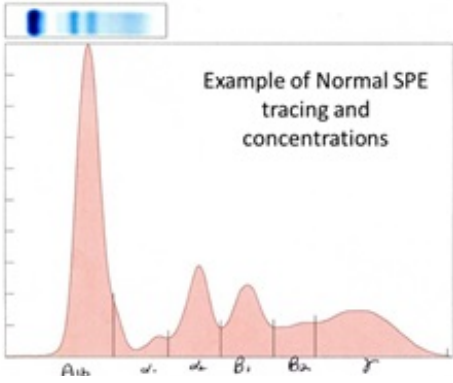
The globulins are how high?! What can protein electrophoresis (PEP) also known as SPE tell us in cats?

Serum protein electrophoresis (SPE) is a laboratory test used to separate serum proteins based on their size and electrical charge. The test results in a specific graphical tracing identifying the proteins separated into four fractions; albumin, and alpha, beta and gamma globulins. Alpha and beta globulins are further divided into alpha and beta 1 & 2. Interpretation of the SPE results requires assessment of both the concentrations of the proteins in each regions, and the shape of the peaks (especially beta and gamma) on the tracing.

Check out the **normal** tracing below.



What do we associate each region with?

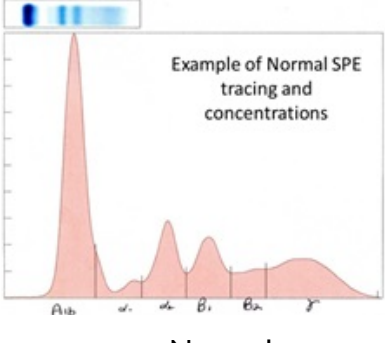
- **Alpha** globulins include acute phase proteins. Elevations are seen in the presence of an acute general immune response to inflammation, trauma, infection or tissue injury.
- **Beta** globulins include transferrin, lipoproteins, complement and immunoglobulins such as IgA or IgM. Elevations are seen with inflammation, various metabolic conditions and neoplasia.
- **Gamma** globulins include acute phase proteins and IgG. Elevations tend to be associated with chronic antigenic stimulation due to elevated Immunoglobulins IgG and C reactive protein but can also be seen with neoplasia.

In disease conditions as the different protein fractions increase you will see different shapes to the tracing. One pays special attention to the **beta and gamma globulin** region because that is where excess immunoglobulin production due to lymphoproliferative diseases such as malignant plasma cell disorders (**multiple myeloma** and **extramedullary plasmacytoma**) and **lymphoma** will be found.

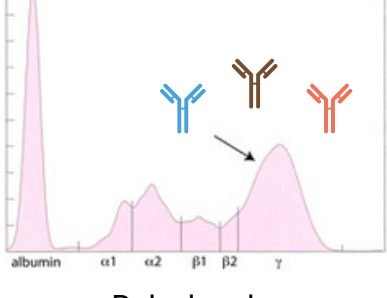
The globulins were elevated and our SPE came back as **polyclonal** gammopathy.

If the gamma globulins are increased due to chronic inflammation we are going to see what is called a polyclonal gammopathy due to a varied population of B cells producing a variety of immunoglobulin types. This causes a wide based peak and is absolutely the most common cause of elevated globulins in cats. Let's check out the only large study available reviewing the SPE results from 155 cats for a bit of perspective.

- The largest category of disease was **infectious** or **inflammatory** in which the majority of cases had increases in the gamma globulin region and decreased albumin.
- Of the 81 cats with increased gamma globulins **95% had a polyclonal gammopathy.**
- The associated inflammatory or infectious diseases included FIP, IBD, dermatophytosis, neutrophilic cholangitis, rhinitis + chronic airway disease, otitis media, pancreatitis, gingivitis, mycobacterium, pyelonephritis, lymphadenitis, endocarditis, inflammatory skin disease, osteomyelitis, uveitis, & IMHA.



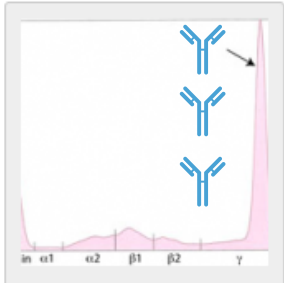
Normal



Polyclonal

Our SPE results came back as **monoclonal** gammopathy.

When there is a clonal population of malignant B cells or plasma cells producing all the same protein source one gets a **tall spike** on the tracing. This is consistent with a monoclonal gammopathy and was not a common occurrence. Only 4/155 cases in the same study came back with a monoclonal gammopathy.



Three of those cats had neoplasia. One cat had both intestinal and hepatic **lymphoma** while the other two had splenic plasmacytomas. Multiple myeloma is a rare form of multifocal plasma cell neoplasia involving the bone marrow. Other forms of plasma cell neoplasia without bone marrow involvement are termed **extramedullary plasmacytoma** and can involve the **skin and/or internal organs** as noted in the cats with splenic disease. Extramedullar plasmacytoma is more common in cats than dogs and often has abdominal organ involvement.

Multiple myeloma is usually seen in older cats (average 12 yrs) and clinical signs may be non-specific. In 12 cats with multiple myeloma, 50% of radiographs showed focal or multifocal osteolysis. Non-regenerative mild to severe anemia was common as was hypocholesterolemia. Multi-organ involvement was noted (spleen, liver, lymph nodes) so consider this if "**hunting**" for the source of a monoclonal gammopathy.

What about the **other cat**?

If you happened to be keeping track, 4/155 had monoclonal gammopathies and 3 had cancer? What about the other cat?! That cat had definitive diagnosis of FIP. The remaining 34/41 cats diagnosed or suspected of FIP had a polyclonal gammopathy.

Keep this in mind. It is possible on rare occasions to see monoclonal gammopathies with infectious and possibly inflammatory disorders. This is recognized more frequently in dogs with leishmaniasis, ehrlichiosis, along with rare individual cases of pyoderma and GI disease. In cats with FIP it is an uncommon but possible finding as infrequent cases have been reported in the literature.

Curiously stomatitis/gingivitis cases were not a stand out group within the 155 cats evaluated and could represent the bias of case selection. It is one of the most common causes where we see mild to moderately elevated globulins. We have seen rare cases of monoclonal gammopathy with severe oral stomatitis and feline lymphoplasmacytic gingivitis is reported rarely in the literature in association with a monoclonal gammopathy.

References and Resources:
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