

A study of the outcome of serum protein electrophoresis reflex testing at the Luton and Dunstable University Hospital NHS Foundation Trust

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Background

Multiple myeloma (MM) is the second most common haematological malignancy in the UK and it accounts for at least 2% of all cancer related deaths (approximately 3000 deaths per year)¹. Multiple myeloma is more common in men than in women. On average, 44% of new cases diagnosed between 2014 and 2016 were in people aged 75 years or older.¹

MM is a progressive malignant disease of the plasma cells that normally produce immunoglobulin. This condition is characterised by a proliferation of abnormal monoclonal immunoglobulins in the blood, known as paraproteinemia.

Though MM is a haematological malignancy, it affects multiple organs and systems including the bones, kidneys and immune system. MM may present with non-specific symptoms such as lower back pain, fatigability, weight loss, symptoms of hypercalcaemia (muscle weakness, constipation, polyuria, confusion) and symptoms of hyper viscosity (headache, visual disturbance, cognitive impairment, breathlessness, or mucosal bleeding). These non-specific clinical features often lead to delayed diagnosis of MM.

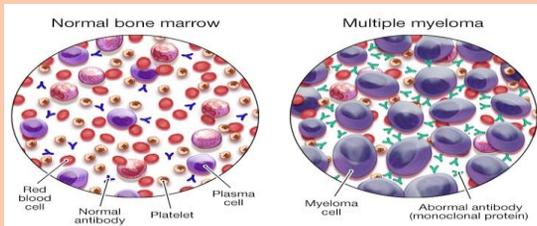


Fig 1. Healthy bone marrow vs bone marrow in multiple myeloma

Aim

To assess the outcome of SPE reflex testing in our laboratory according to locally established rules over two years.

The rules are:

- if immunoglobulins are requested and SPE is not requested (excluding genitourinary medicine (GUM))
- if high density lipoprotein (HDL) is ≤ 0.4 mmol/L and SPE is not requested
- if globulins are >51 g/L with normal liver function tests or globulins are >55 g/L regardless of liver function (excluding GUM).

These rules are only applied when the patient is ≥ 35 years of age and SPE has not been requested in the previous 90 days.

Method

All SPE reflex test results reported from the *Sebia CapillaryS 2* between 03/2018 and 01/2020 were extracted. Information from laboratory IT systems including patients' data and test results were used. Data analysis was done using Excel to determine: the number of SPE reflex tests; number of reported cases with normal SPE pattern, abnormal SPE pattern and number of new cases with a paraprotein band.

Results

From 03/2018 to 01/2019 there were total of 3855 samples for reflexed SPE tests.



Fig 2. Reflexed SPE tests according to the gender



Fig 3. Reflexed SPE tests on males and females based on 3 request rules

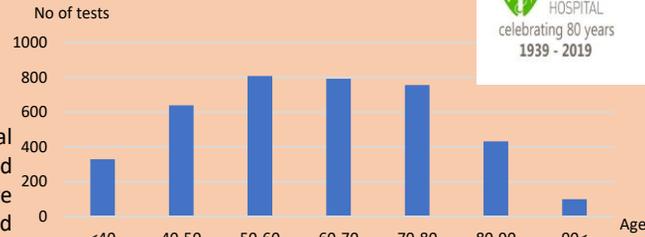


Fig 4. Number of reflexed SPE tests according to different age groups

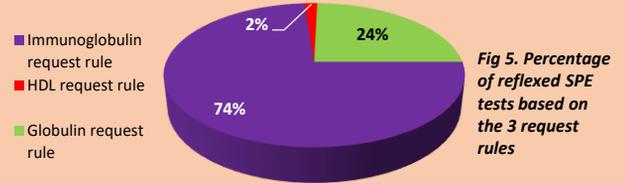


Fig 5. Percentage of reflexed SPE tests based on the 3 request rules

Rule	SPE Pattern			Total
	Normal pattern	Altered** pattern	New paraprotein band	
Immunoglobulin request rule	1884	959	95	2843
HDL request rule	26	37	1	63
Globulin request rule	10	939	58	949

Table 1. Outcome of reflexed SPE tests according to the 3 request rules

** This refers to all the SPE patterns, those deviate from the normal SPE patterns except new paraprotein band. This pattern originated from a wide range of conditions including known paraproteinemia, chronic inflammation, acute inflammation, chronic liver disease, concentration and/or migration alterations of specific serum proteins; albumin, α , β & γ

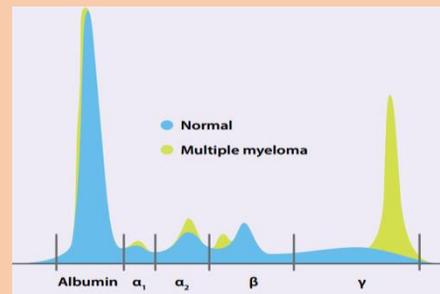


Fig 6. SPE pattern in normal & MM



Fig 7. Outcome of reflexed SPE tests in percentages based on the 3 request rules

Conclusions

The study shows half (50.19%, n=1935) of the SPE reflexed tests have abnormal SPE pattern, with an overall paraprotein detection rate of 8% (n=150). Despite a significant increase in the number of patients having SPE, the detection rate for paraproteinemia from reflex testing in patients where the diagnosis has not been considered is significant and demonstrates the value of the post analytical phase on patient pathway

Reference.

1. CRUK (2020) *Myeloma statistics*. Cancer Research UK <http://www.cancerresearchuk.org>