

No.1252

Esophagus, stomach and duodenum
of a monkey

LSI Medience Corporation

Case History

Specimens: Esophagus, stomach and duodenum

Animal: Cynomolgus monkey, male, 6-year-old

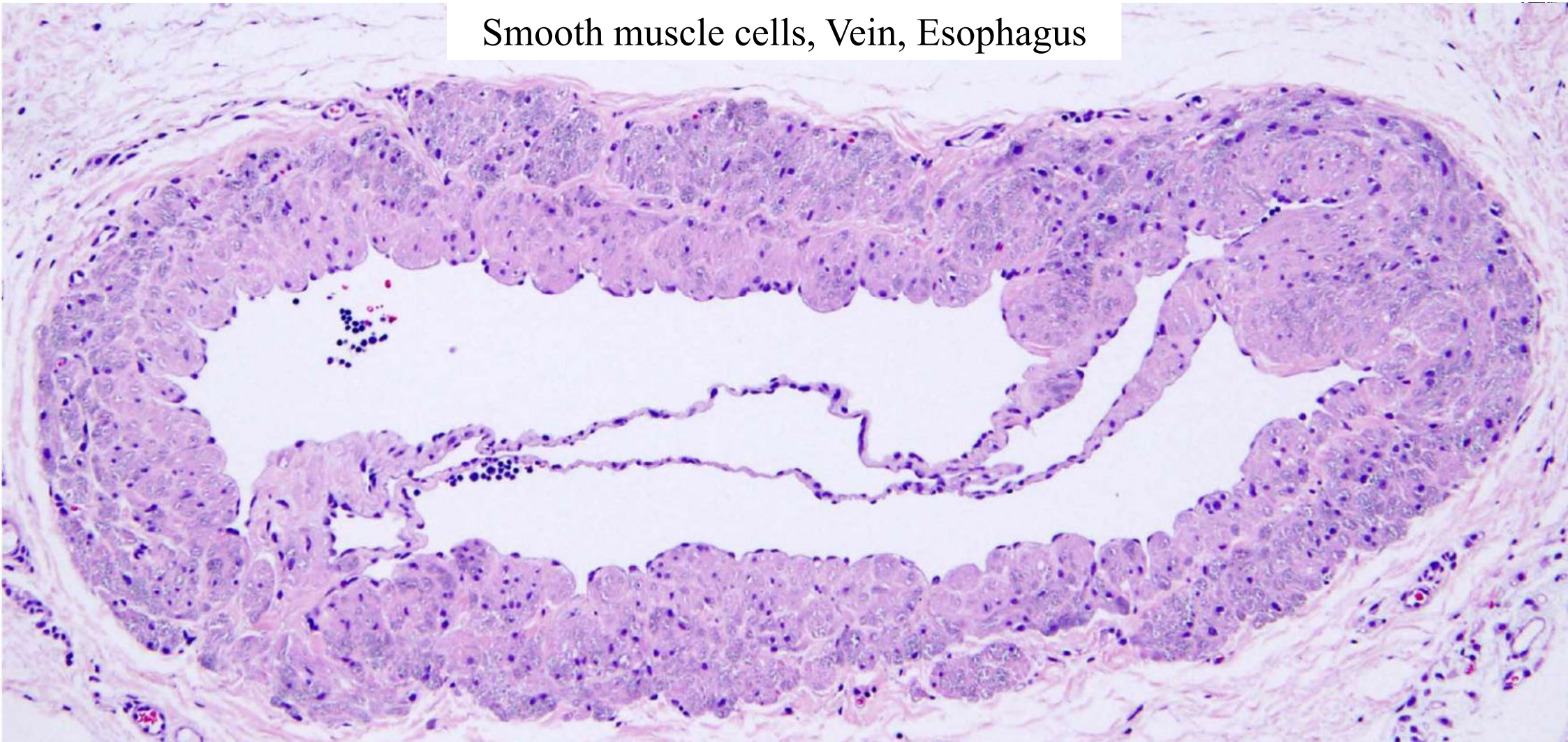
History: The animal was bred normally without any treatment. This animal showed **wasting**, **diarrhea** and vomiting (food residue), though no decrease in food consumption. Then the animal was euthanized due to deteriorating general condition.

Gross findings : No gross abnormalities were observed in digestive tract. In other organs, small thymus and gelatinous change in femoral bone marrow were observed.

Body Weight



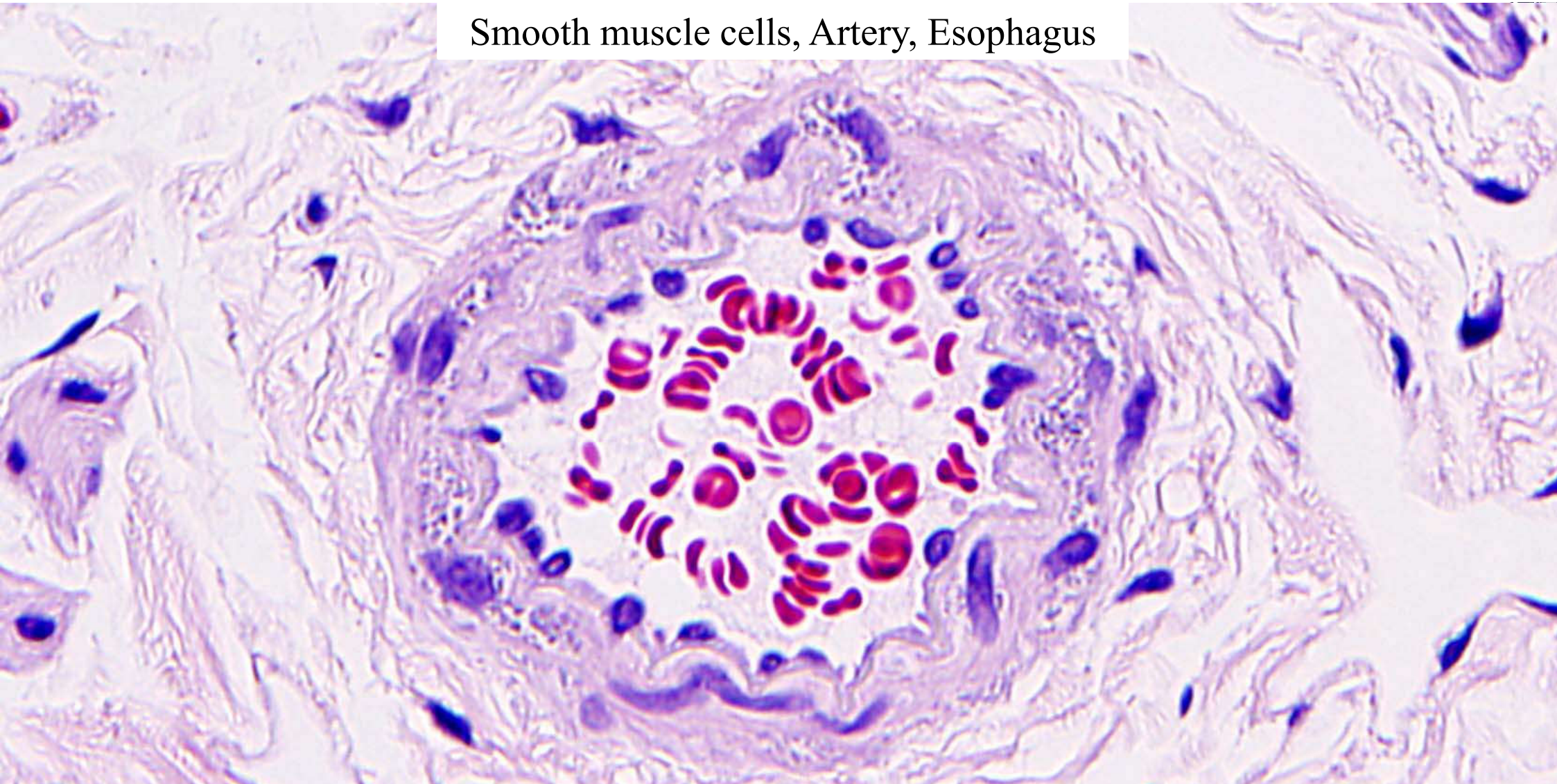
Smooth muscle cells, Vein, Esophagus



Pigment granules are remarkably observed in the smooth muscle cells of the vein in the adventitia of the esophagus.

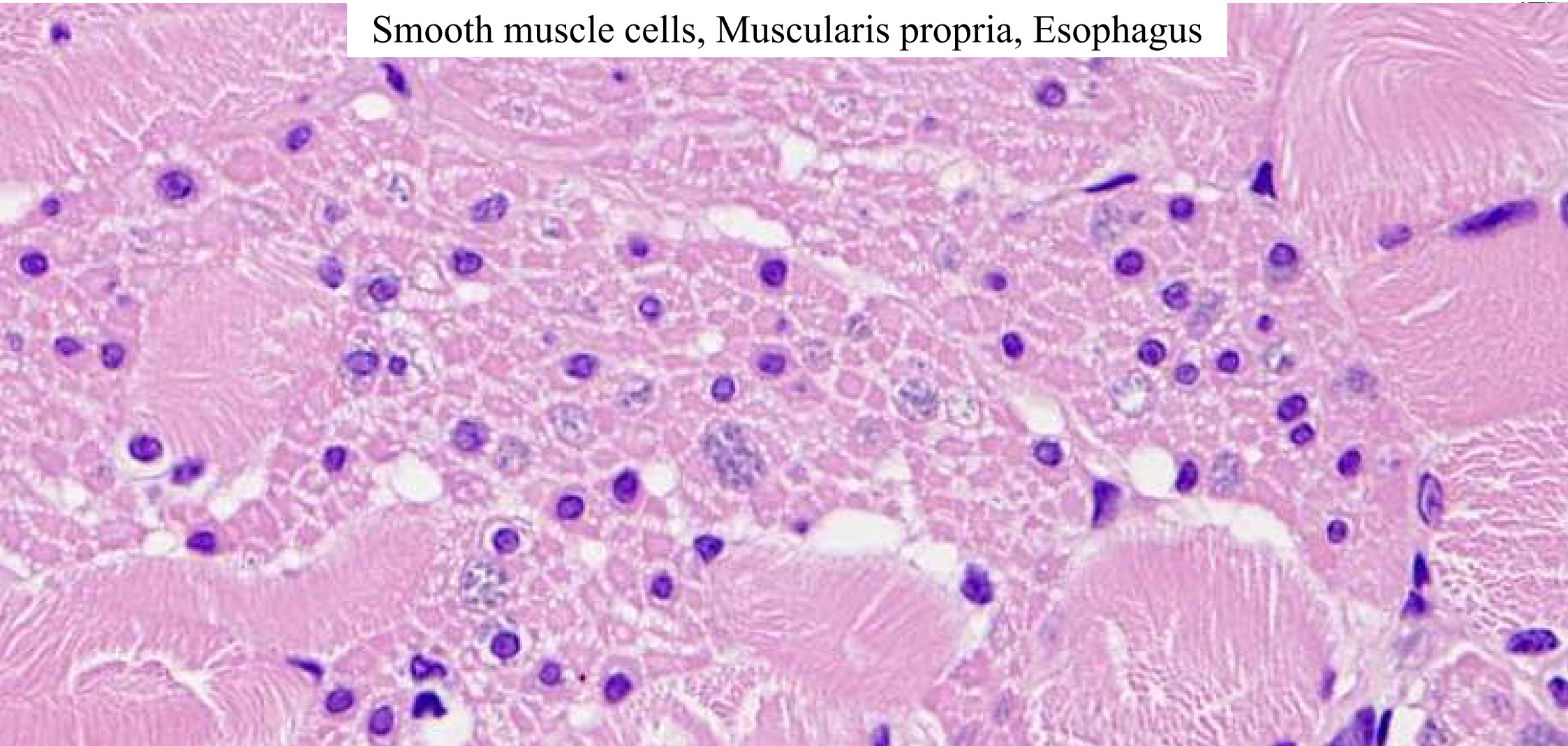
Pigment granules were also observed in the veins of the stomach and duodenum.

Smooth muscle cells, Artery, Esophagus



Pigment granules are observed in the smooth muscle cells of the artery in the adventitia of the esophagus. Pigment granules were also observed in the artery of the stomach.

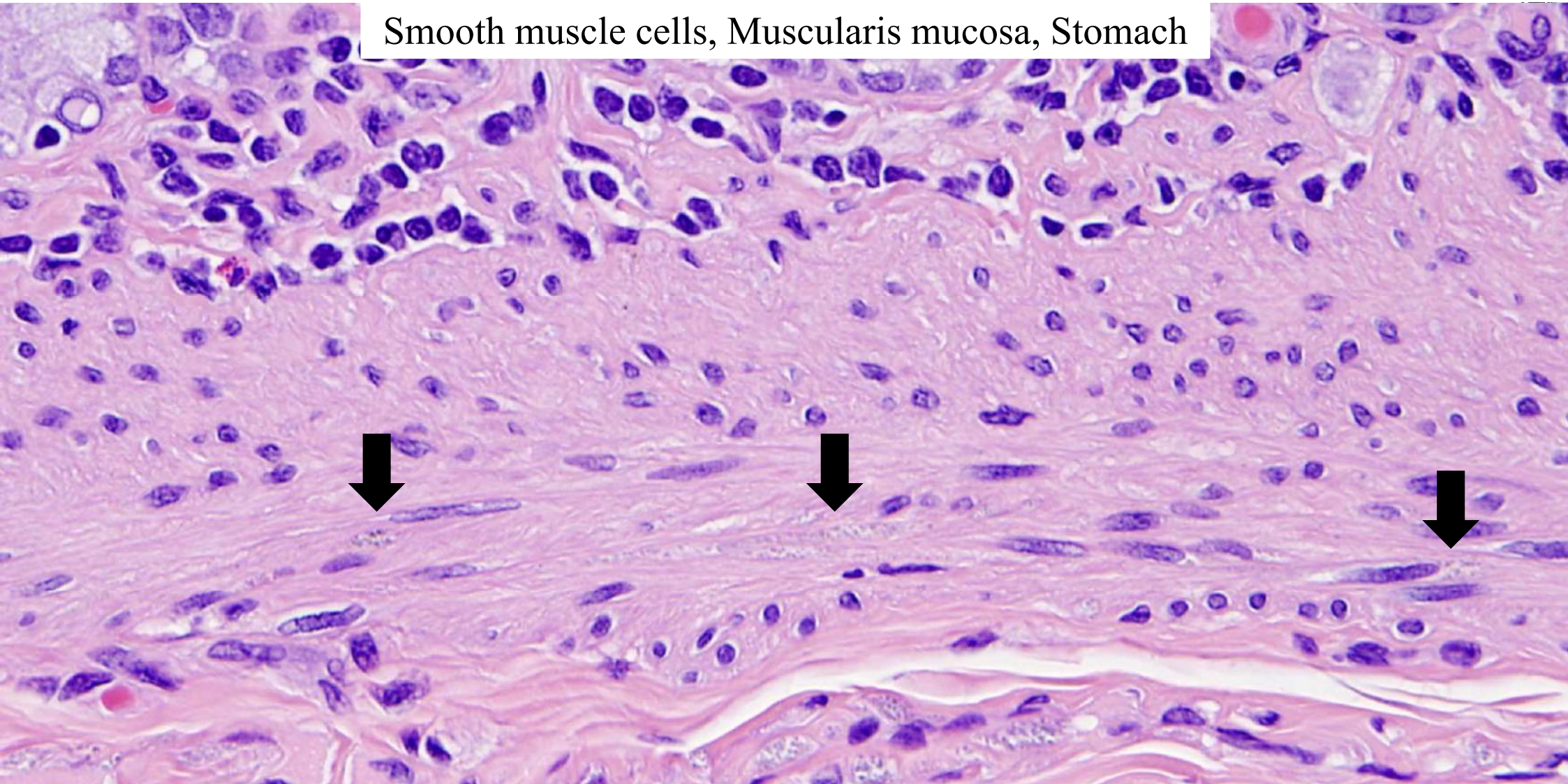
Smooth muscle cells, Muscularis propria, Esophagus



Pigment granules are observed in the smooth muscle cells of the muscularis propria in the esophagus. They are not observed in the striated muscles of the esophagus.

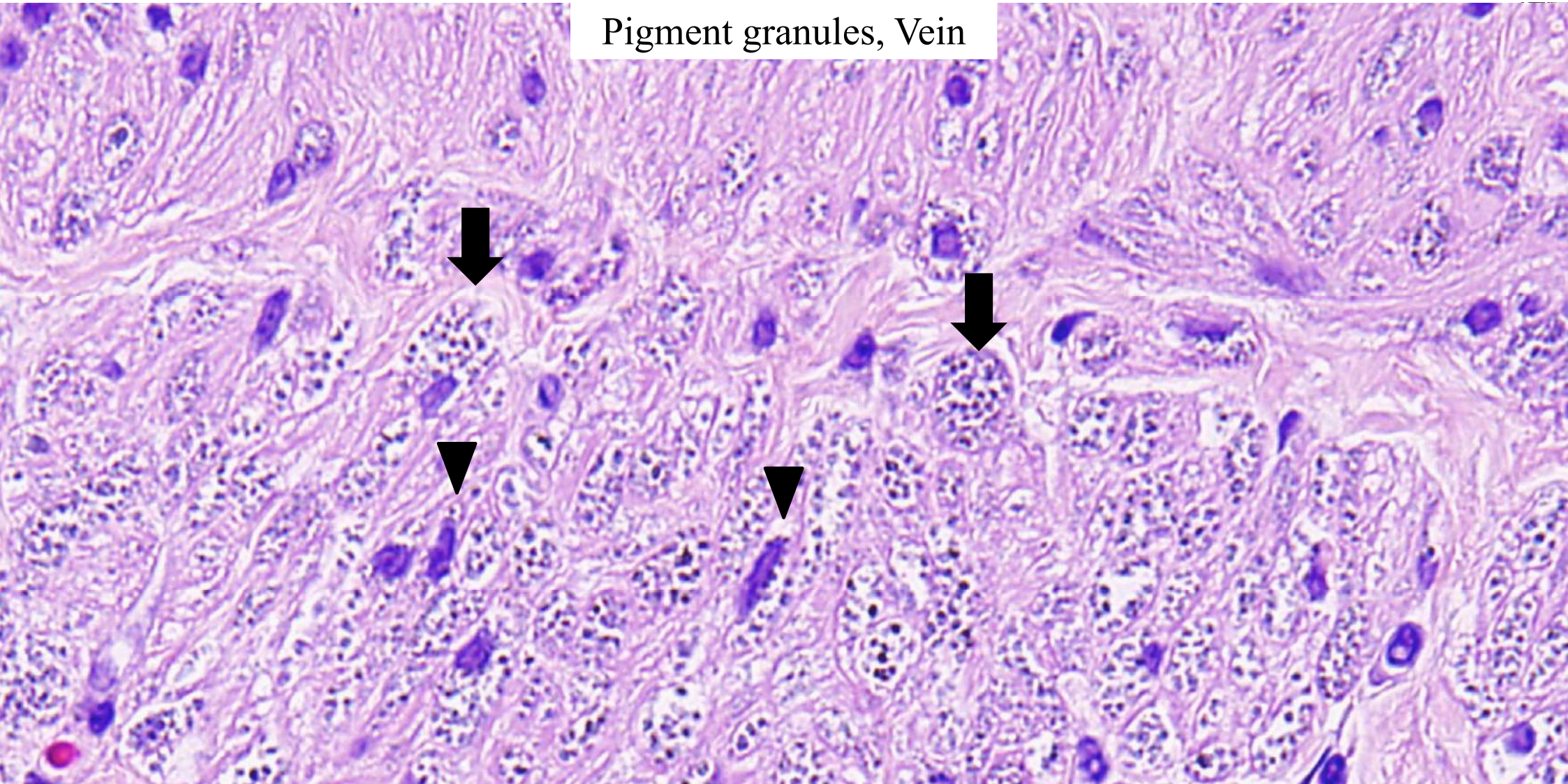
Pigment granules were also observed in the muscularis propria of the stomach and duodenum.

Smooth muscle cells, Muscularis mucosa, Stomach

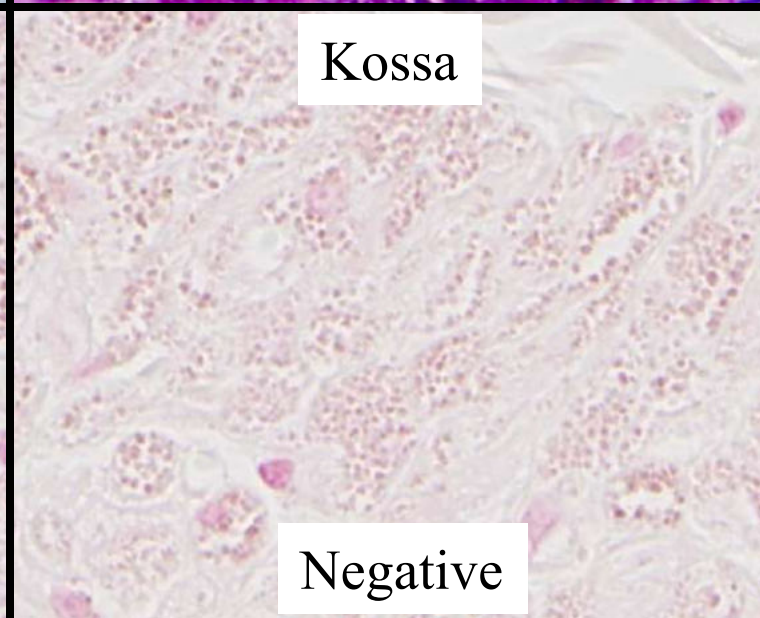
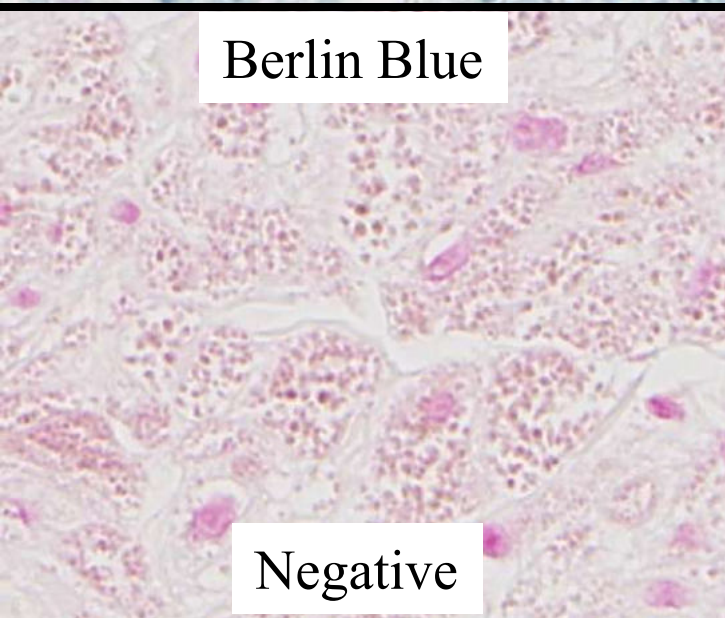
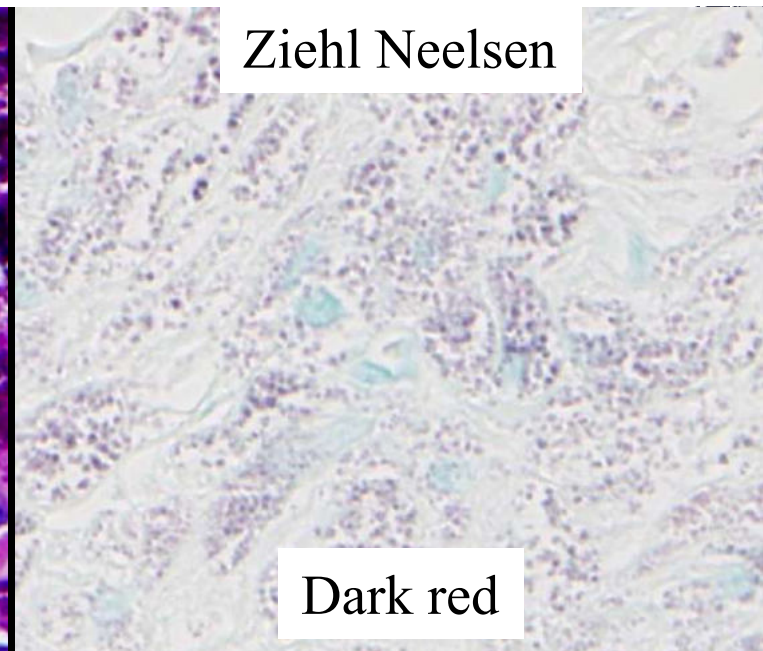
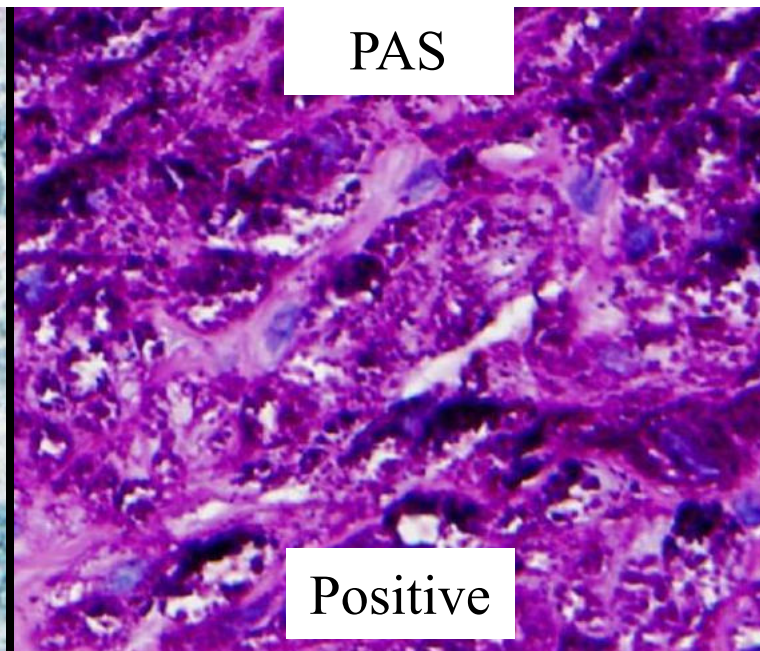
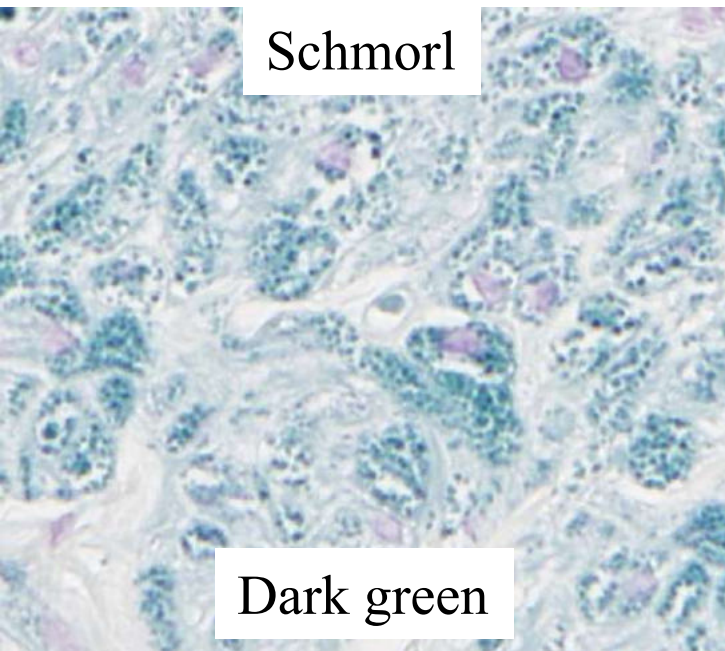


Pigment granules are observed in the smooth muscle cells of the muscularis mucosa in the stomach (arrows). Pigment granules were also observed in the muscularis mucosa of the stomach and duodenum.

Pigment granules, Vein



Various-sized brown or basophilic pigment granules are distributed diffusely within the cytoplasm (arrows) or observed around the nuclei (arrow heads) of the smooth muscle cells.



Staining Result of Pigment Granules

	Lipofuscin	Pigment granules of the case
HE	Yellowish brown	Brown or Basophilic
Schmorl	Dark green	Dark green
PAS	Positive	Positive
Ziehl Neelsen	(Dark) Red	Dark red
Berlin Blue	Negative	Negative
Kossa	Negative	Negative
*Eosin only	Yellowish brown	Yellowish brown

*Eosin only staining was conducted because the pigment was suspected to be modified by basophilic substance.

Although the pigment granules were basophilic in HE stain, they were identified to be lipofuscin by special stains and eosin only stain.

Histopathological Diagnosis in the Submitted Specimens

Lipofuscin Deposition in Smooth Muscle Cells of Esophagus, Stomach and Duodenum, Predominantly in Veins

食道・胃・十二指腸の平滑筋細胞へのリポフスチン沈着，
静脈を主体とする

Pigment Distribution

	Vein	Artery	Muscularis propria	Muscularis mucosa
Esophagus	+++	++	++	+
Stomach	++	+/-	+	+
Duodenum	+/-	-	++	-
Jejunum	+	+	+	-
Ileum	++	-	++	-
Cecum	+	-	-	-
Colon	+/-	-	+	-
Rectum	+	+/-	++	-
Urinary bladder	-	-	++	
Kidney	+++	+		
Lung	++	-		
Pancreas	+++	++		
Thymus	+++	-		
Epididymis	++	-		
Mesenteric Lymph node	+++	++		
Mandibular Lymph node	++	-		

Systemically, pigment granules deposited in the smooth muscle cells of the organs listed in the table; however, there was no tendency of deposition in specific organ systems. The pigment granules were observed remarkably in blood vessels, predominantly in veins. In neurons, myocardiocytes and hepatocytes known as common sites of lipofuscin deposition, no pigment granules were observed.

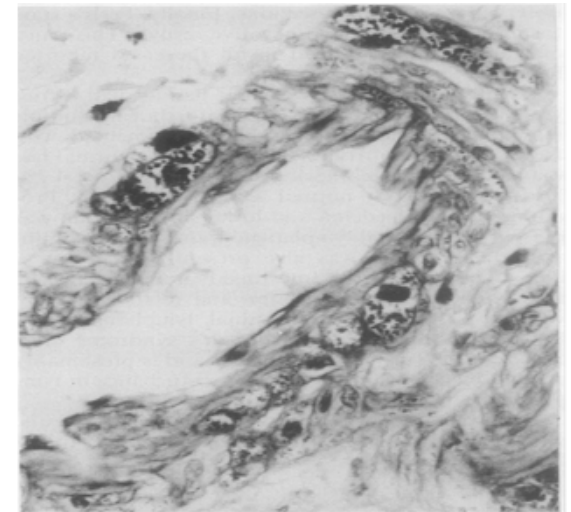
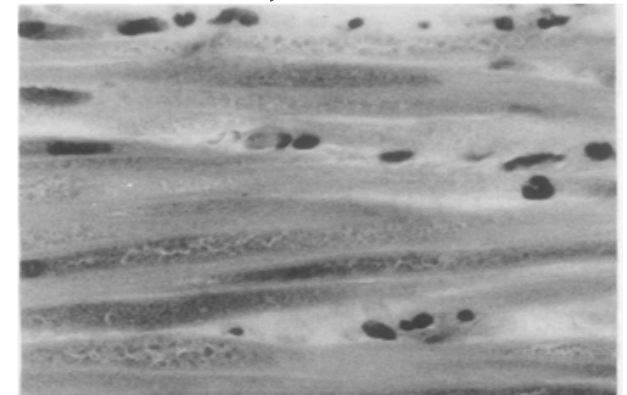
Diagnosis

Smooth Muscular Lipofuscinosis, Predominantly in Veins

平滑筋のリポフスチノーシス、
静脈を主体とする

Intestinal Lipofuscinosis (humans)

- In humans, intestinal lipofuscinosis is known as a very rare condition characterized by lipofuscin deposition, predominantly in smooth muscle cells of the digestive tract.
- Gross discoloration of the intestinal wall is observed. It is caused by deposition of lipofuscin on the muscularis propria and muscularis mucosa of any section of the digestive tract.
- Deposition in vascular smooth muscle cells is reported in a few patients, but deposition is mainly in the digestive tract unlike the present case.
- Intestinal lipofuscinosis is associated with various malabsorption syndromes that cause vitamin E deficiency. Pathogenesis is unknown.

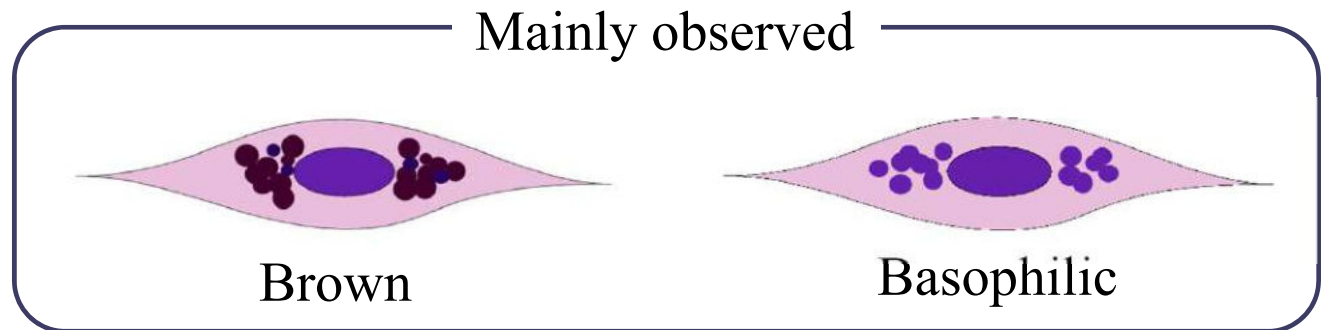
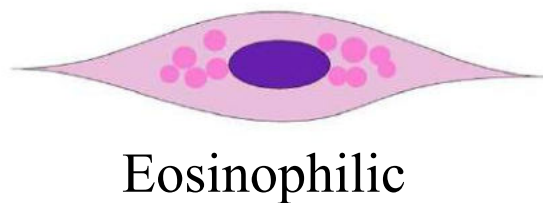


Case -Summary

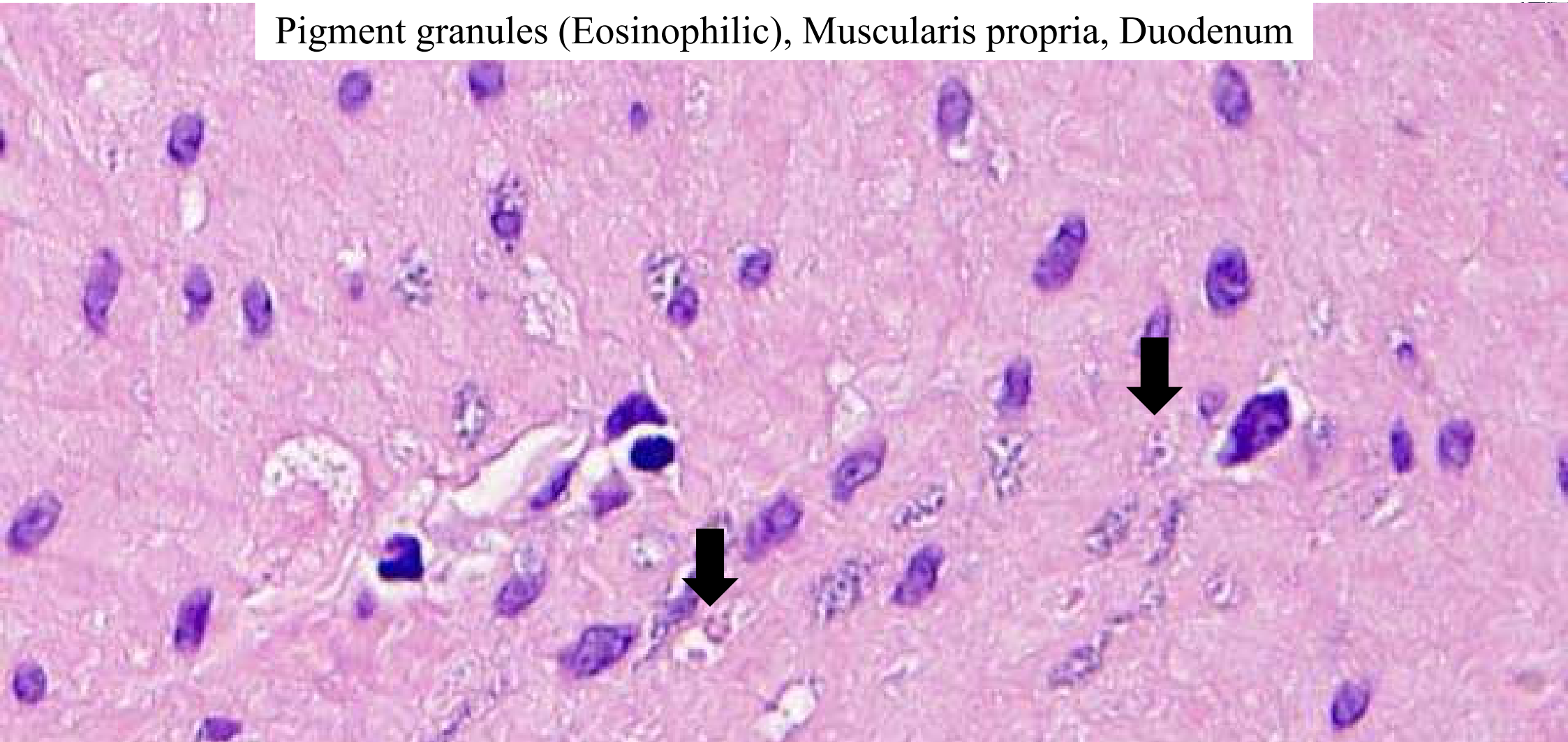
- A 6-year-old male cynomolgus monkey showed chronic wasting without any decrease in food consumption.
- No gross abnormalities were observed in necropsy expect for changes secondary to wasting.
- Microscopic examination revealed pigment granule deposition in systemic smooth muscle cells.
- Pigment granules stained brown or basophilic with HE stain. Special stains and eosin only stain identified the pigment granules as lipofuscin.
- Unlike intestinal lipofuscinosis in humans, the pigment granules distributed systemically in blood vessels and in the digestive tract, predominantly in veins.
- To our knowledge, this is the first report on smooth muscular lipofuscinosis predominantly observed in the veins of primates.

Pigment Granules

- Most pigment granules stained brown or basophilic, but rarely, eosinophilic granules were observed in the smooth muscle cells in HE stain.
- The eosinophilic granules did not indicate the same staining characteristics as brown or basophilic granules by special stains.



Pigment granules (Eosinophilic), Muscularis propria, Duodenum



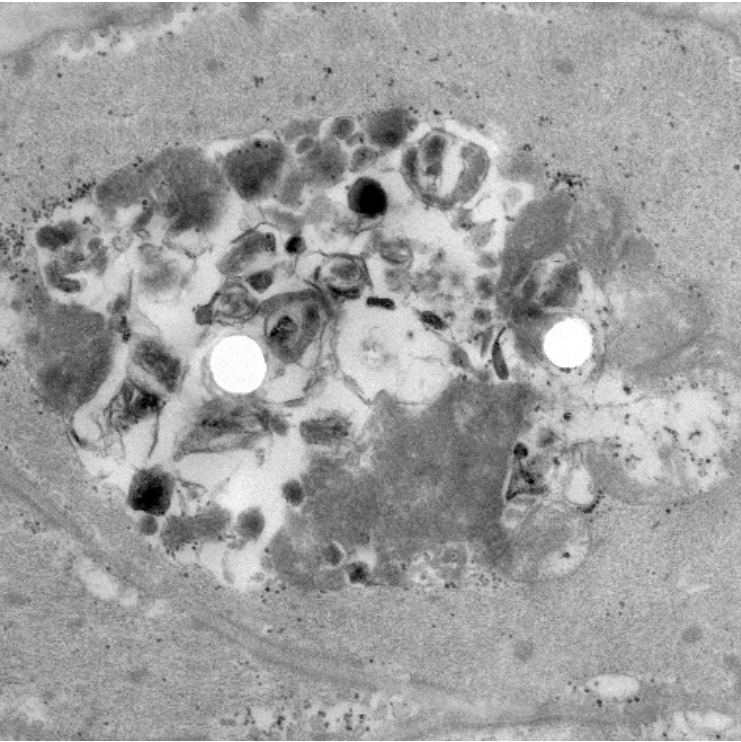
Rarely, eosinophilic granules are observed (arrows) in the smooth muscle cells of the duodenum in HE stain. Few eosinophilic granules were also observed in the veins and muscularis propria of the esophagus and stomach.

This electron micrograph shows a cross-section of a cell containing numerous dark, electron-dense granules. These granules vary in shape, appearing as rounded or irregular bodies. The background is filled with a fine, granular texture, which the text identifies as ribosomes. The overall appearance is that of a highly specialized cell, likely a pigment cell, given the presence of these granules.

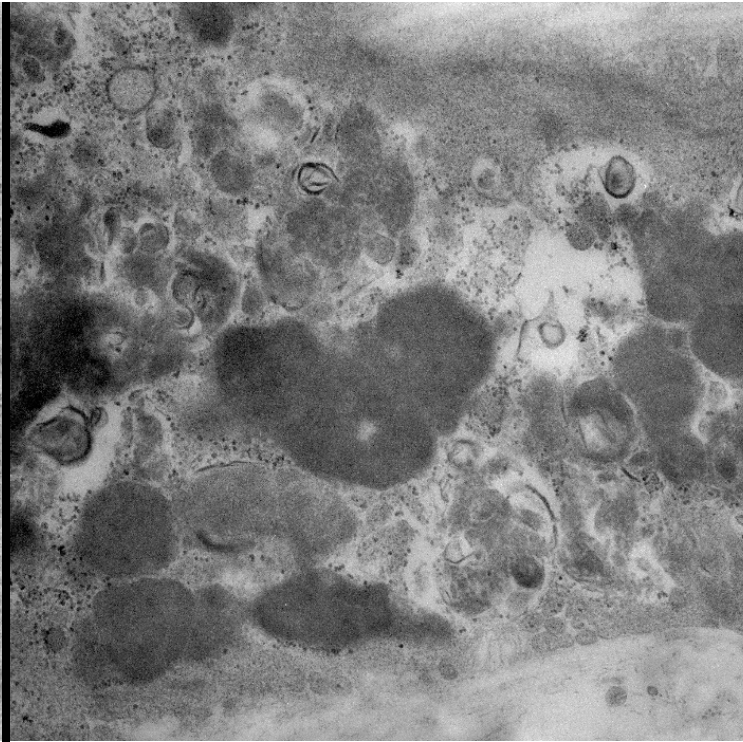
Pigment granules

Ultrastructurally, the pigment granules are consistent with rounded or irregularly shaped residual bodies. Various amounts of ribosomes are observed in the background.

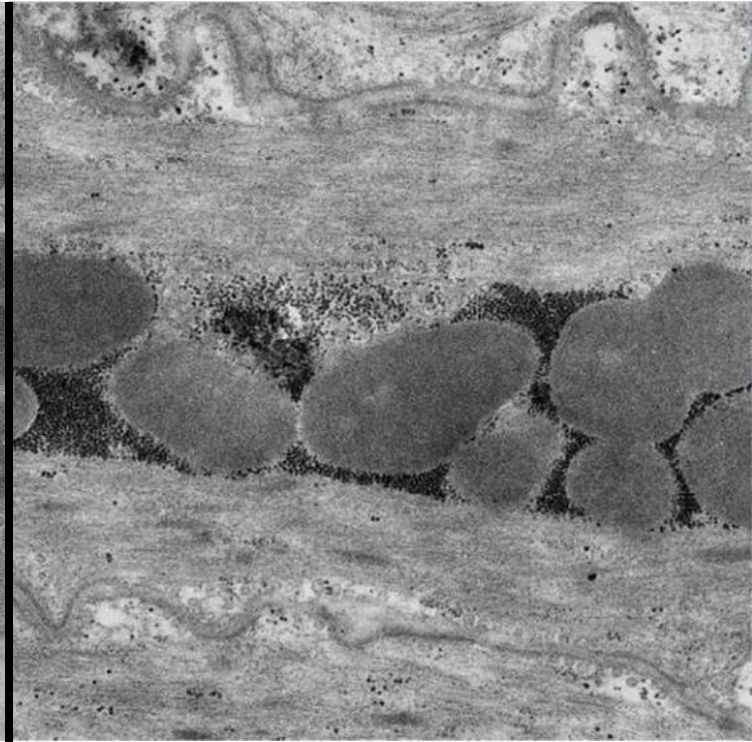
Three types of the cluster of residual bodies are shown in the next slide.



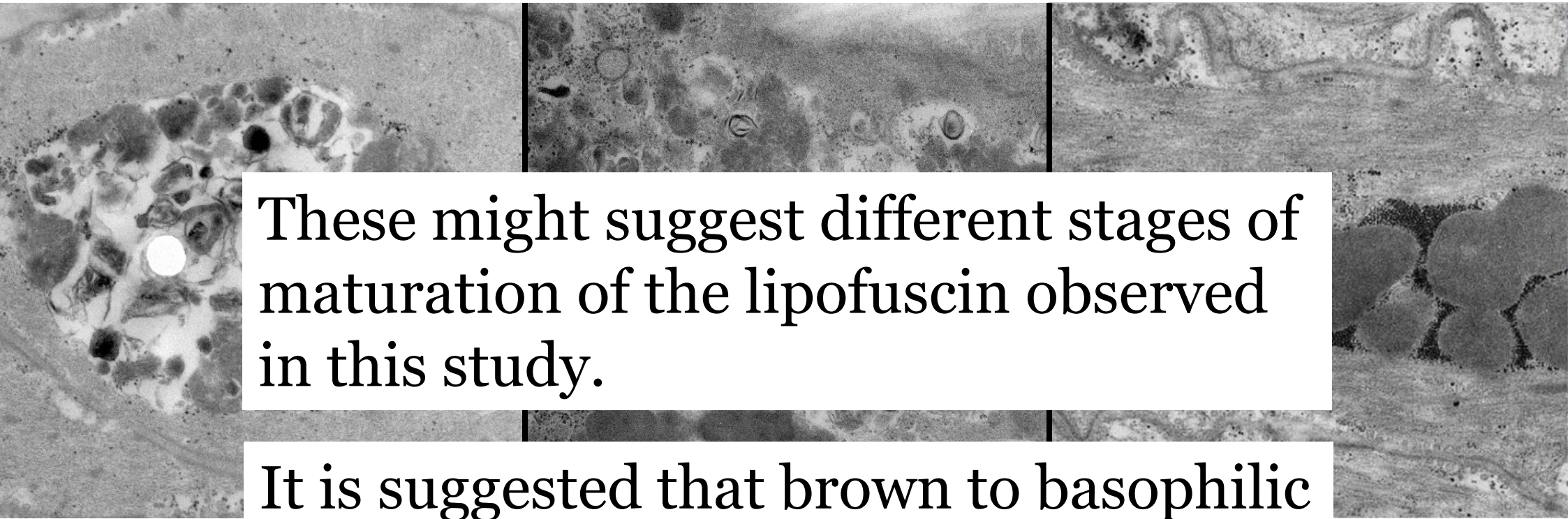
- Mostly disrupted organelles or myelinoid membranes.
- Dense-granular materials with or without membrane.
- Few ribosomes.



- Irregularly-shaped residual bodies sometimes including remnants of organelles or myelinoid membranes.
- Mild to moderate amount of ribosomes.



- Uniformly round residual bodies.
- Large amount of ribosomes.

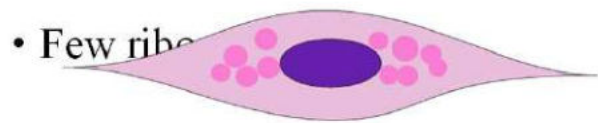


These might suggest different stages of maturation of the lipofuscin observed in this study.

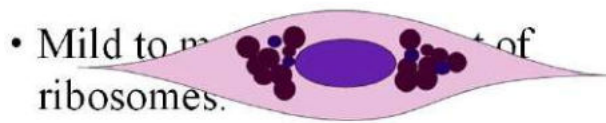
It is suggested that brown to basophilic granules in a light microscope reflect the amount of ribosomes.

- Mostly disrupted myelinoid membranes
- Dense-granular without membrane.

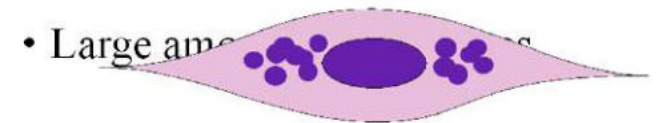
residual bodies.



- Few ribosomes



- Mild to moderate amount of ribosomes.



- Large amount of ribosomes