Problem 1:

A 50-year-old woman presented with spinal cord compression due to a tumour in the spinal canal. Histology of the tumour showed large lymphoid cells with many mitotic figures and apoptotic bodies. On immunohistochemistry, the lymphoid cells show strong expression of CD20, CD10, BCL6, and MYC. They are negative for MUM1, and in-situ hybridization for EBER is negative. Approximately 60% of the cells are positive for Ki-67.

Fluorescent in-situ hybridization (FISH) using *MYC* break-apart probes (chromosome 8q24) were performed, and the results are shown in figures 1 and 2.

How would you interpret the FISH results?

Figure 1:

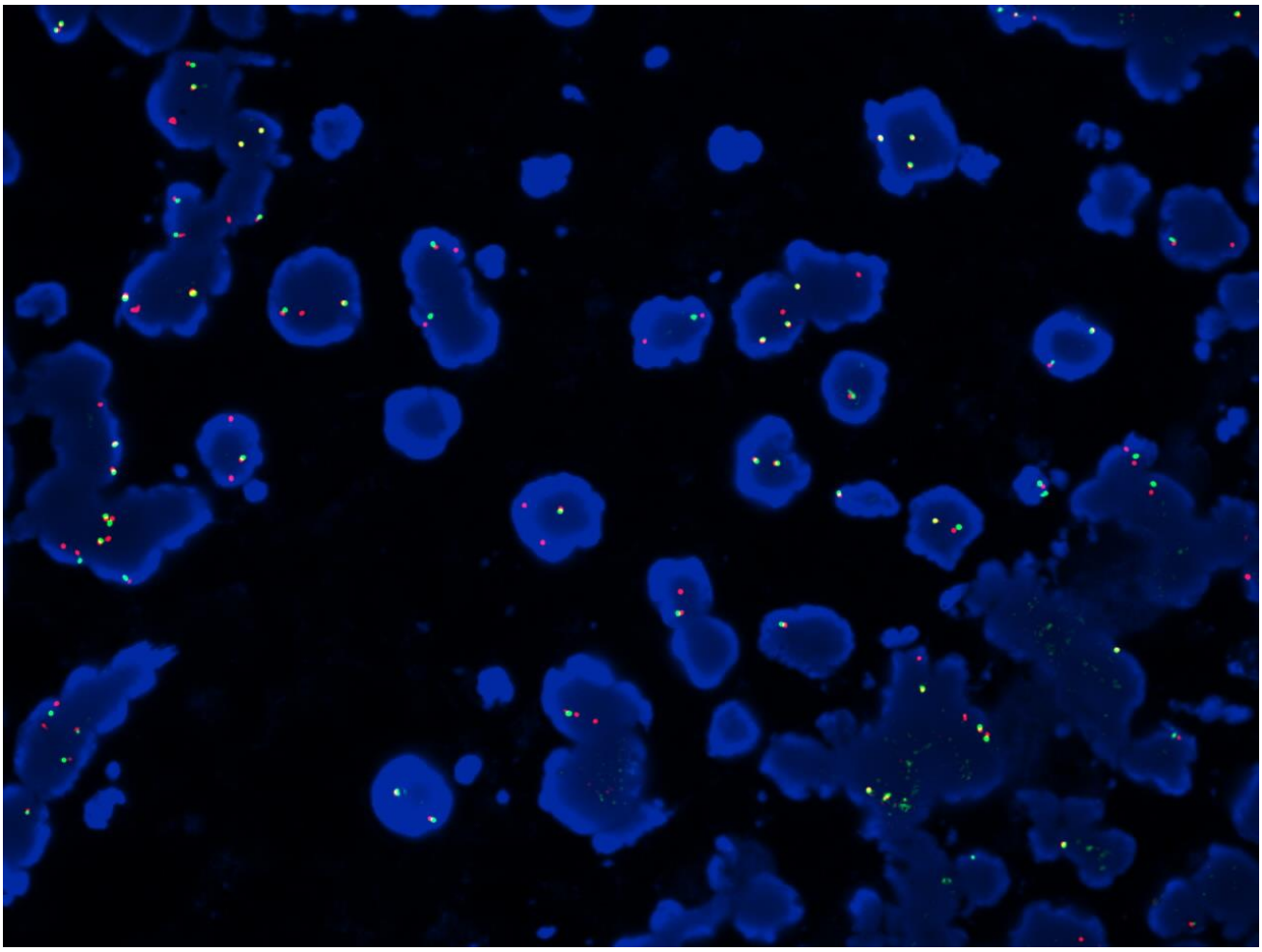
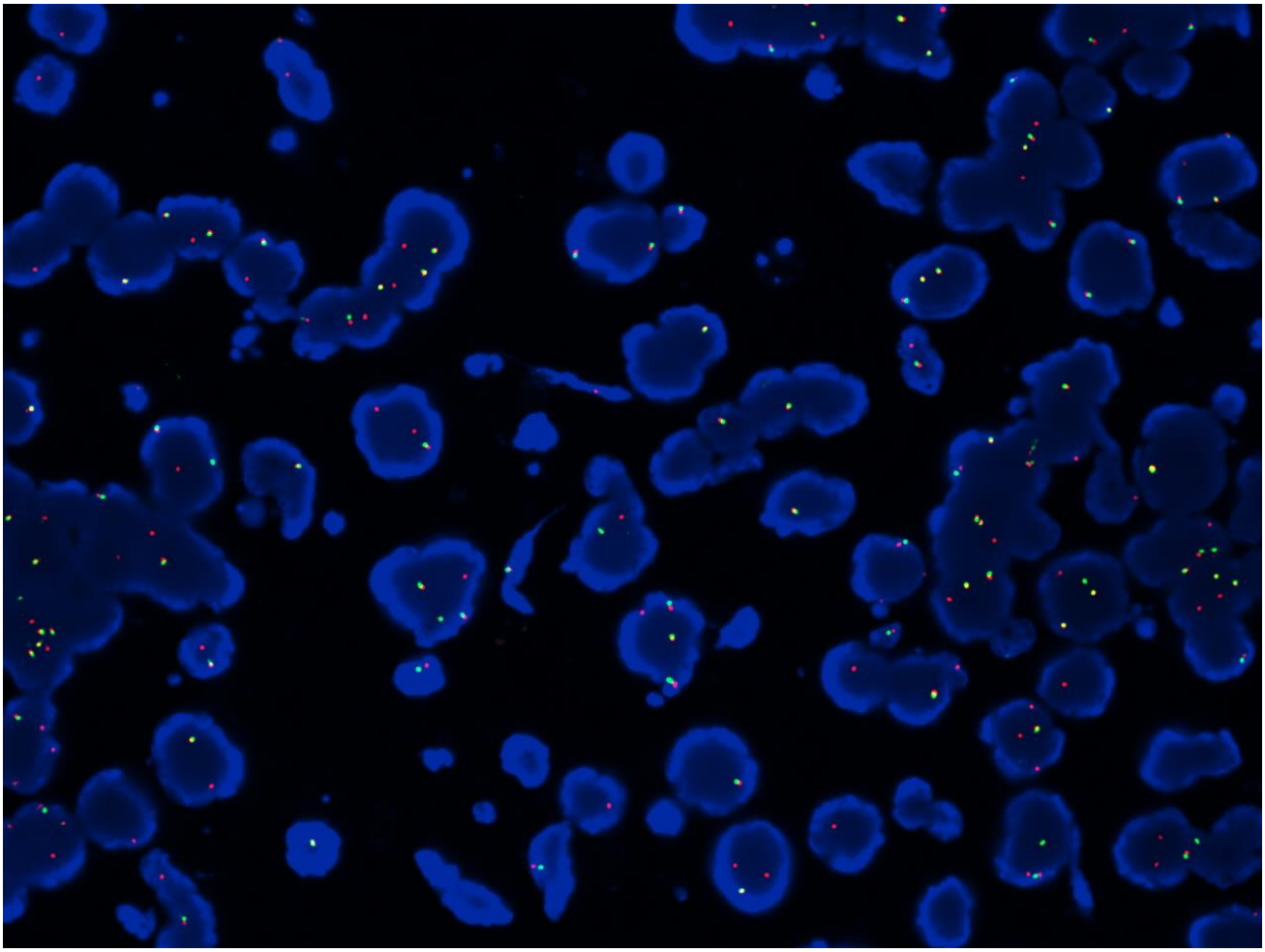


Figure 2:



Problem 2:

A 20-year-old woman presented with abdominal distension for one year and multiple bruises for two months. A massively enlarged spleen was palpable on physical examination. Blood tests showed leukopenia (white cell count 1.8 x 10^9/L), anaemia (haemoglobin 7.6 g/dL) and thrombocytopenia (platelet count 52 x 10^9/L). A splenectomy was performed, and histology of the spleen showed abnormal medium-sized lymphoid cells that are positive for CD3 but doubly negative for CD4 and CD8. PCR for T-cell receptor (TCR) gene rearrangement was performed on the splenic tissue, and the capillary electrophoresis results are shown in figures 3 and 4.

1. What is your interpretation of the TCR gene rearrangement results?
2. There are four TCR genes, namely alpha, beta, gamma and delta. Why is TCR-beta and TCR-gamma most often used for clonal gene rearrangement studies? (Hint: You can refer to the gene rearrangements in normal T-cell development, and the section on TCR-beta and TCR-gamma in *Leukemia* 2003; 17:2257-317).

Figure 3: Euroclonality/BIOMED-2 TCR-beta primers

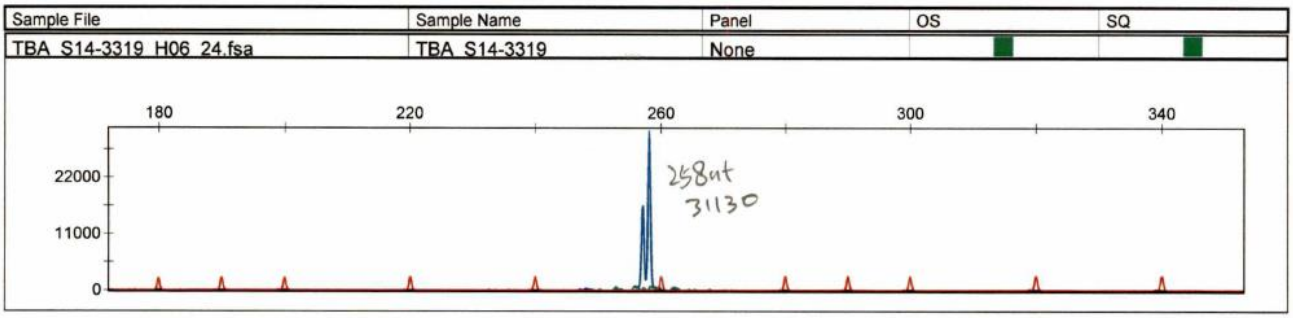


Figure 4: Euroclonality/BIOMED-2 TCR-gamma primers