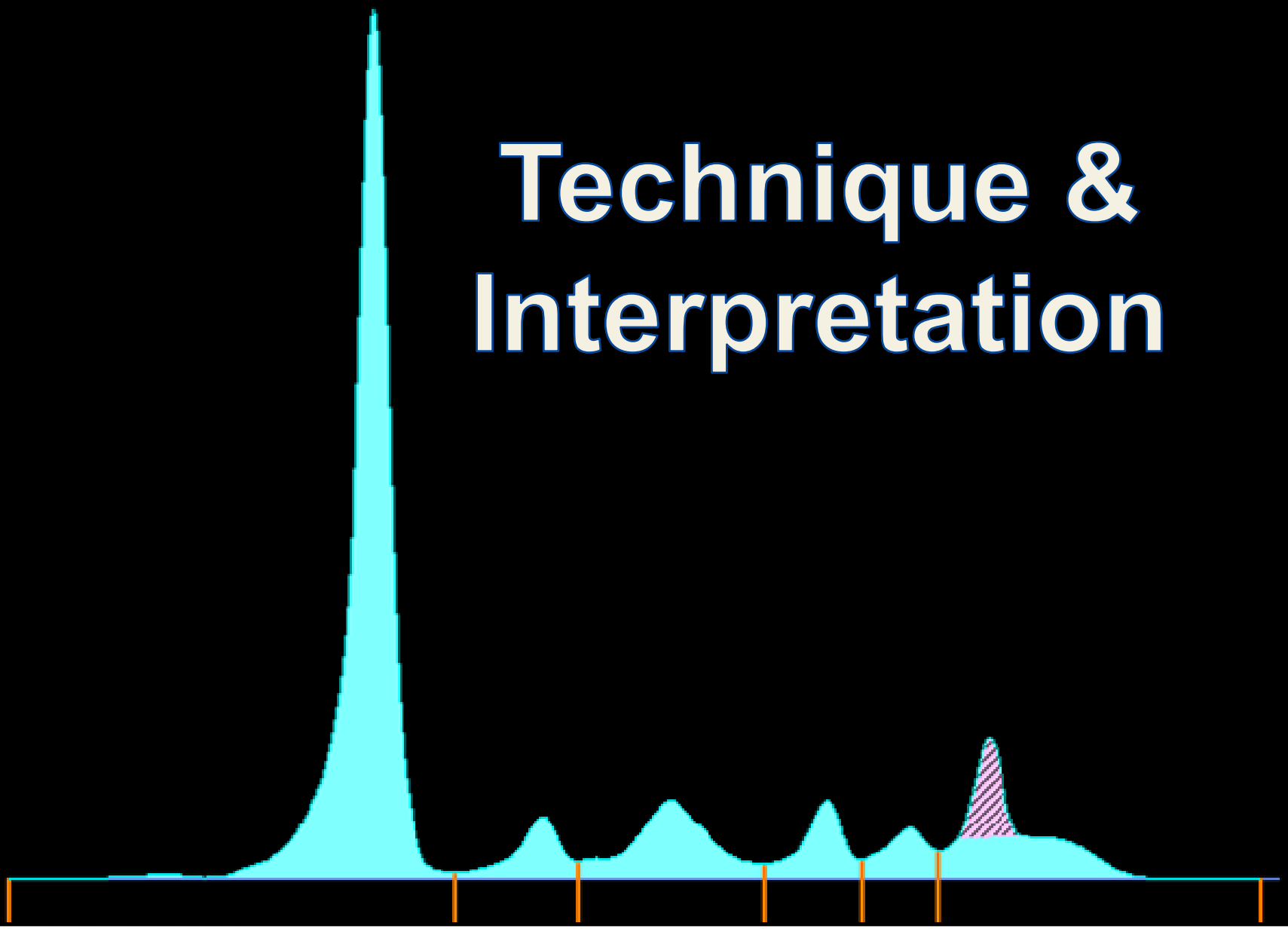
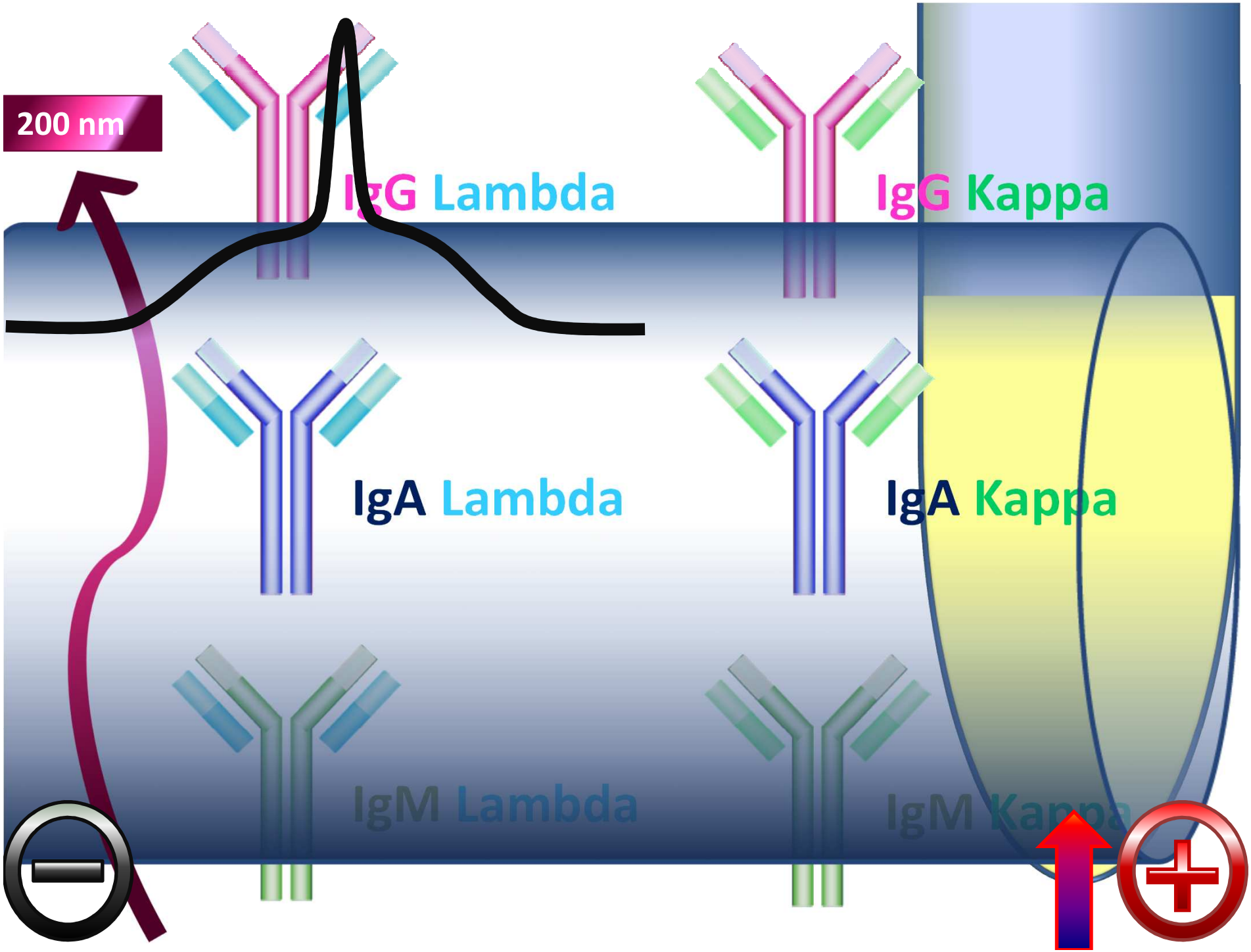
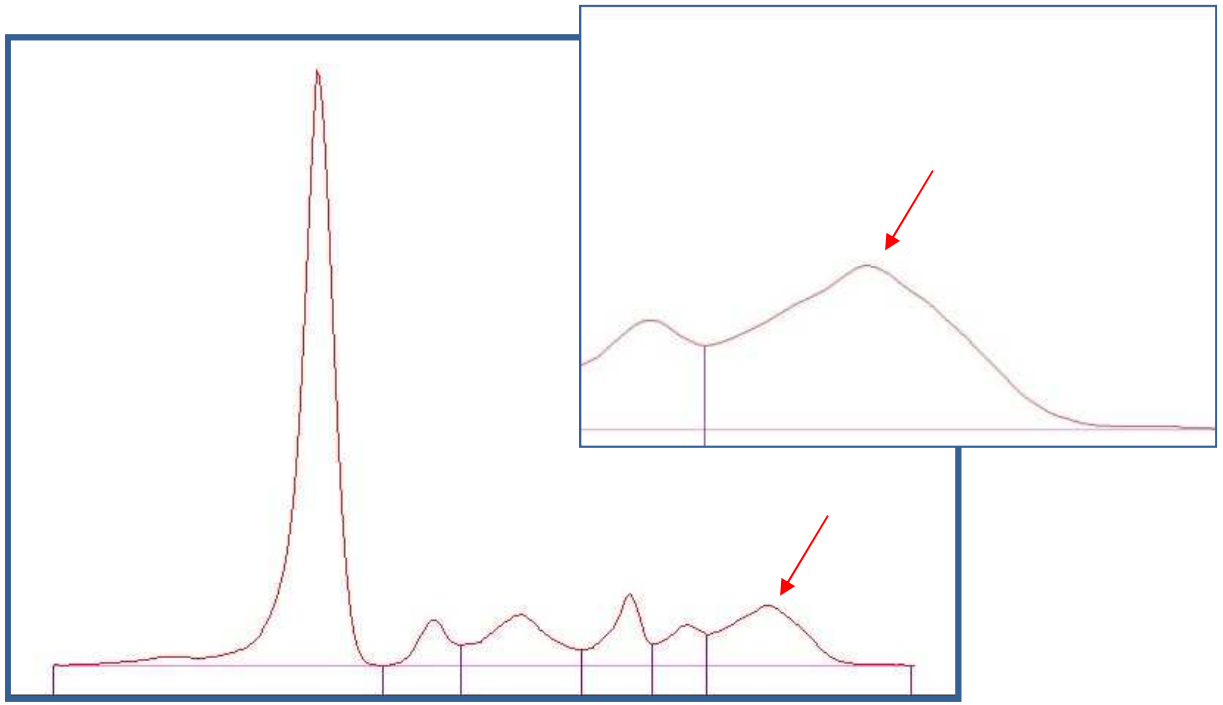
Technique & Interpretation

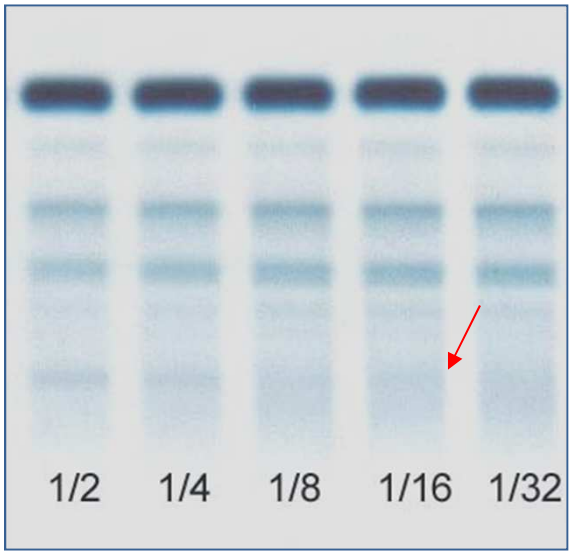



200 nm
IgG Lambda
IgG Kappa
IgA Lambda
IgA Kappa
IgM Lambda
IgM Kappa

Sensitivity Study

A monoclonal component is diluted with normal serum and analyzed on both Hydragel and Capillarys.

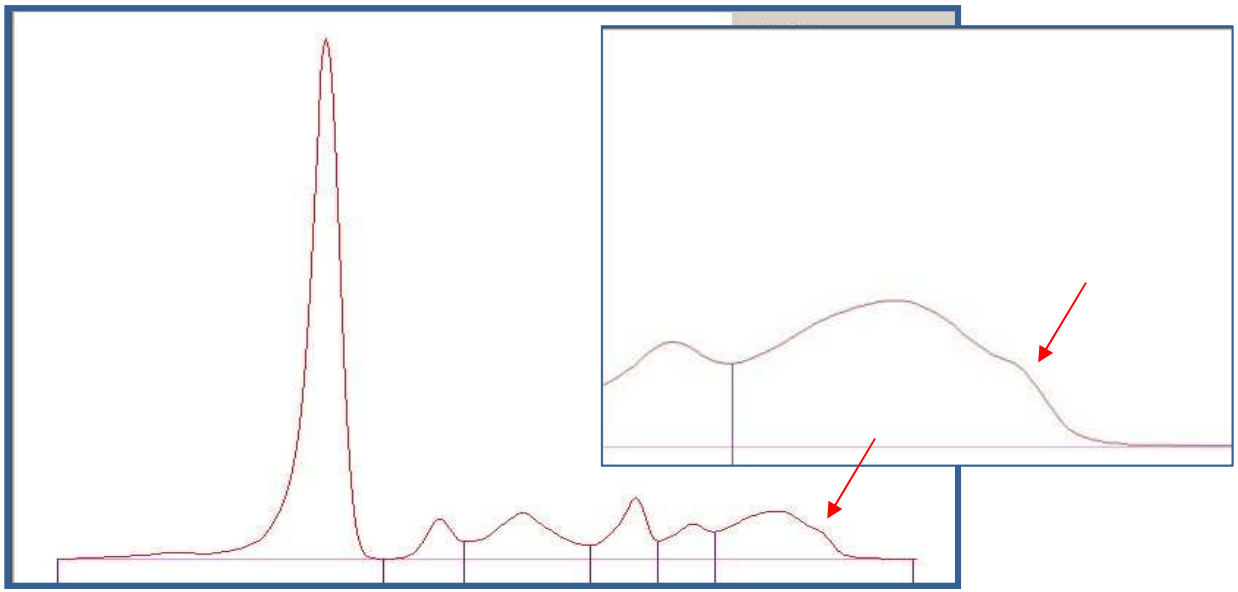


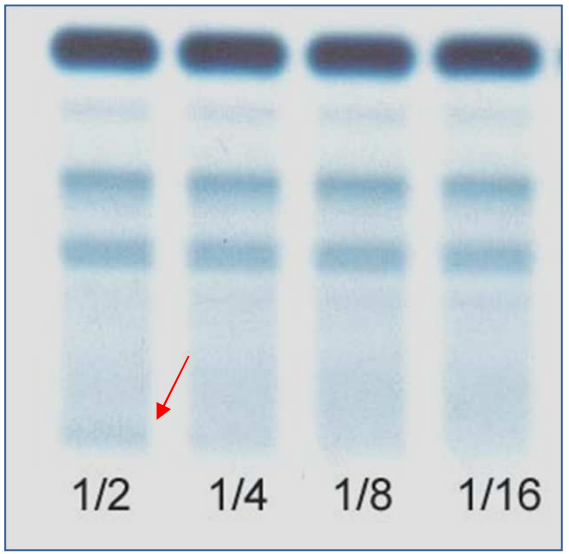


The lowest concentration detected is **0,18 g/L** on both systems.

Sensitivity Study

A monoclonal component is diluted with normal serum and analyzed on both Hydragel and Capillarys.





The lowest concentration detected is **0,4 g/L** on both systems.

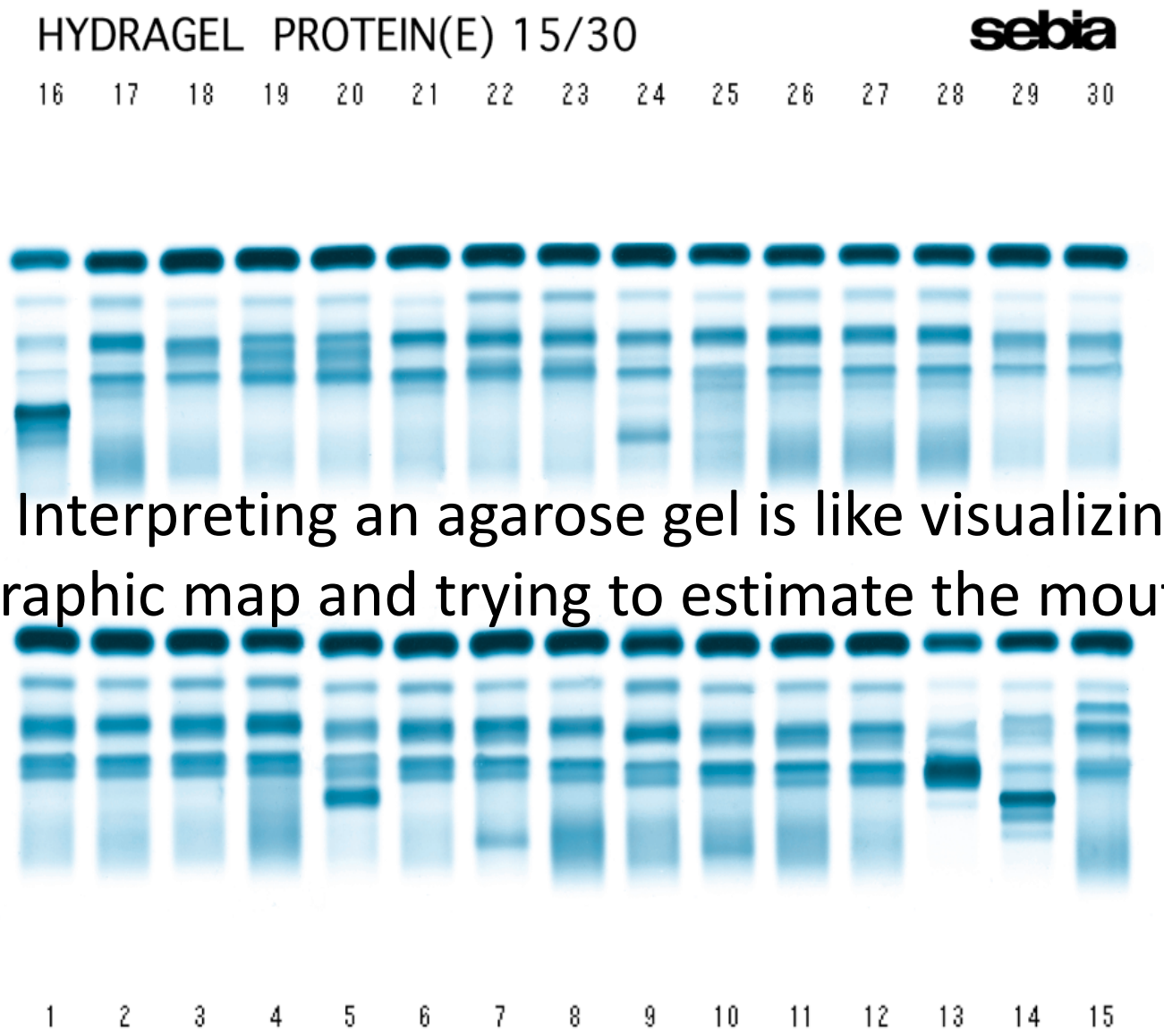
Sensitivity depend of the monoclonal component mobility and also of the polyclonal background

Comparative Study
Hydragel to Capillarys

- Correlations were performed on 1064 samples containing at least one monoclonal component.

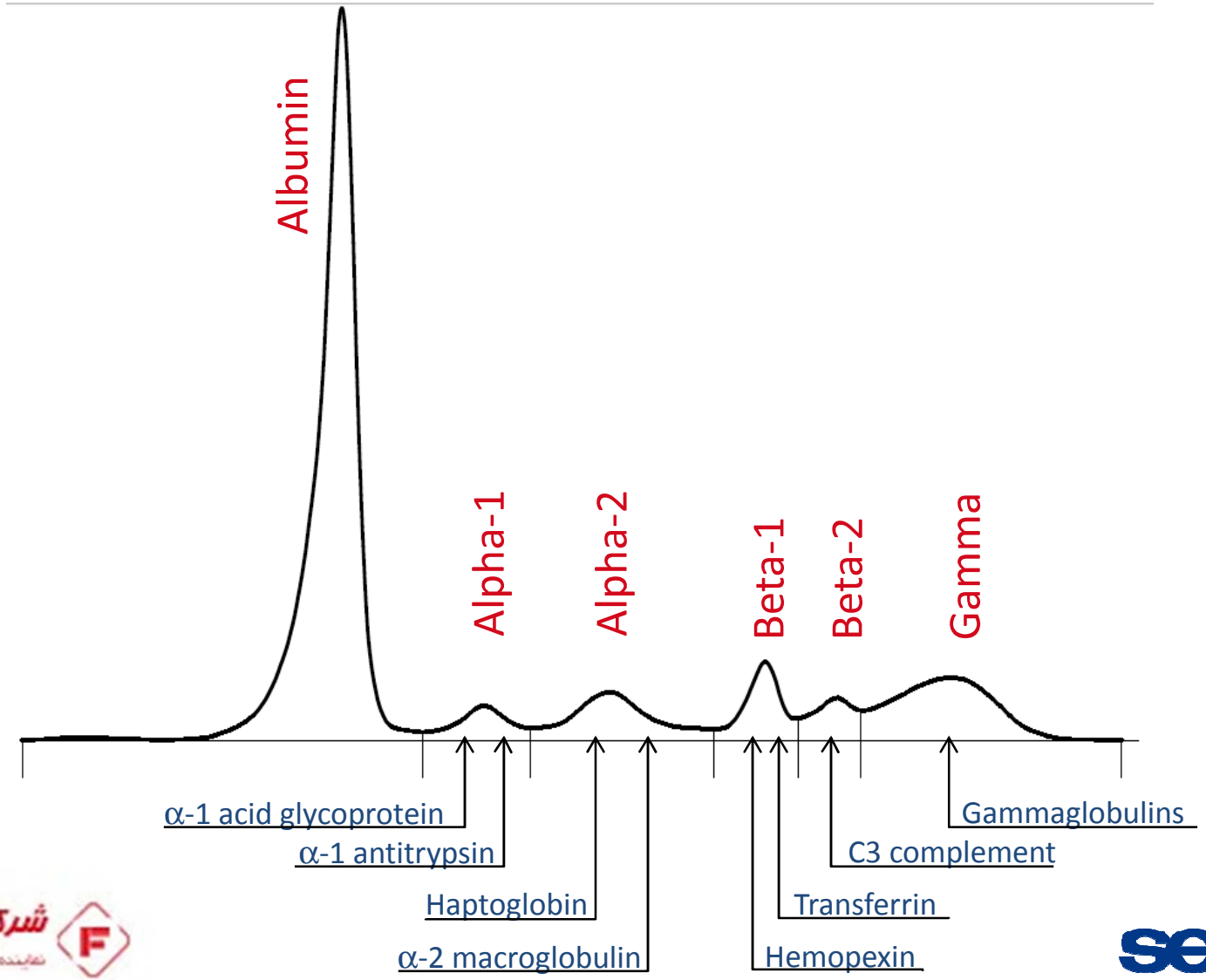
- Samples were run in parallel on Capillarys and Agarose gel

	CAPILLARYS	HYDRAGEL
Positives	**99.4%** *(1058)*	**98.4%** *(1047)*
Negatives	**0.6%** *(6)*	**1.6%** *(17)*

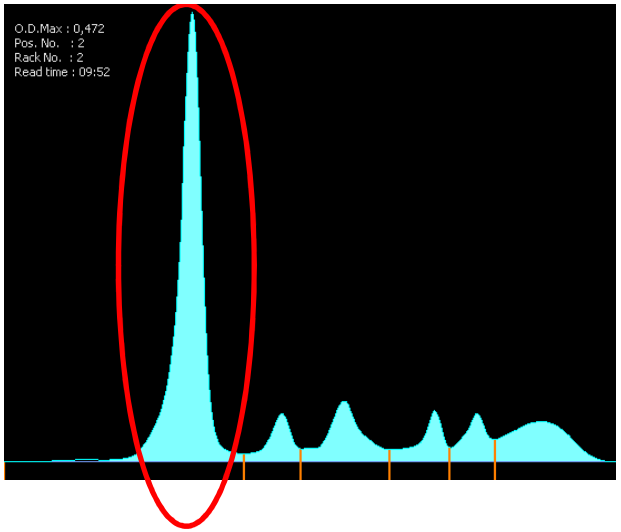


Interpreting an agarose gel is like visualizing
a topographic map and trying to estimate the moutain relief

Fraction identification

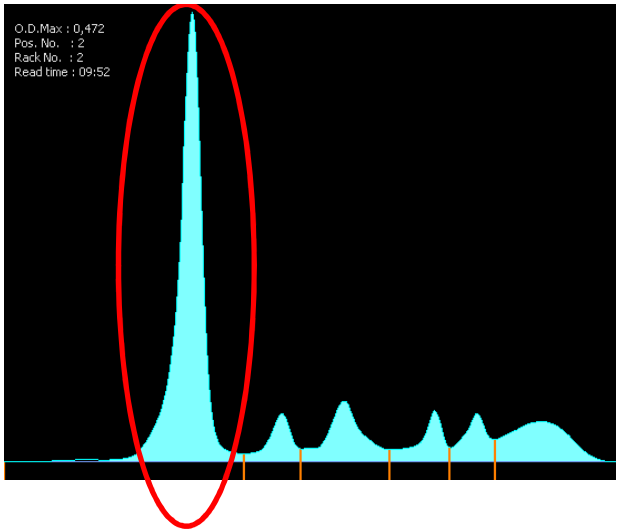


ALBUMIN



- Most abundant protein in normal serum
- Migrates anodally
- Functions:
  - Maintains oncotic pressure within the body
  - General transport protein
  - Source of amino acids
- Normal Range: 3.8 to 4.8 g/dL

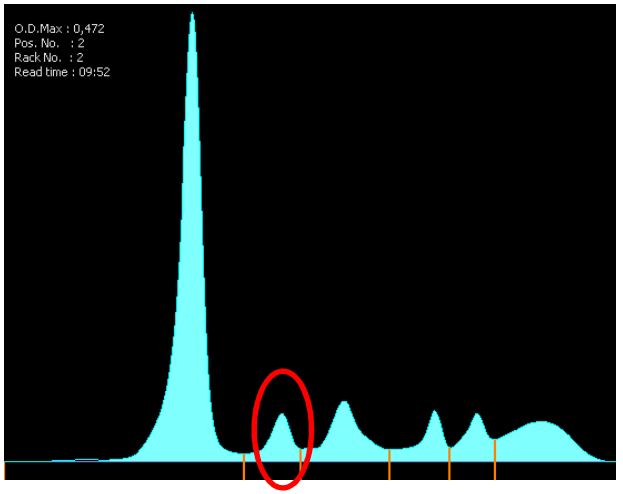
ALBUMIN



- *Hypoalbuminemia*
  - Liver disease
  - Malnutrition
  - Protein loss (urine, GI tract, burns, neoplasia)
- *Hyperalbuminemia*
  - Normal healthy variation
  - Dehydration is the only pathological association
- *Bisalbuminemia*
  - Congenital
  - Induced by drugs
  - In acute pancreatitis

ALPHA-1 FRACTION

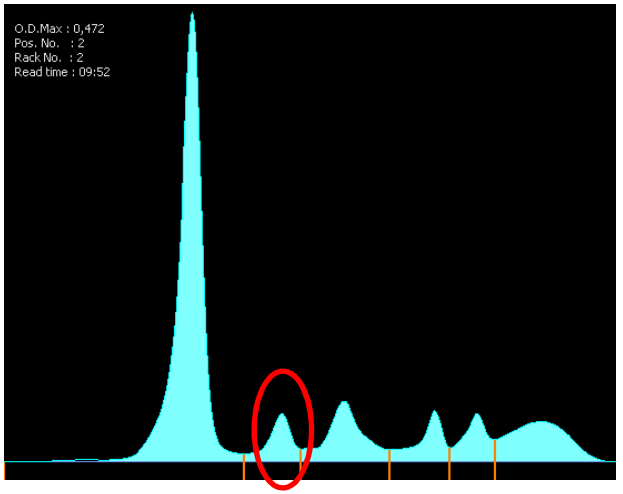
α-1 ACID GLYCOPROTEIN



- Alpha-1 acid glycoprotein (AGP) or orosomucoid (ORM)
  - 41- 43 kDa glycoprotein
  - pI of 2.8-3.8
  - AGP is one of the major acute phase proteins
  - Serum concentration increases in response to systemic tissue injury, inflammation or infection

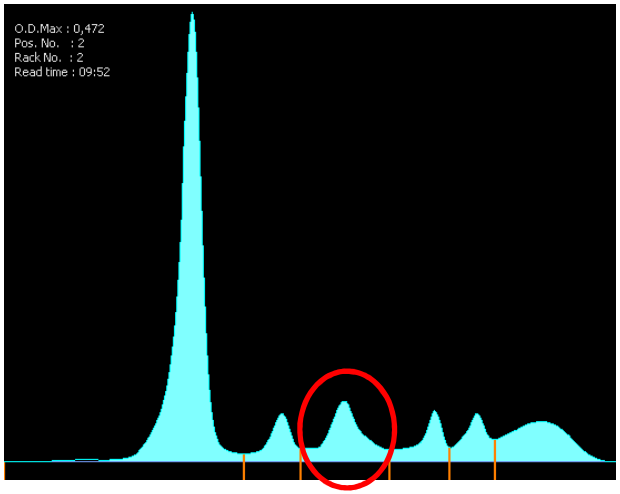
ALPHA-1 FRACTION

α-1 ANTITRYPSIN



- Alpha-1 antitrypsin (or alpha-1 protease inhibitor):
  - plasma protein (an *α*1-globulin, *53 kDa*) produced primarily in the liver
  - an acute phase reactant
  - inhibits the activity of elastase, cathepsin G, trypsin and other proteolytic enzymes
  - deficiency of this protein is associated with development of emphysema

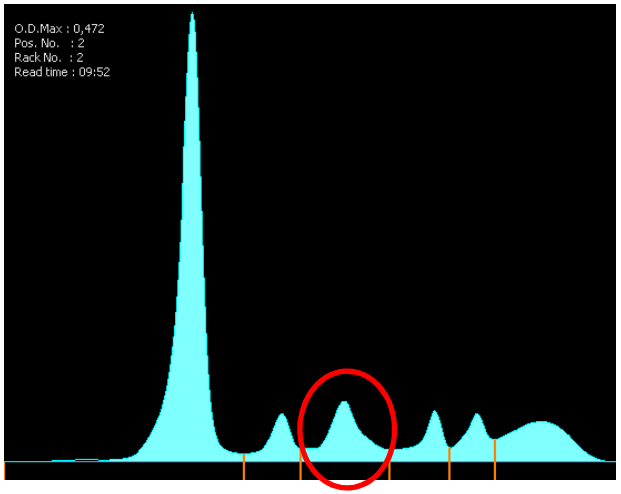
ALPHA-2 FRACTION



- Normally appears as single peak cathodic to (before) alpha-1 fraction
- Several proteins migrate together:
  - Haptoglobin (double band may be indicator of phenotype)
  - Alpha-2 macroglobulin
  - Ceruloplasmin and Gc globulin are minor components
- Decreased alpha-2 values are due to hemolysis (intravascular)
- Increased alpha-2 values are due to:
  - Acute inflammation
  - Nephrotic syndrome
  - In hemolysed samples (in vitro)

ALPHA-2 FRACTION

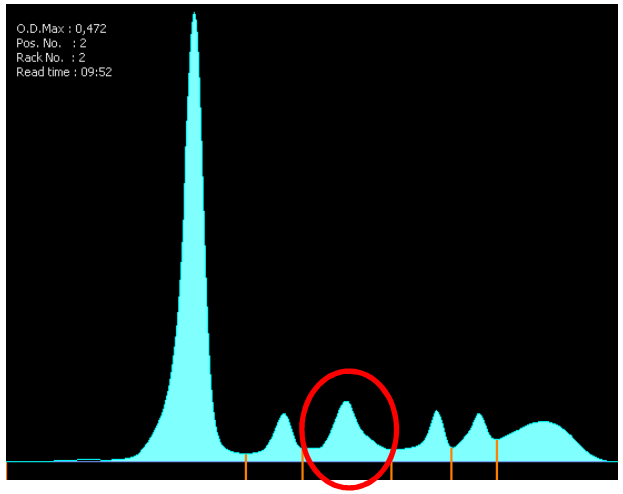
α-2 MACROGLOBULIN



- Protease inhibitor
- Concentration range: 150 -- 350 mg/dl
- Alpha-2 macroglobulin is not eliminated through kidney due to its huge size and may increase 10 fold in nephrosis (secondary to synthesis)
- No specific disease states are associated with low levels
- Mobility may change with storage

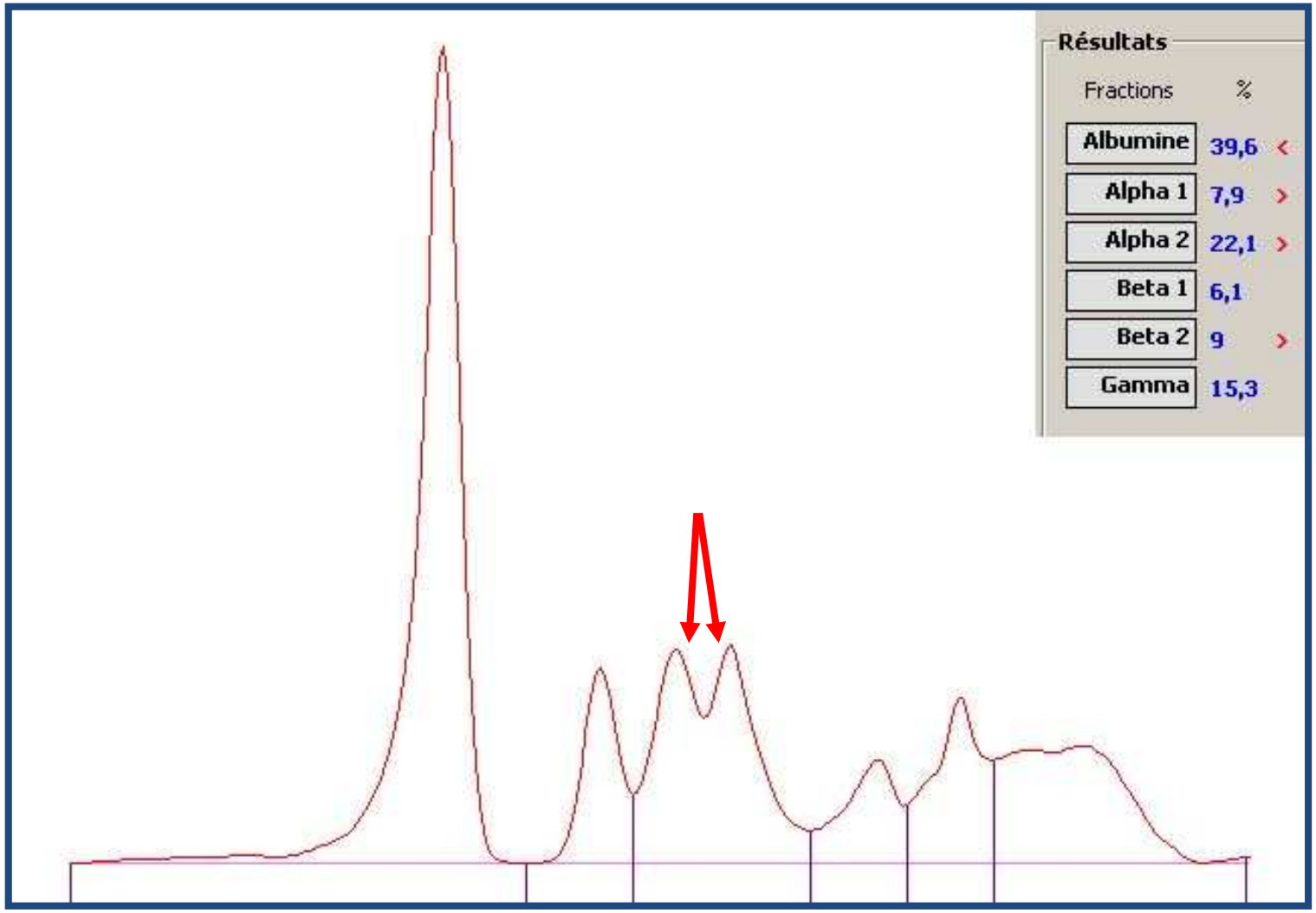
ALPHA-2 FRACTION

HAPTOGLOBIN



- Haptoglobin (HAP) binds free oxyhemoglobin in plasma and makes a complex with hemoglobin molecule
- Functions:
  - Acute phase protein -- elevated in inflammation
  - Carry Hb in case of hemolyse
- Increased in hypoproliferative anemia, including iron deficiency and in hemolysis in vitro
- Decreased in intravascular hemolysis, hemolytic anemia, transfusion reaction, malaria

Alpha 2 Zone

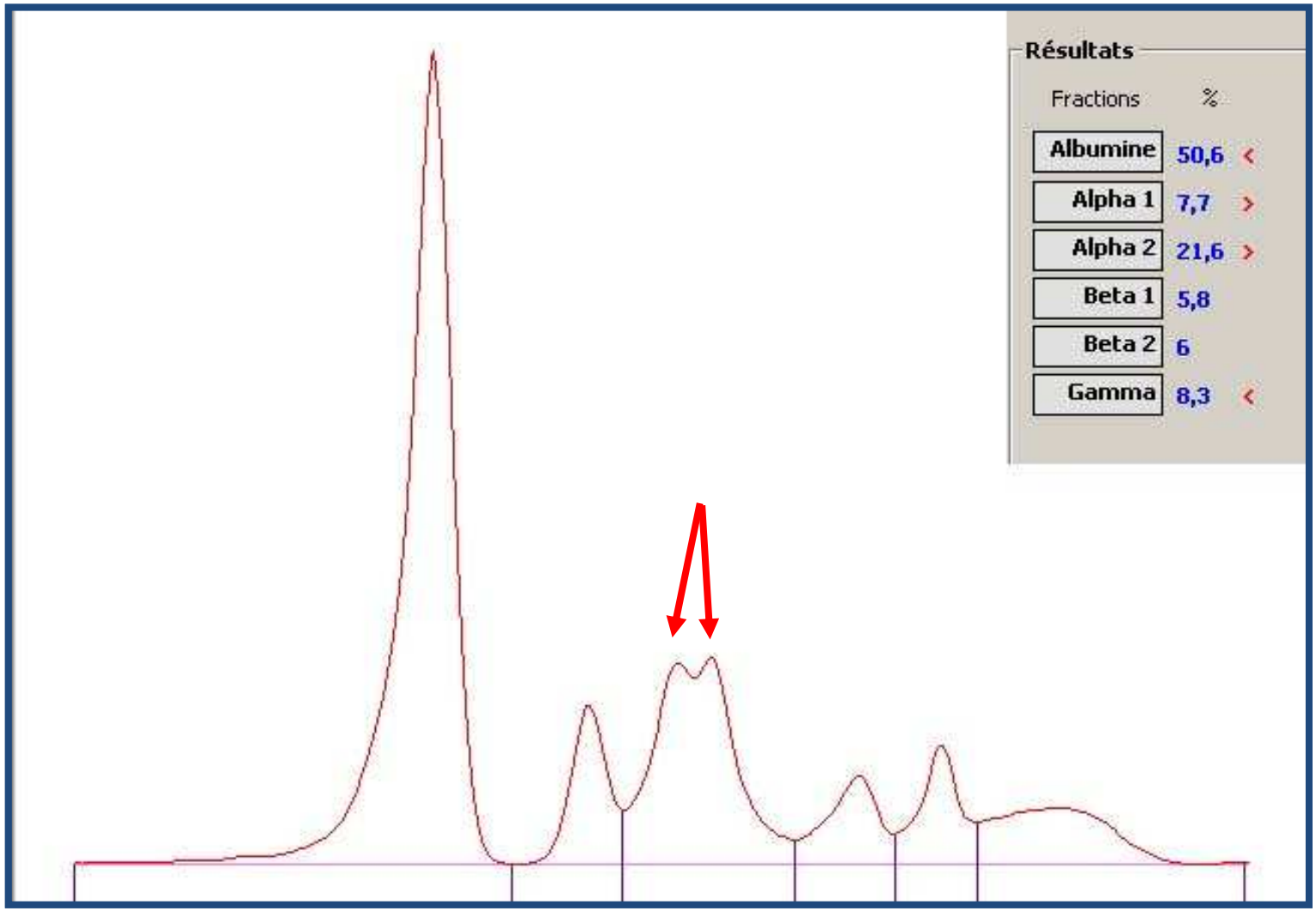


Haptoglobin phenotyping I – I

2 distinctive bands in Alpha 2

Inflammatory syndrome

Alpha 2 Zone

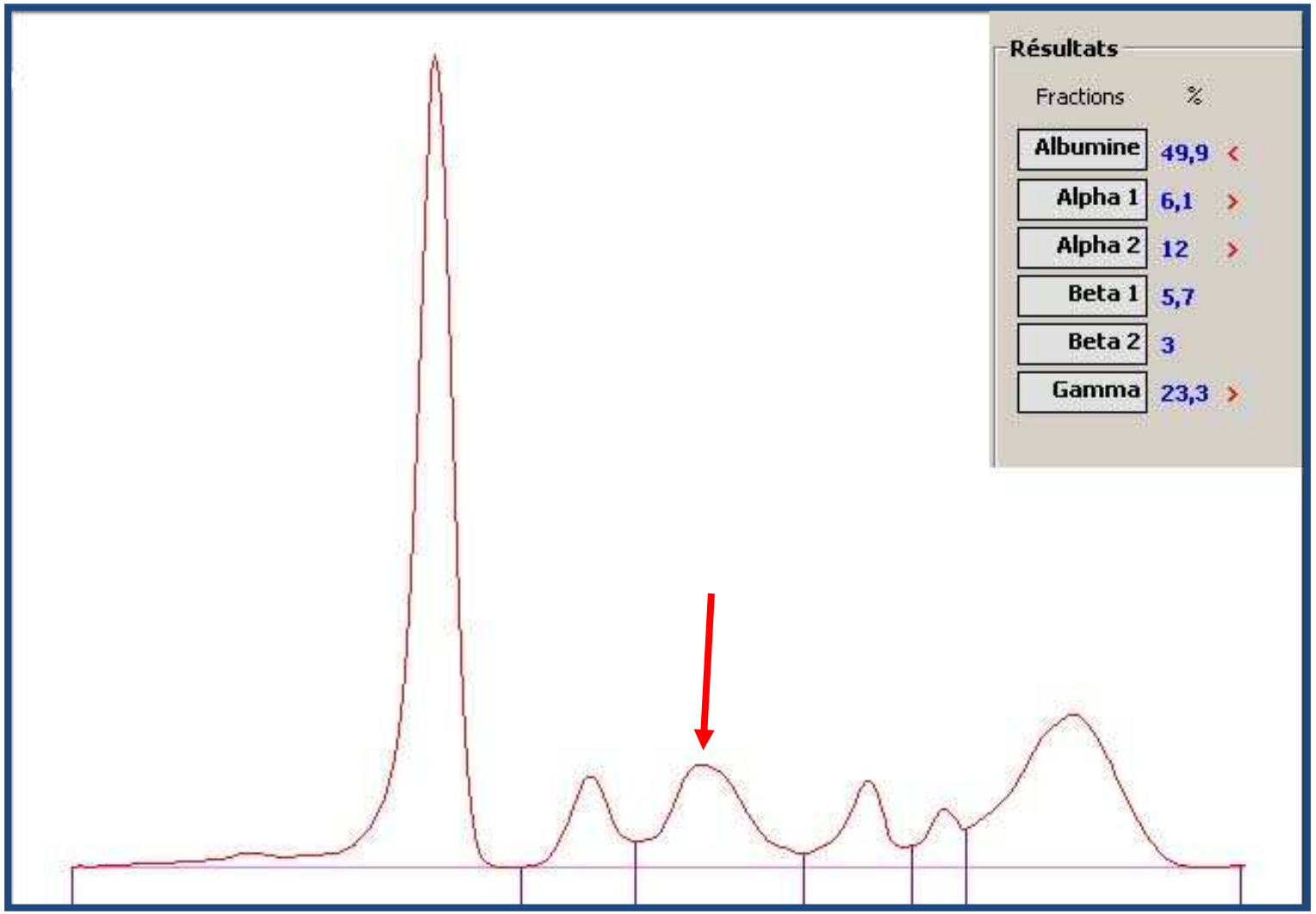


Haptoglobin Phenotyping I - II

2 close bands in Alpha 2

Inflammatory syndrome

Alpha 2 Zone

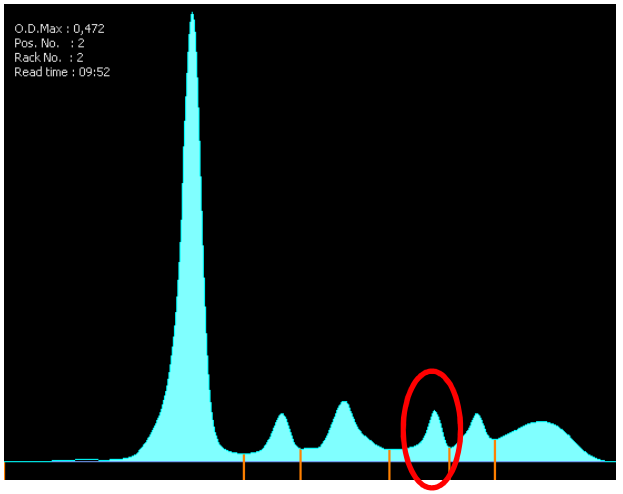


Haptoglobin Phenotyping II - II

Only 1 band in Alpha 2

Inflammatory Syndrom

BETA-1 FRACTION

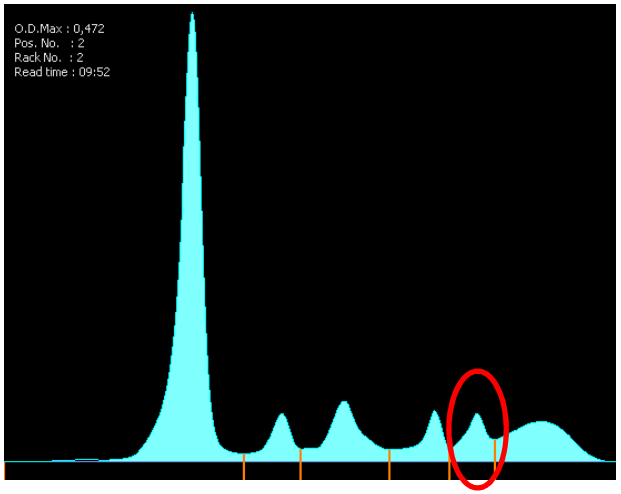


TRANSFERRIN

- Transferrin (TRF) is the principle protein for iron transport
- Mainly synthesized in the liver
- Transferrin binds iron released from catabolism of hemoglobin or absorbed from the intestine, and carries it to iron storage sites
- Increased in:
  - Iron deficiency anemia
- Decreased in:
  - Iron overload
  - Acute or chronic inflammation

BETA-2 FRACTION

C3 COMPLEMENT



- Complement = system of ~30 proteins that serve as mediators of the inflammatory response

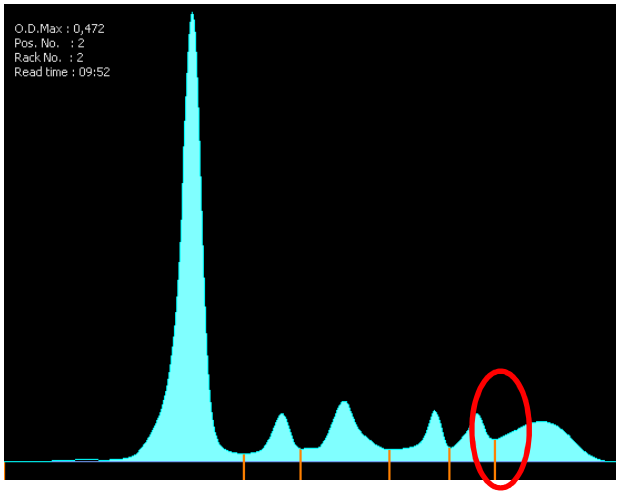
  Decreased:

  – > 3 day old sample
- Increased:

  – acute phase response or *co-migrating MC band*
- Normal Range: 2.0 – 5.4% of TP

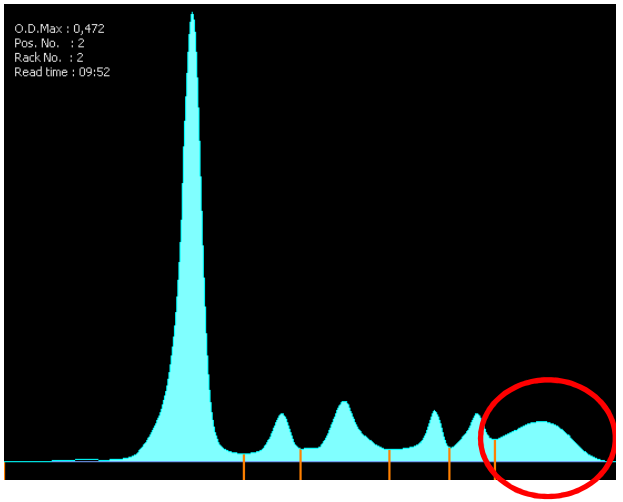
BETA-2 FRACTION

C-REACTIVE PROTEIN (CRP)



- M.W. 120 kDa
- Clinical significance: acute phase protein
- High levels of CRP are caused by infections and many long-term diseases
- May be mistaken for a monoclonal band

GAMMA FRACTION



- Immunoglobulins migrate within the gamma fraction
- IgG, IgA, IgM, IgD, IgE, Kappa, Lambda
- IgA: migrates closest to the Beta-2 fraction

Decreased:

In elderly

congenital immunodeficiency

Immunosuppressive treatment (HIV ,Transplant etc..)

Increased:

in lymphoplasmocytic syndromes such as Multiple Myeloma

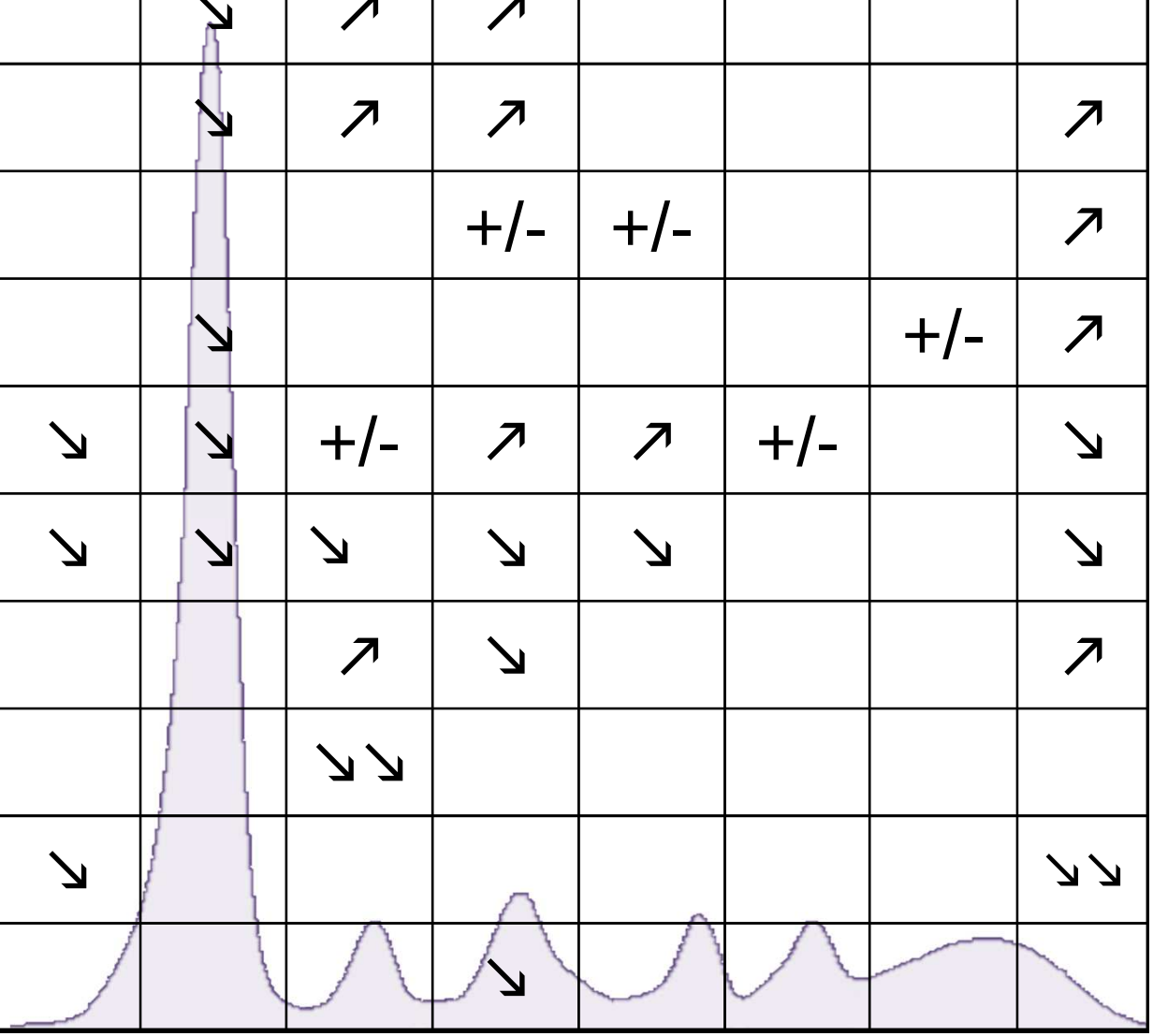
Hyperimmunization

Acute infection (HIV….)

Chronic Liver disease

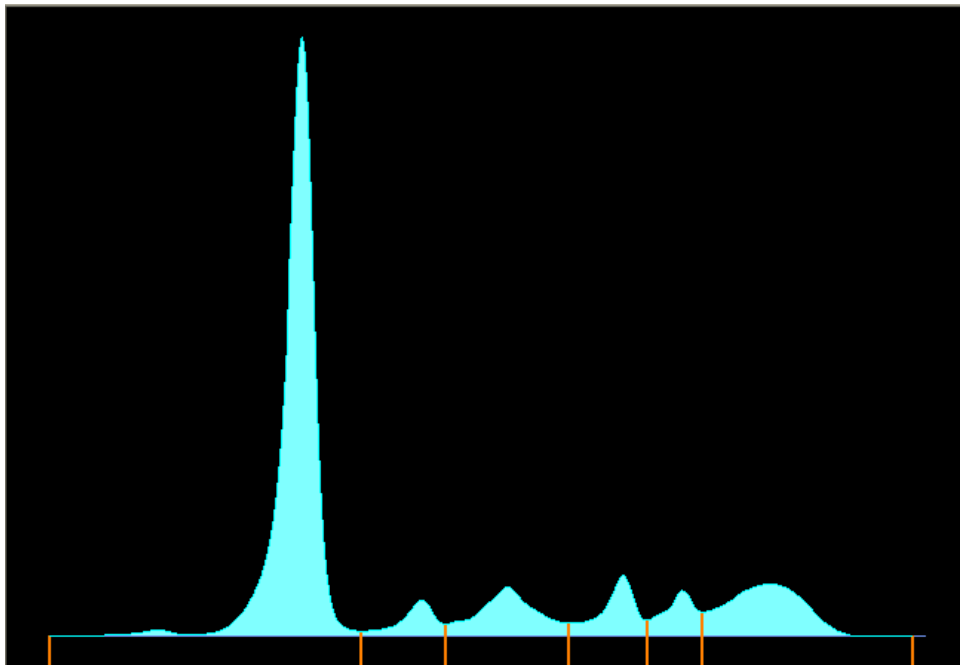
Chronic inflammatory disease

Multiple Pathologies screening	TP, g/dL	Alb	α-1	α-2	β	Split β	*β-γ bridge*	γ
Acute inflammatory pattern and Hyper-estrogenism pattern		↘	↗	↗				
Chronic inflammatory disorders		↘	↗	↗				↗
Polyclonal gammopathy				+/-	+/-			↗
Liver disease/Cirrhosis		↘					+/-	↗
Nephrotic syndrome	↘	↘	+/-	↗	↗	+/-		↘
Protein-losing pattern/malnutrition	↘	↘	↘	↘	↘			↘
Autoimmune reactions			↗	↘				↗
Alpha-1-antitrypsin deficiency			↘↘					
Hypogammaglobulinemia	↘							↘↘
Hemolytic anemias/congenital hemoglobin defects				↘				

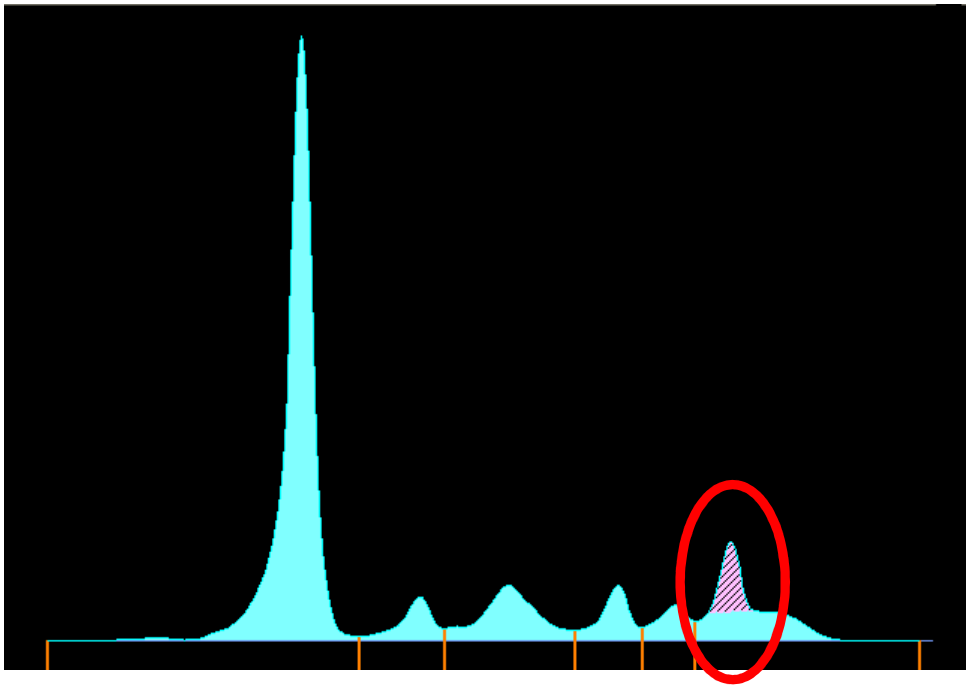


Total protein, Albumin, alpha 1 & 2 zones, beta zone, gamma zone (gammaglobulins)

Picking-up monoclonal protein by serum protein electrophoresis



Normal serum



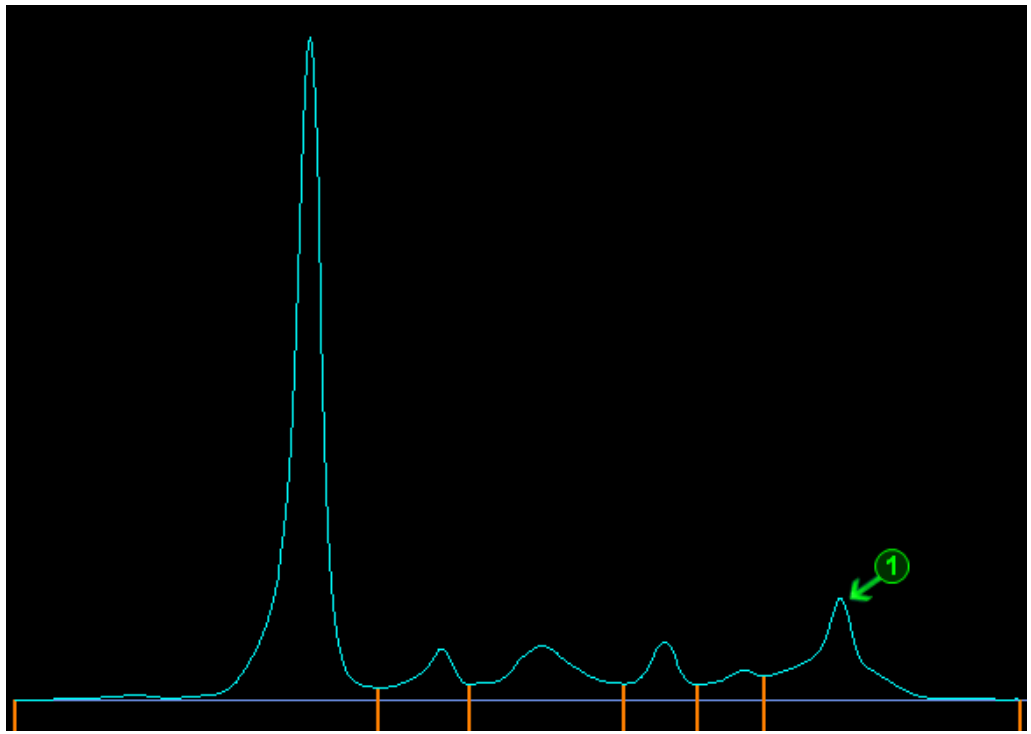
Serum with Monoclonal Protein

- Paraprotein
- M-protein
- M-spike
- M-component

Serum Protein Electrophoresis by

capillarys 2 sebia flex piercing

- ✓ Complete walk-away automation
- ✓ Direct Protein measurement
- ✓ Optimal resolution
- ✓ Excellent sensitivity
- ✓ True positive sample ID
- ✓ High throughput
- ✓ Large autonomy



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