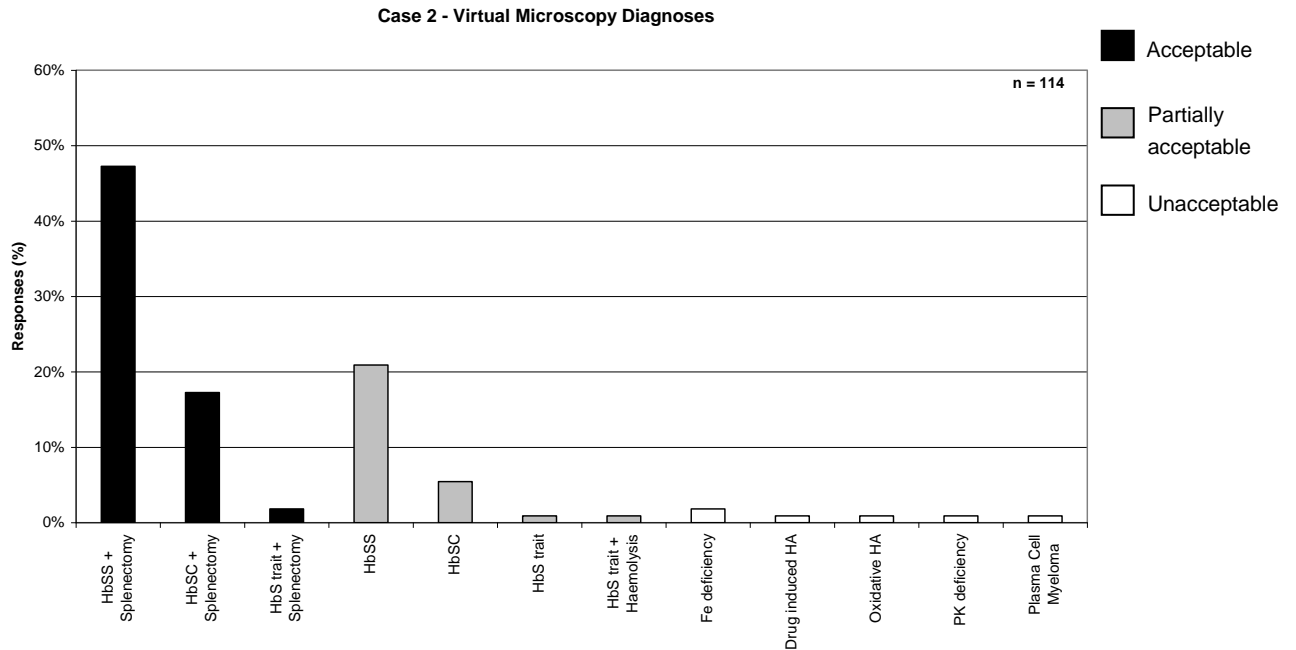
19 year old female. Bone pain.

WCC =  $8.9 \times 10^9/L$

Hb = 78 g/L

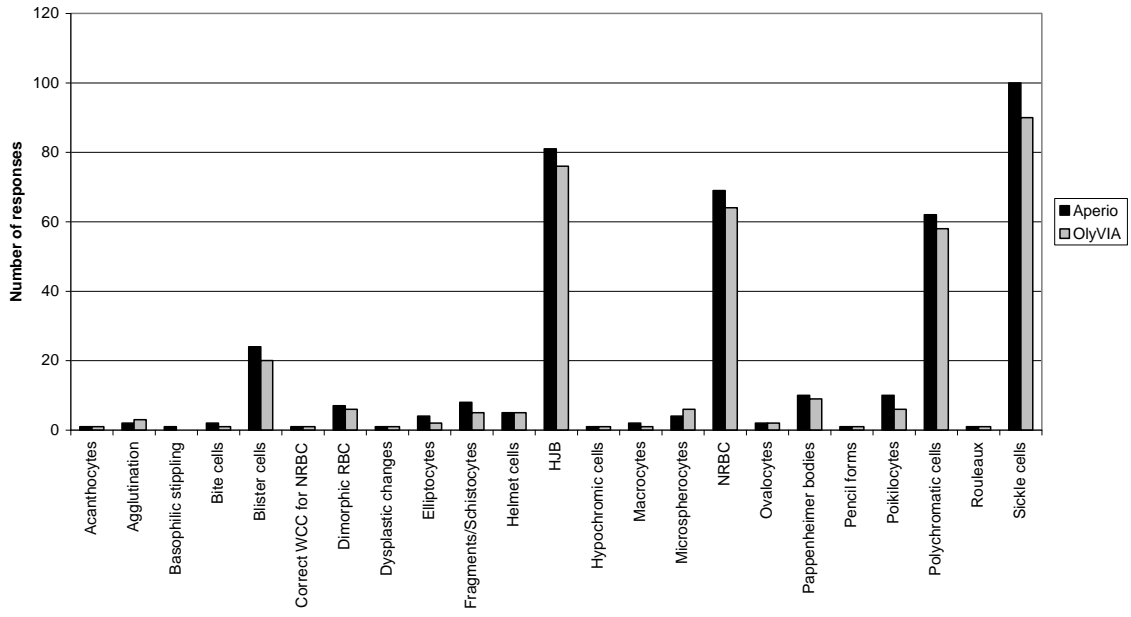
MCV = 89 fL

PLT =  $548 \times 10^9/L$

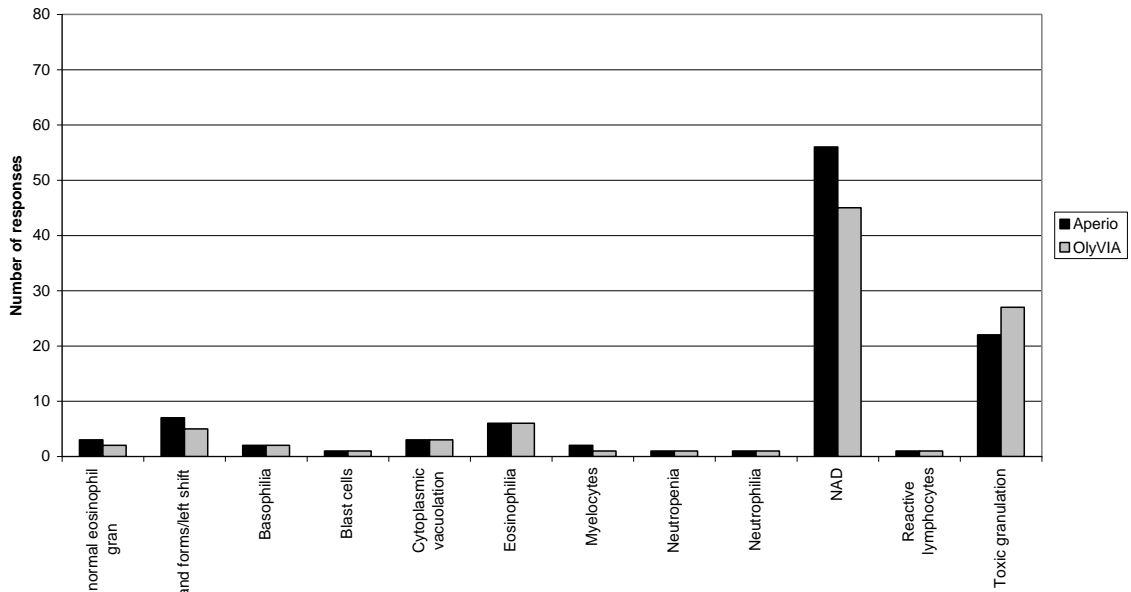


The actual diagnosis for case study 2 was Hb SS + Splenectomy and it was previously used as MP6-05c, in 2006. The actual diagnosis of Hb SS + Splenectomy was returned by approximately 50% of participants in both submissions. Again a wider variety of responses from the virtual exercise are listed compared to the original exercise (MP6-05c) as diagnoses in the latter were pre-grouped for reporting. Similar percentages of acceptable, partially acceptable and unacceptable results were returned in both exercises.

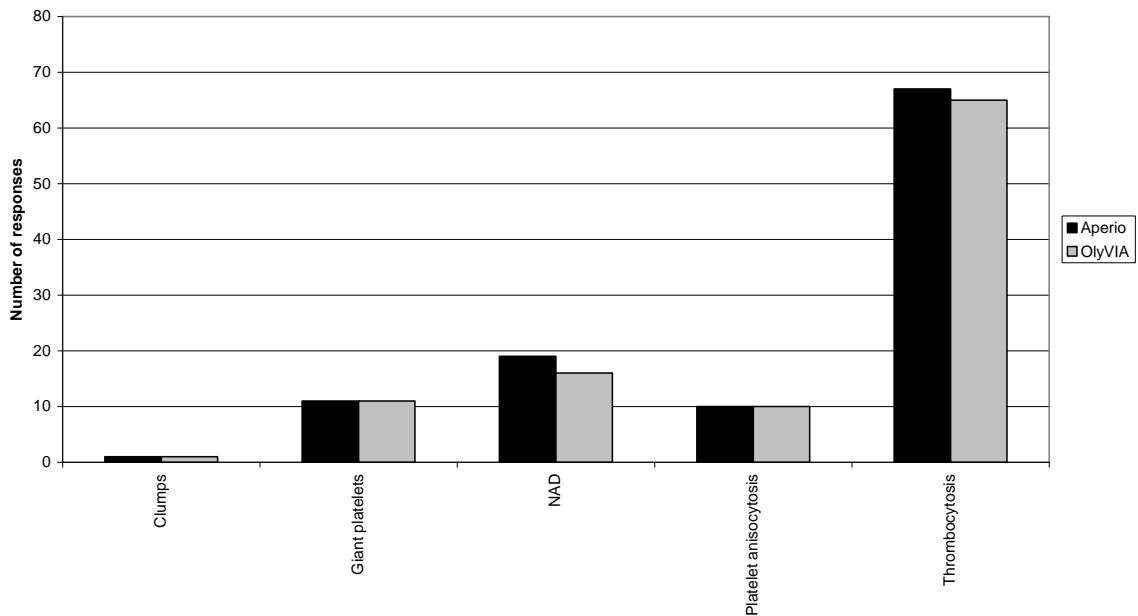
**CASE 2 - Red cell descriptions**



**CASE 2 - White cell descriptions**



**CASE 2 - Platelet descriptions**



### CASE 3

58 year old male in ICU for marrow transplant.

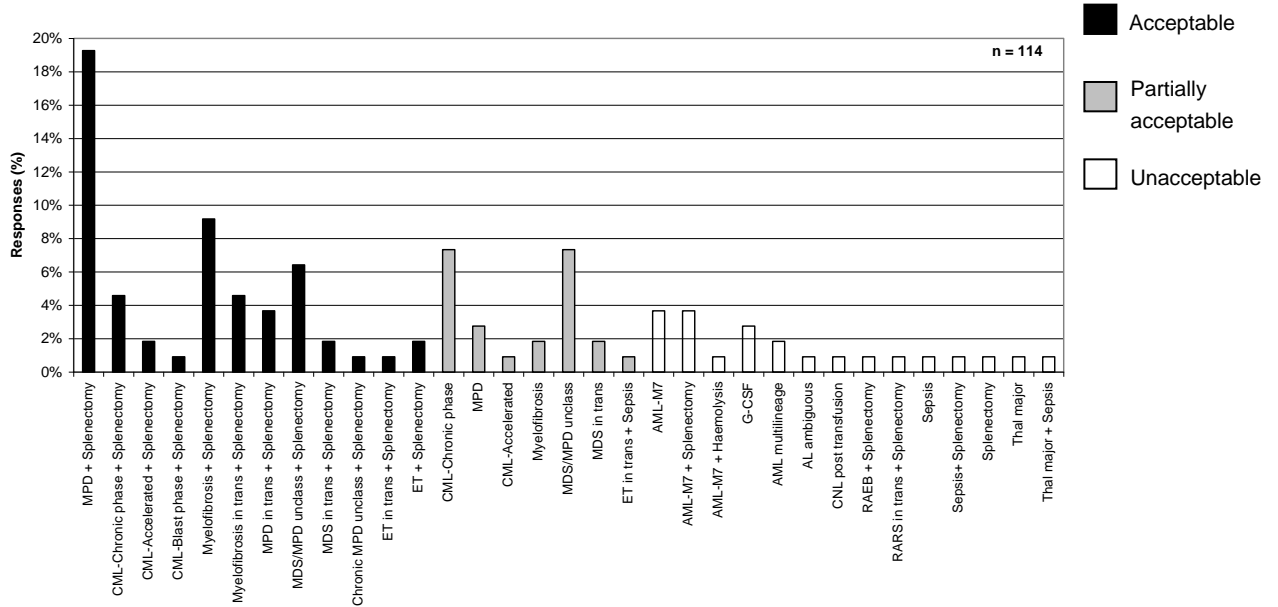
WCC = 90.2 x 10<sup>9</sup>/L

Hb = 87 g/L

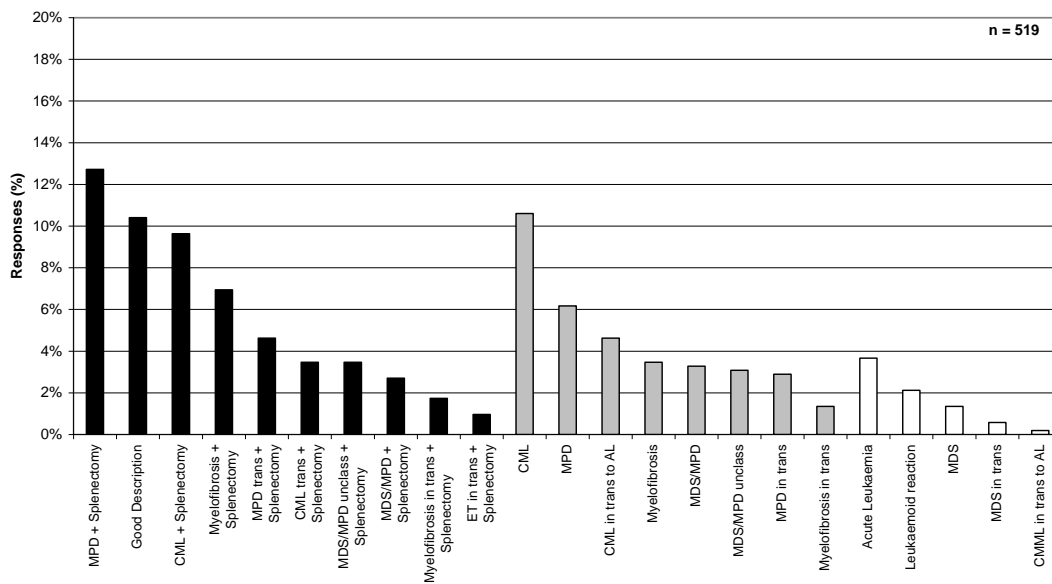
MCV = 83 fL

PLT = 220 x 10<sup>9</sup>/L

Case 3 - Virtual Microscopy Diagnoses

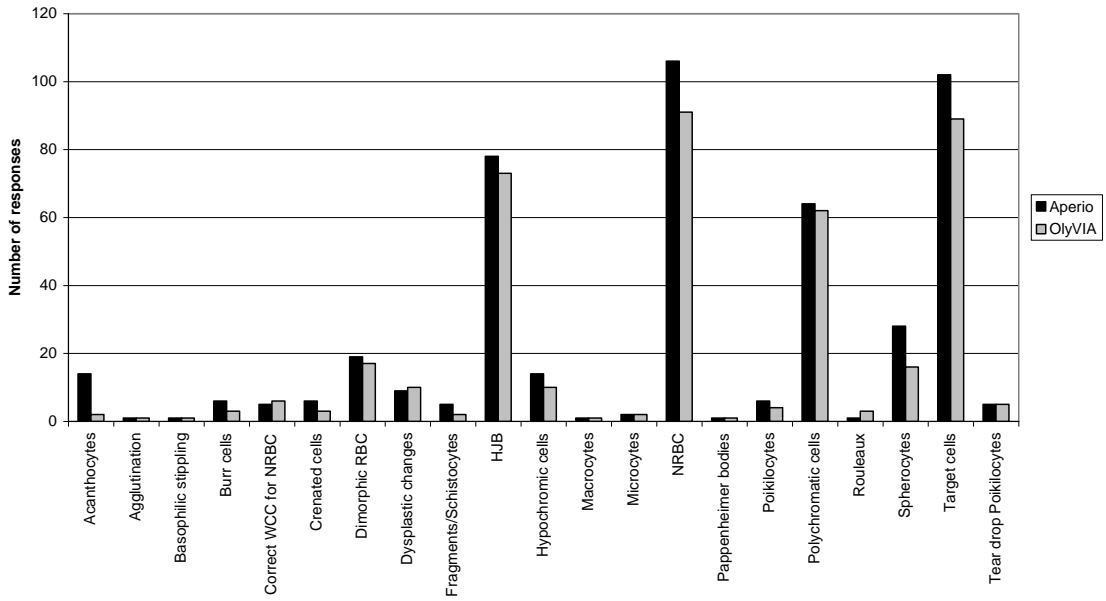


Case 3 (MP6-02b) - Diagnoses

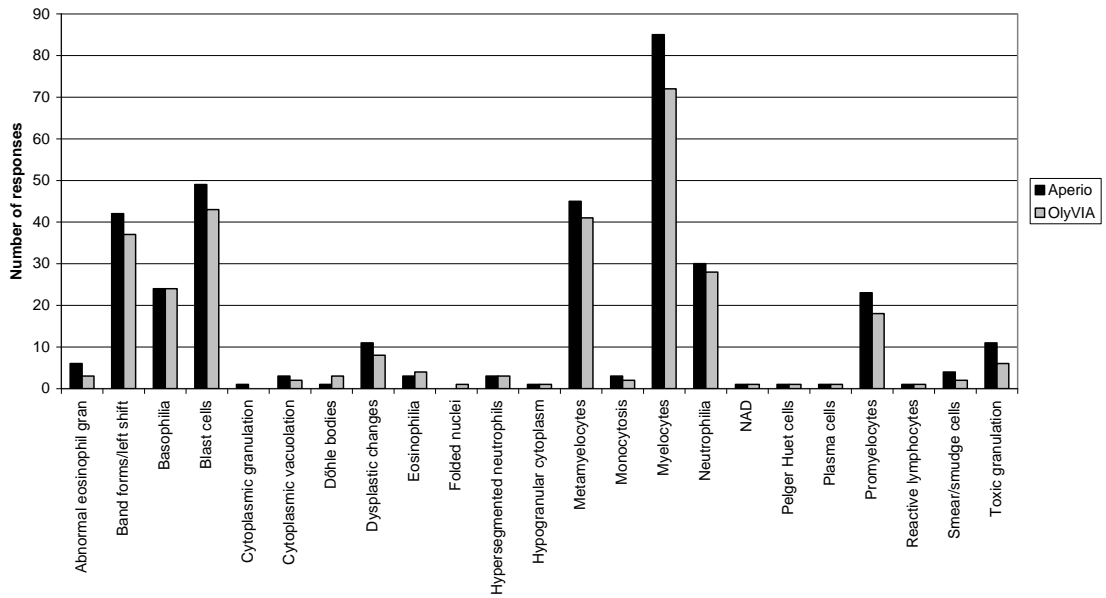


The actual diagnosis for case study 3 was MDS/MPD + Splenectomy and this was previously case MP6-02b in 2006. Although a wide variety of diagnoses were submitted, the range was similar in both the original survey and the virtual exercise, given that diagnoses had been grouped together in the original survey.

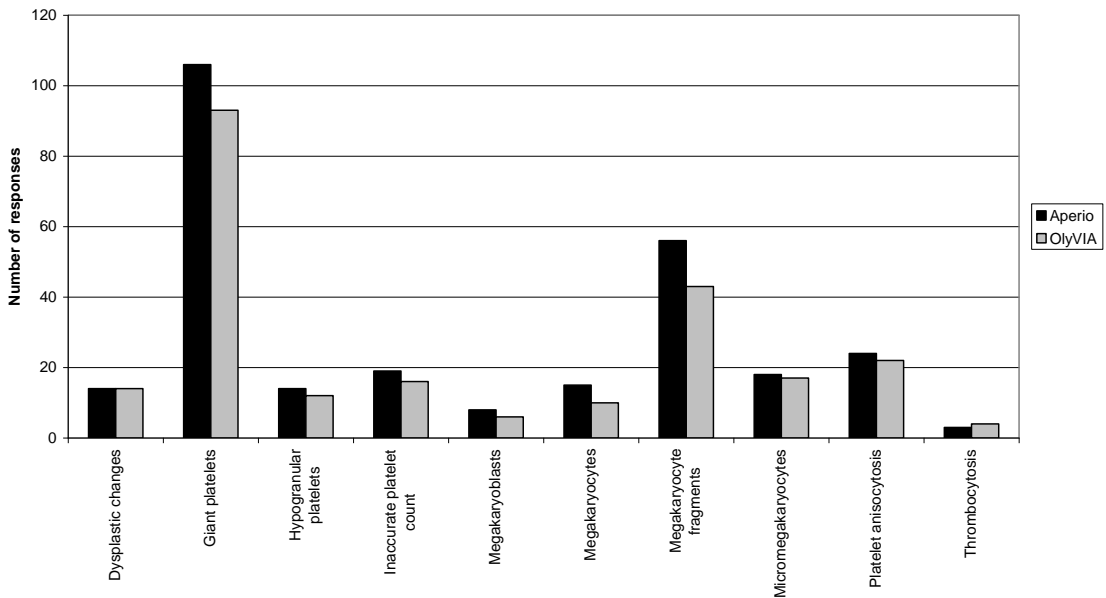
**CASE 3 - Red cell descriptions**



**CASE 3 - White cell descriptions**



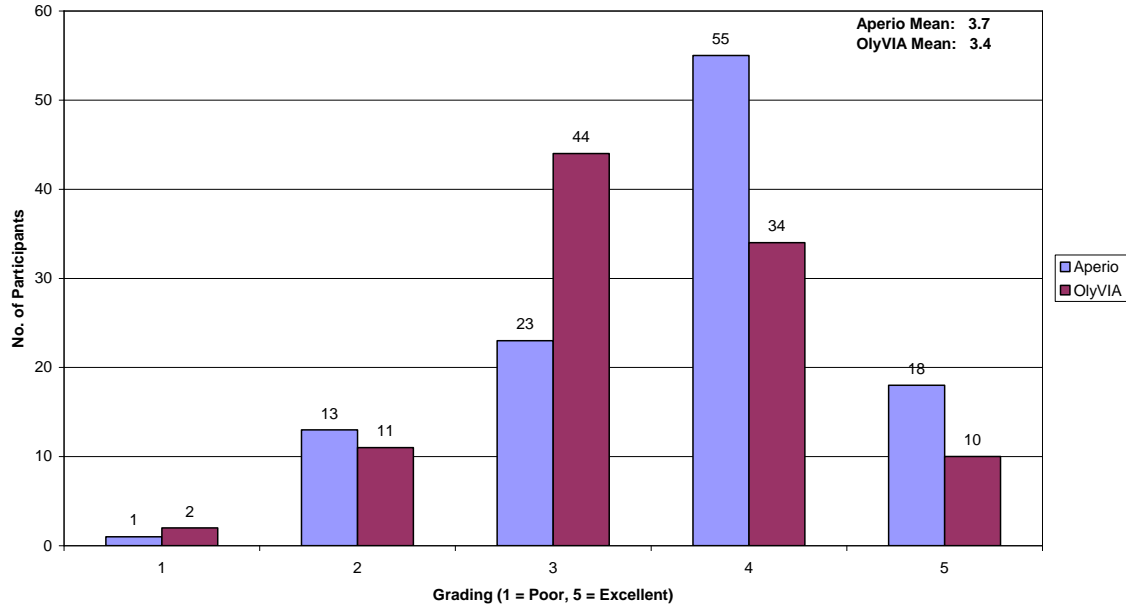
**CASE 3 - Platelet descriptions**



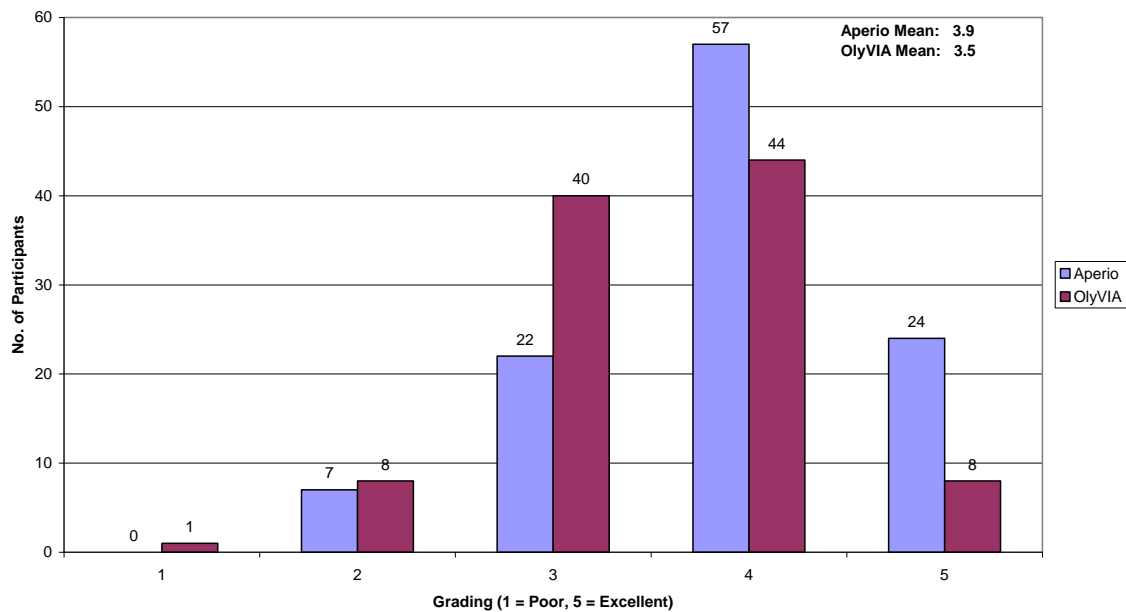
## PART B

Participants were asked to rate the two virtual systems using a worst to best grading system (1 = poor, 5 = excellent). The majority of participants rated each system from 3 to 5, with higher proportions scoring Aperio as 4 or 5. It should be noted that it is possible that the scoring for ease of use and loading of the software may have been biased towards Aperio if some participants were already familiar with it through the Anatomical Pathology QAP. Data on this was not collected. The evaluations were graphed as follows.

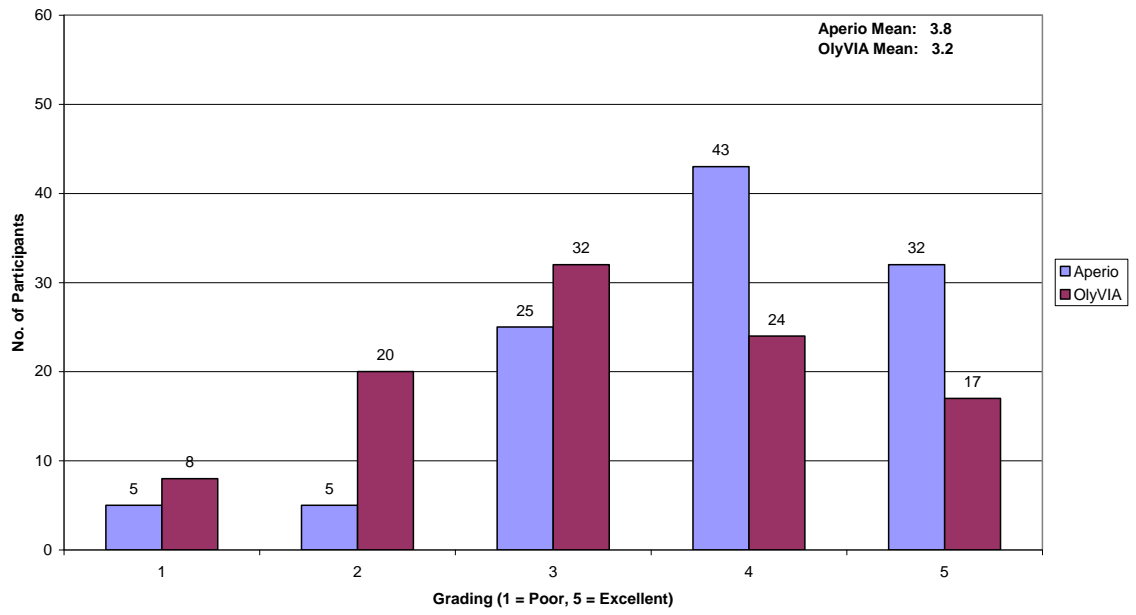
Q1. How did the images compare to viewing glass slides?



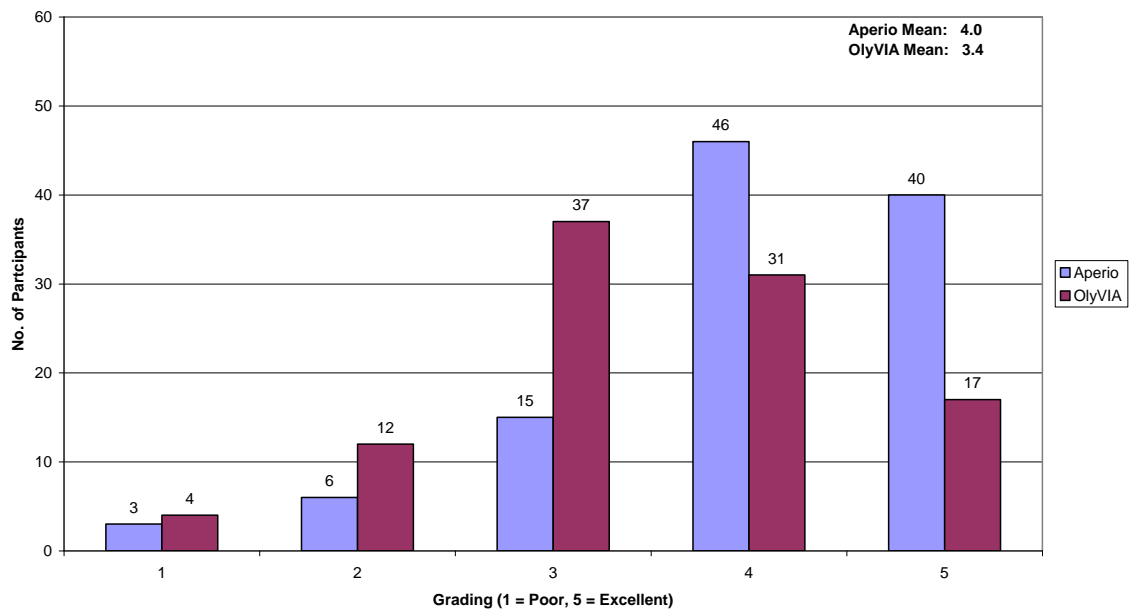
Q2. How would you assess the quality of the images?



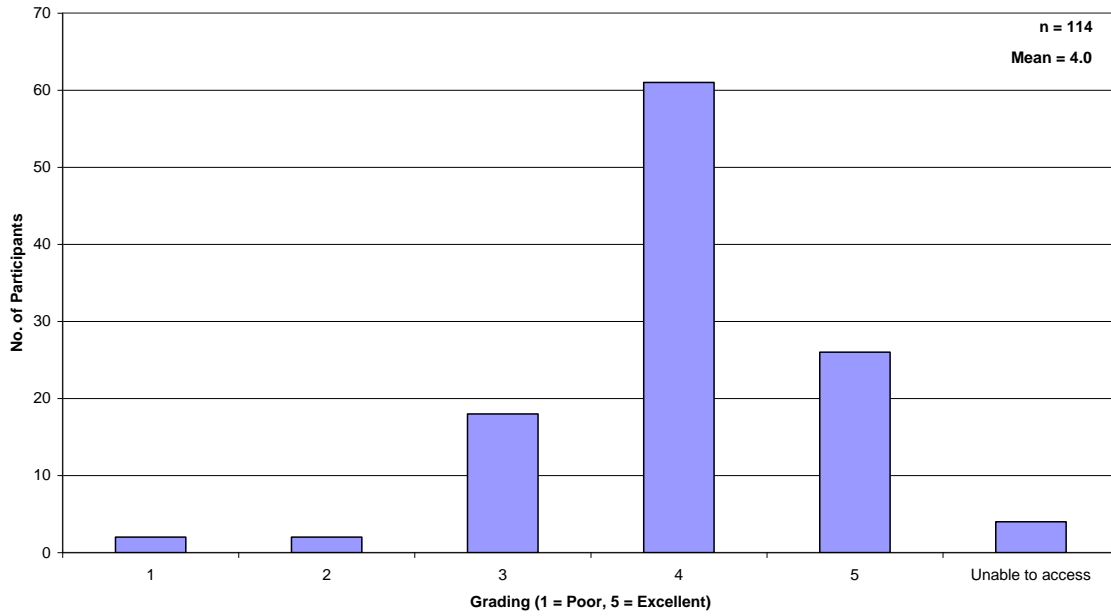
**Q3. How easy was the viewing software to load?**



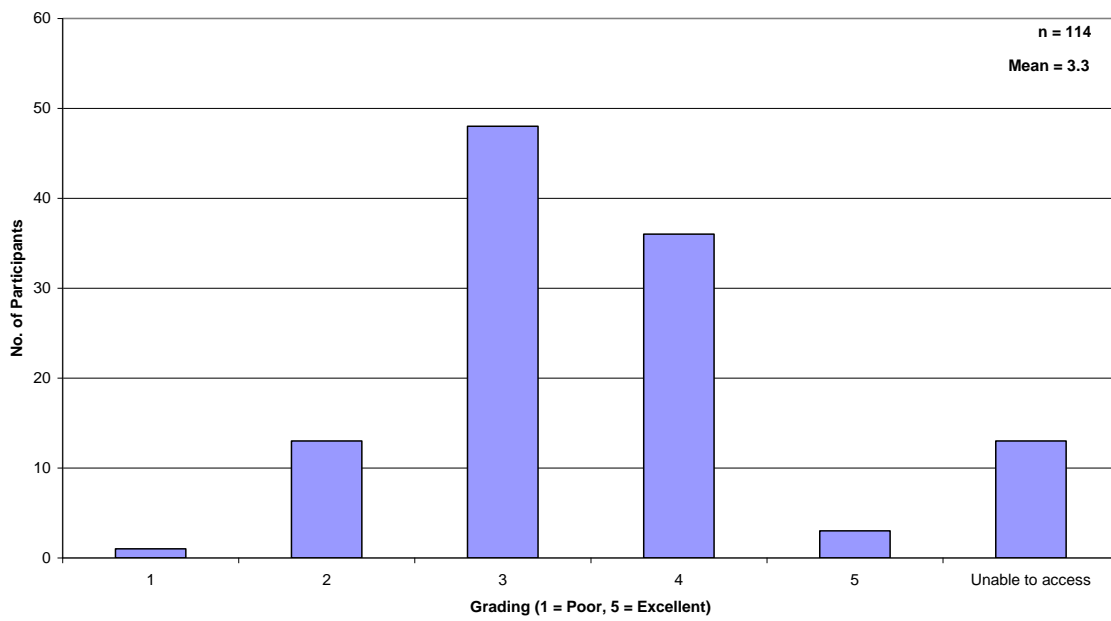
**Q4. How easy was the viewing software to navigate?**



Aperio - Overall Grading

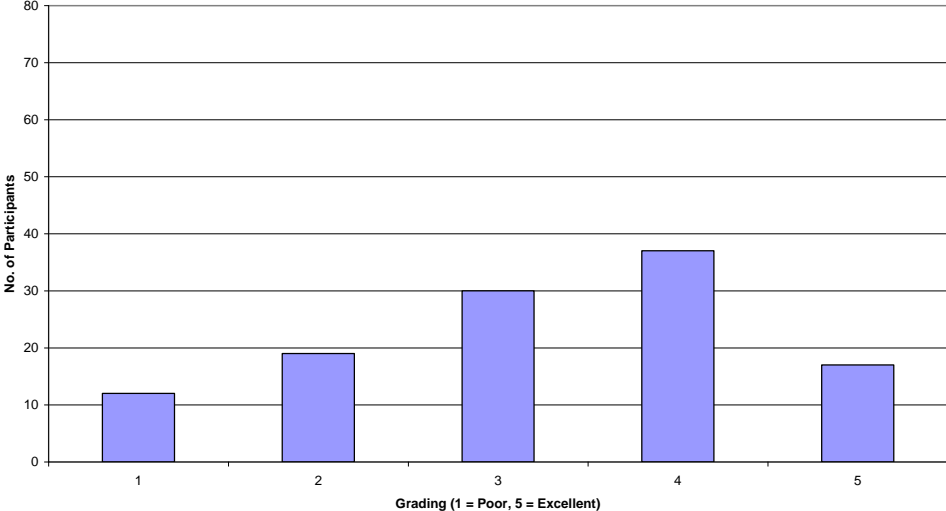


OlyVIA - Overall Grading

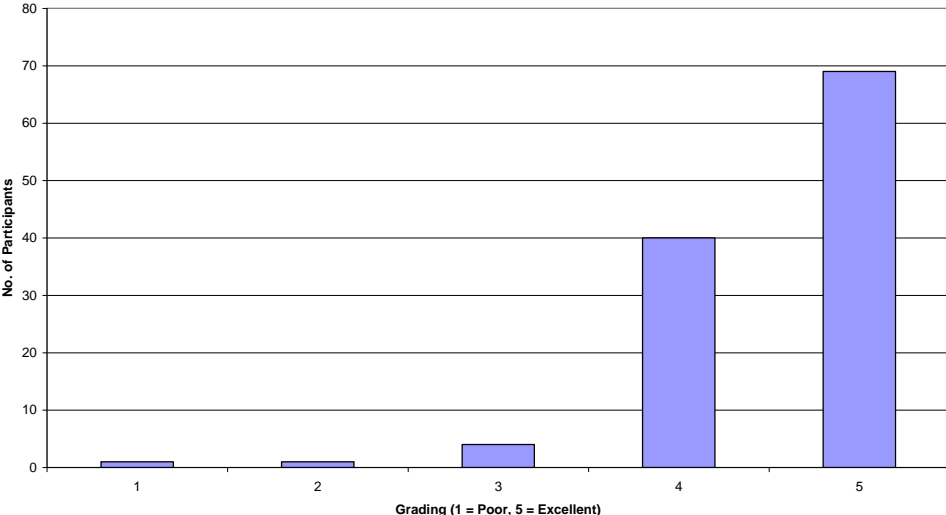


The RCPA Haematology QAP was also interested in feedback from participants about other potential uses of Virtual Microscopy. Responses are listed below.

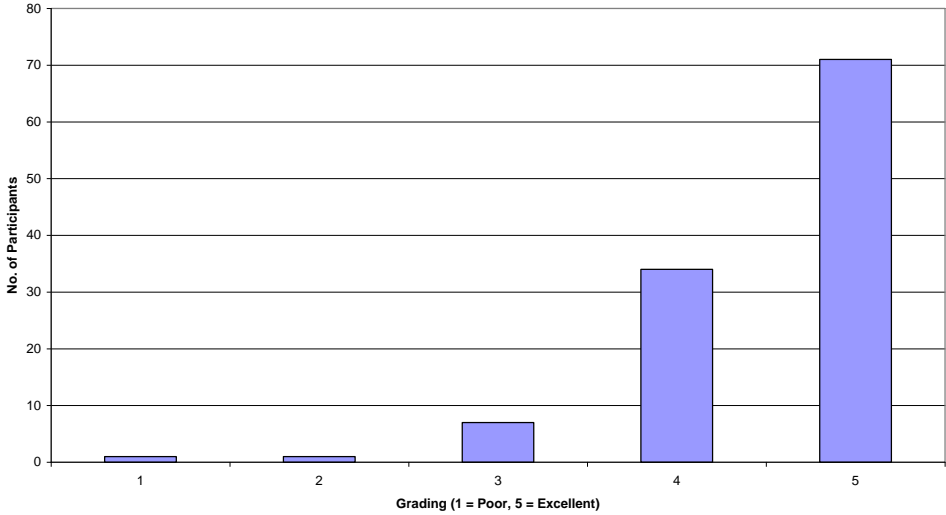
**Q1a. Assess the potential of VM in replacing glass slides in EQA**



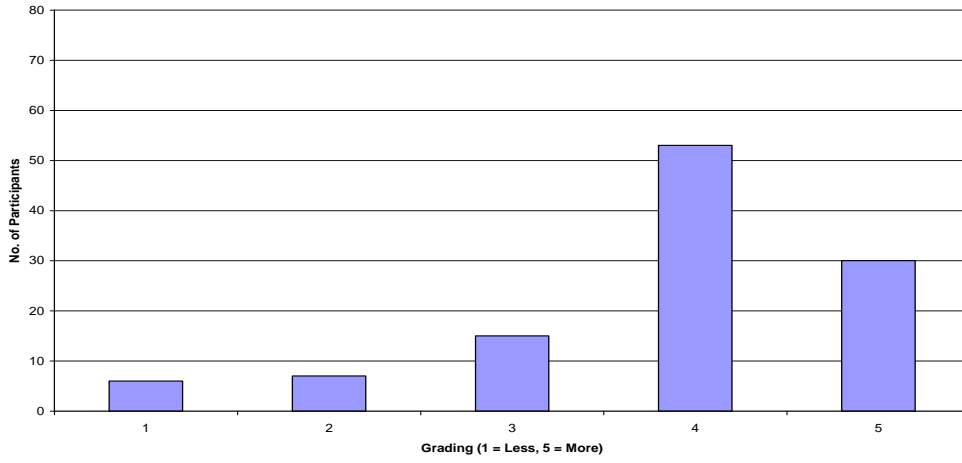
**Q1b. Assess the potential of VM for use as a teaching aide**



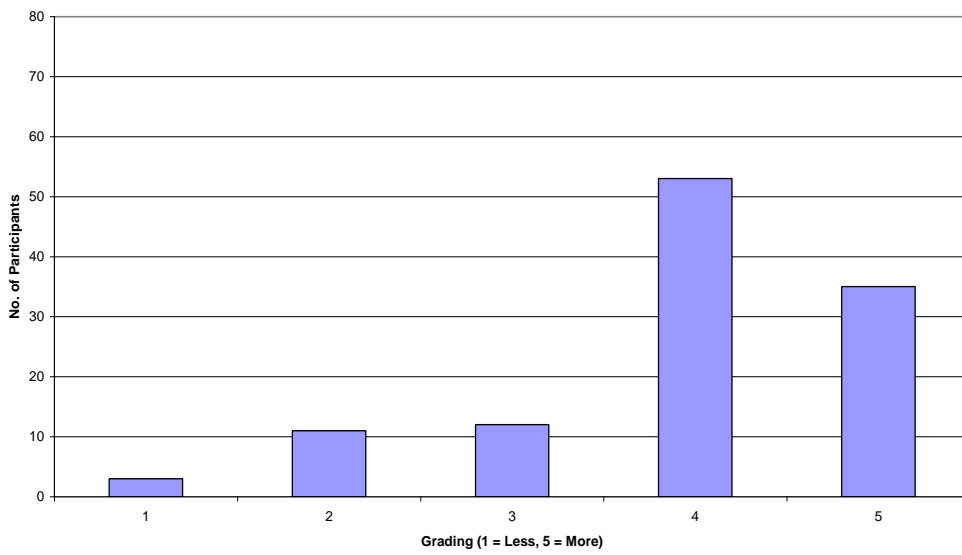
**Q1c. Assess the potential of VM for images of difficult to collect or rare slides**



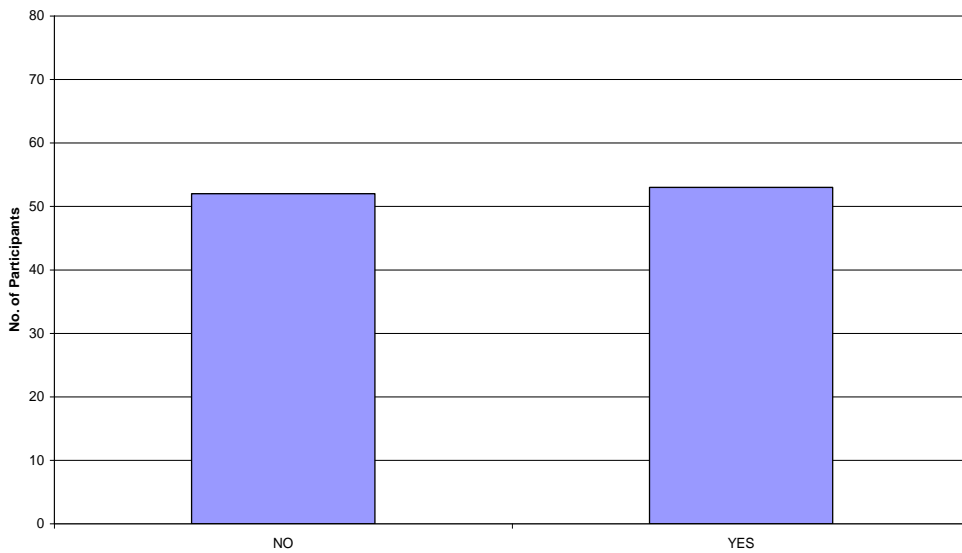
**Q2. Are you now more or less enthusiastic about the applications of VM in EQA?**



**Q3. Do you consider the addition of a VM Program worthwhile?**



**Q4. Would your laboratory be interested in the offer of individual subscriptions?**



## **Discussion:**

### **PART A:**

The results returned by the Virtual Microscopy pilot survey compared well with those previously obtained in the original Morphology surveys with glass slides. In case studies 2 and 3, laboratories were able to see the inclusions in the red cells and ascertain hyposplenism in both cases.

The proportions of diagnoses which were acceptable, partially acceptable and unacceptable were similar in all three cases with the virtual microscopy and previous glass slide surveys. However, it is possible that some familiarity had developed from the previous exposure to the slides in the 2005 and 2006 surveys.

### **PART B:**

The evaluation of both systems was positive from the majority of laboratories, with the Aperio Scanscope (OS model) obtaining a slightly higher rating in the questions asked. However, this was not unanimous and some participants preferred the Olympus .slide system over the Aperio system, indicating a degree of individual personal preference.

There was a positive response from the majority of participants with an average score of 3.4 (Olympus) & 3.7 (Aperio) out of 5.0 to the question "How did the images compare to viewing glass slides?" The remaining 3 questions were similar, with all questions averaging a score of 3.2 - 4.0 for both systems, which implies that participants welcome the advances that Virtual Microscopy has to offer.

The responses received from participants with regards to the different applications that may be available were positive. There was positive feedback overall with regards to the different potential uses for virtual microscopy for blood film morphology. The RCPA does not plan to replace the current surveys which use glass slides with Virtual Microscopy but the scope can be broadened with virtual images of difficult to obtain samples including bone marrow smears.

The majority of laboratories that participated in this study also welcomed Virtual Microscopy as a teaching aide, with an average score of 4.5. With the majority being enthusiastic about Virtual Microscopy applications in external quality assurance schemes, there appears to be a good interest in a Virtual Microscopy program. However, only 50% are interested in an individual subscription for a virtual microscopy program.

## **Conclusion:**

From the pilot survey results, there appears to be an overall positive reaction to Virtual Microscopy with favourable responses to image quality, ease of use and potential applications. The RCPA Haematology QAP hope to introduce a Virtual Microscopy program as part of the range offered to subscribing laboratories. We will also be investigating the variety of applications that the Virtual system has to offer for educational purposes.