Obesity and its complications

Obesity is a chronic complex disease defined by excessive fat deposits that can impair health. Obesity can lead to increased risk of type 2 diabetes and heart disease, it can affect bone health and reproduction, and it increases the risk of certain cancers. Obesity influences the quality of living, such as sleeping or moving. Obesity is defined as a BMI greater than or equal to 30. In case of a BMI greater than or equal to 25, it is termed as overweight.

Ref.: Kinlen D, et al, Complications of obesity. QJM 2018; 111(7): 437-443. doi: 10.1093/qjmed/hcx152

Abnormal obesity

Obese General Tuscan of the Holy Roman Empire by Alessandro dal Borro (1600-1656)

An obese woman seen in the Japanese handscroll of diseases and deformities "Yamai-no-Soshi"

(the world-oldest atlas in the 12th Century)

Complications of obesity

1) Cancer (breast, endometrium and ovary)

2) Hyperlipidemia

3) Hypertension

4) Atherosclerosis

5) Type II diabetes mellitus

6) Fatty liver and non-alcoholic steatohepatitis (liver cirrhosis)

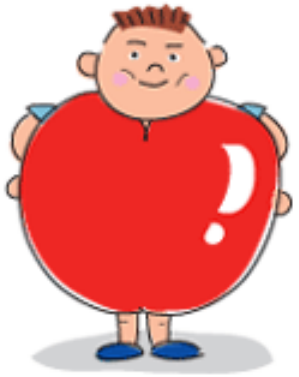
7) Knee osteoarthritis (gonarthrosis)

8) Sleep apnea syndrome

9) Chest deformity (pectus excavatum)

10) Infertility

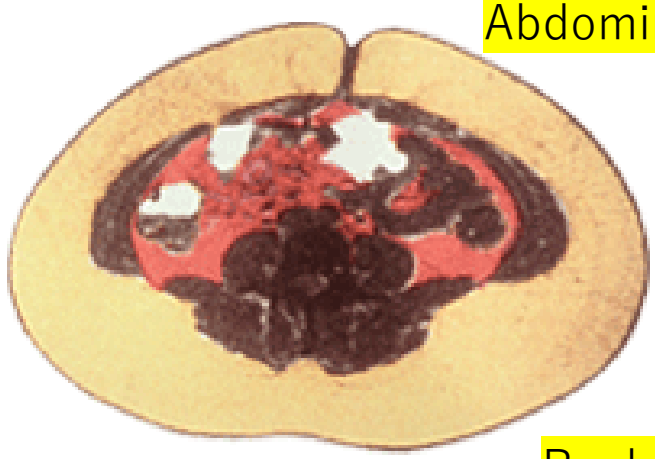
Obesity: subcutaneous type vs visceral type

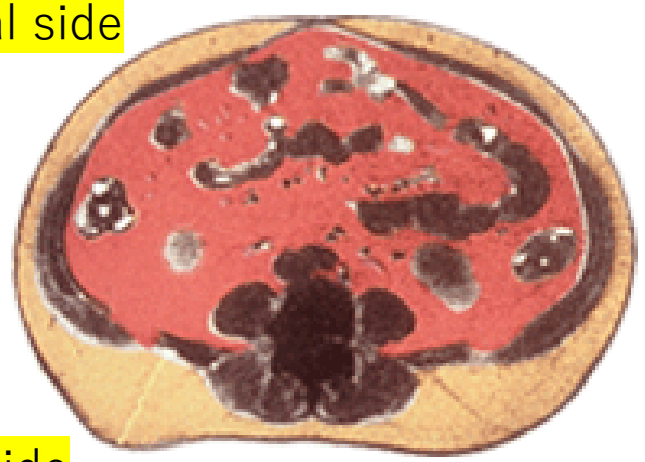


Pear-shaped：

Subcutaneous type obesity

Abdominal side





Back side

Apple-shaped：

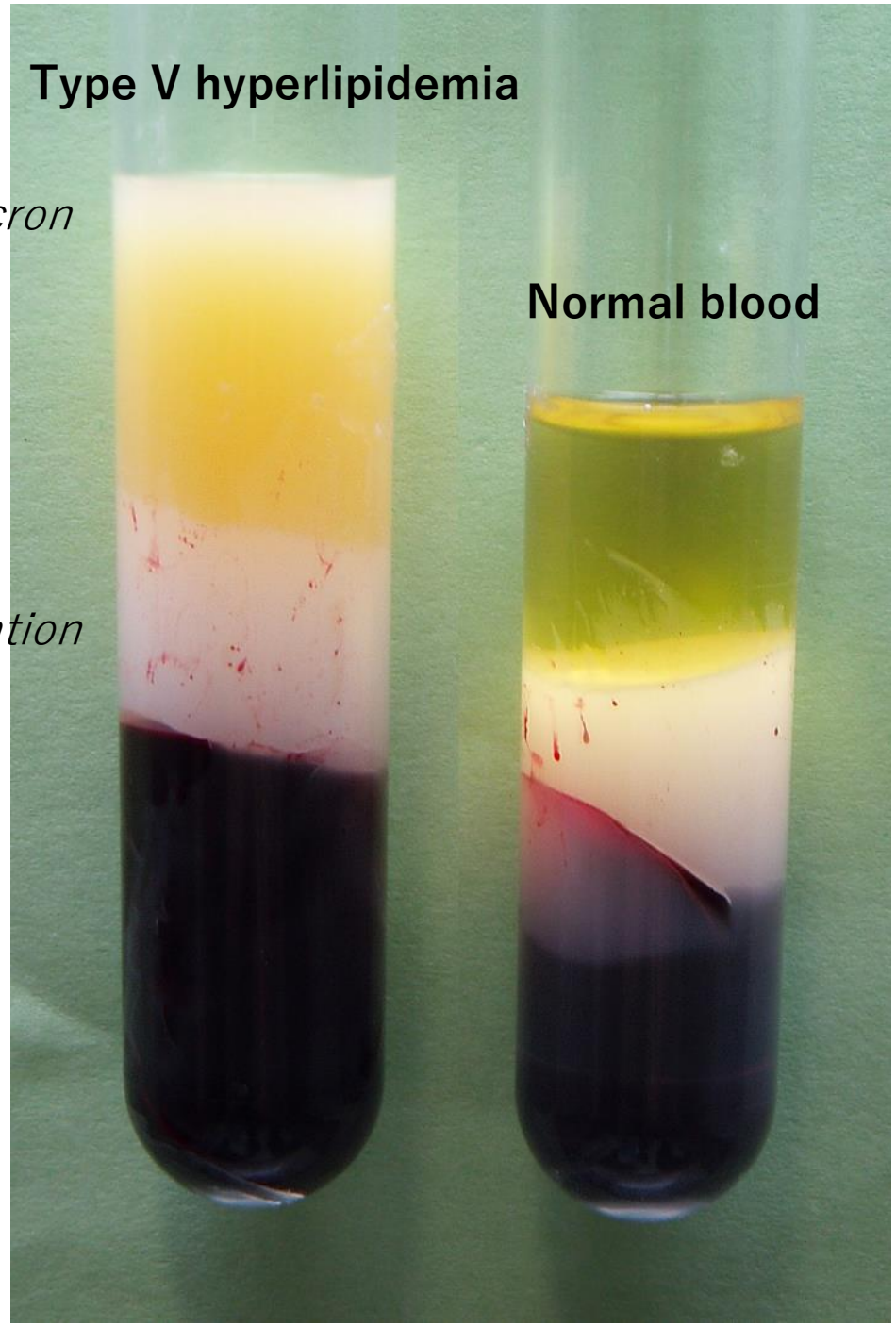
Visceral-type obesity

Metabolic syndrome

Visceral-type obesity (increased waist circumference) plus either two of the hyperglycemia, hypertension and hyperlipidemia (also called as "insulin resistance syndrome" or "deadly quartet")

The Guideline of the Japan Society for the Study of Obesity (2005)

1) Waist circumference: >85 cm (male) and >90 cm (female)
2) The two items of the following three
   a) hypertension >130/85 mmHg
   b) Triglyceride (TG) >150 mg/dL or HDL <40 mg/dL
   c) Fasting blood glucose >110 mg/dL



Left: the serum of an obese 56-year-old lady

Total cholesterol 298 mg/dl

(Reference value: 120～219)

Triglyceride 1,128 mg/dl

(Reference value: 30～149)

Right: the serum of normal control

Total cholesterol 135 mg/dl

Triglyceride 78 mg/dl

Classification of hyperlipidemia

Type Ⅰ: increase of chylomicron

Type Ⅱa: increase of LDL

Type Ⅱb: increase of LDL and VLDL

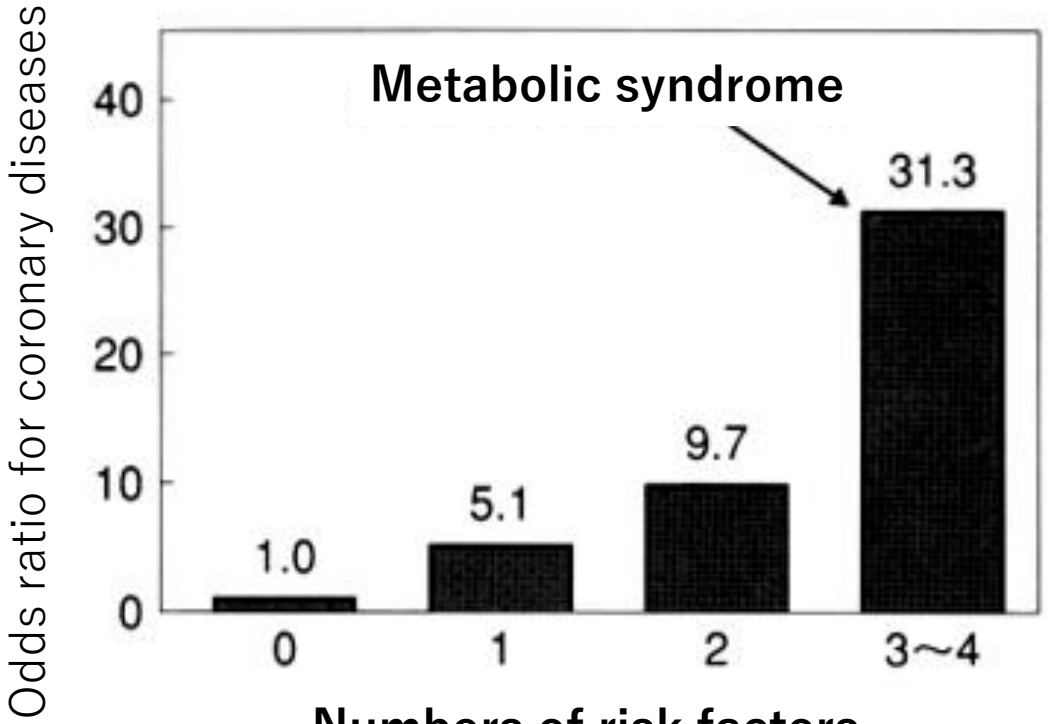
Type Ⅲ: increase of IDL

Type Ⅳ: increase of VLDL

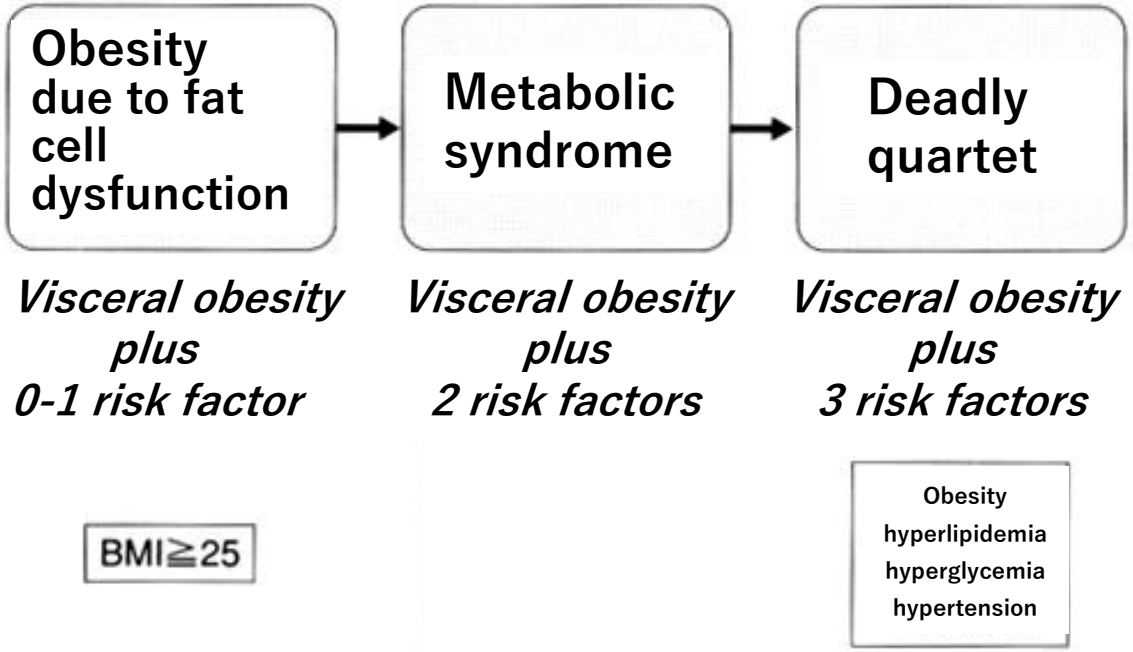
Type Ⅴ: increase of chylomicron and VLDL

Severe atherosclerosis of the aorta in an aged patient with obesity and type 2 diabetes mellitus

Coronary artery diseases and risk factors



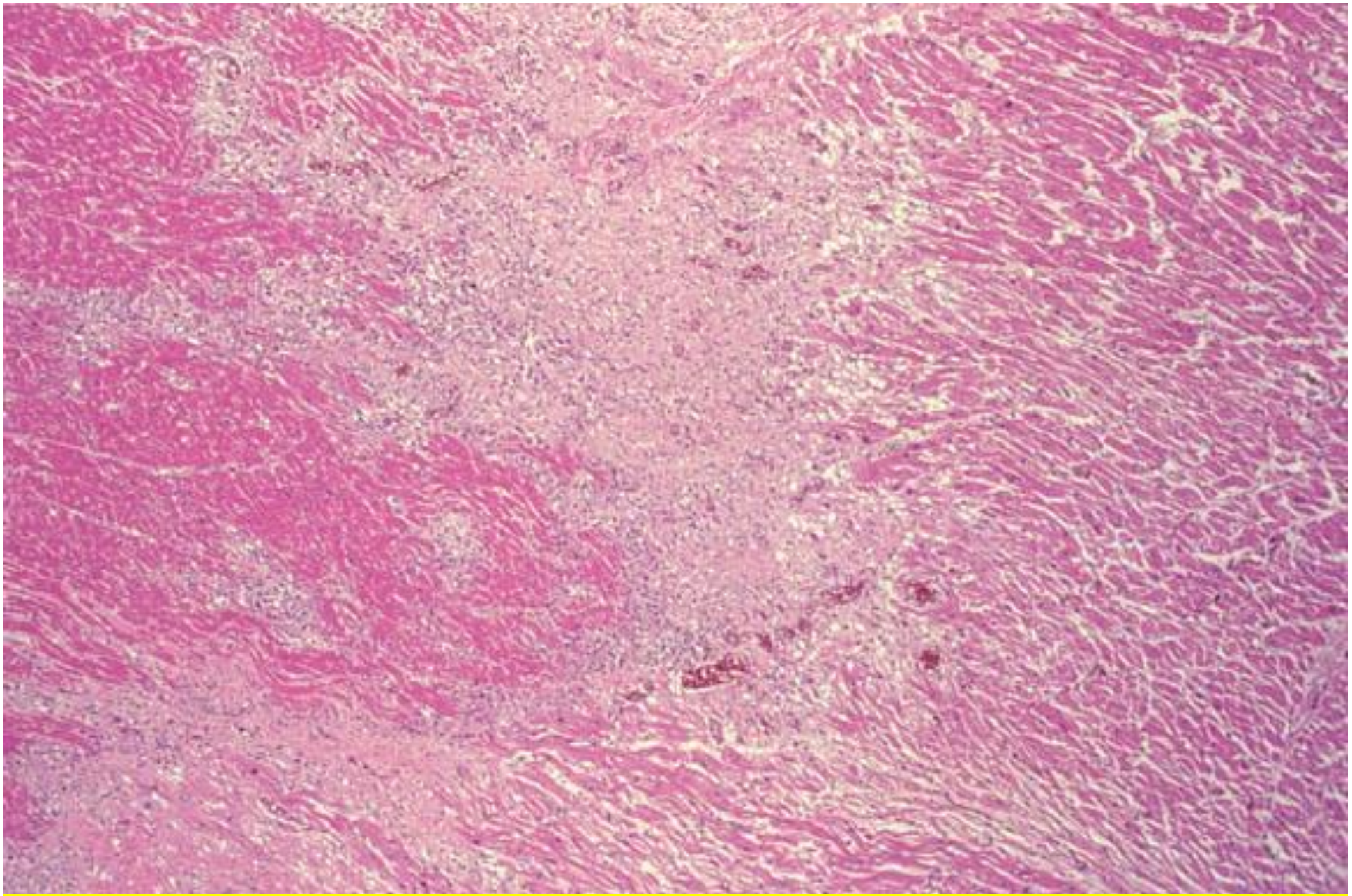
Numbers of risk factors (obesity, hyperlipidemia, hypertension and diabetes mellitus)



Myocardial infarction is the most serious problem

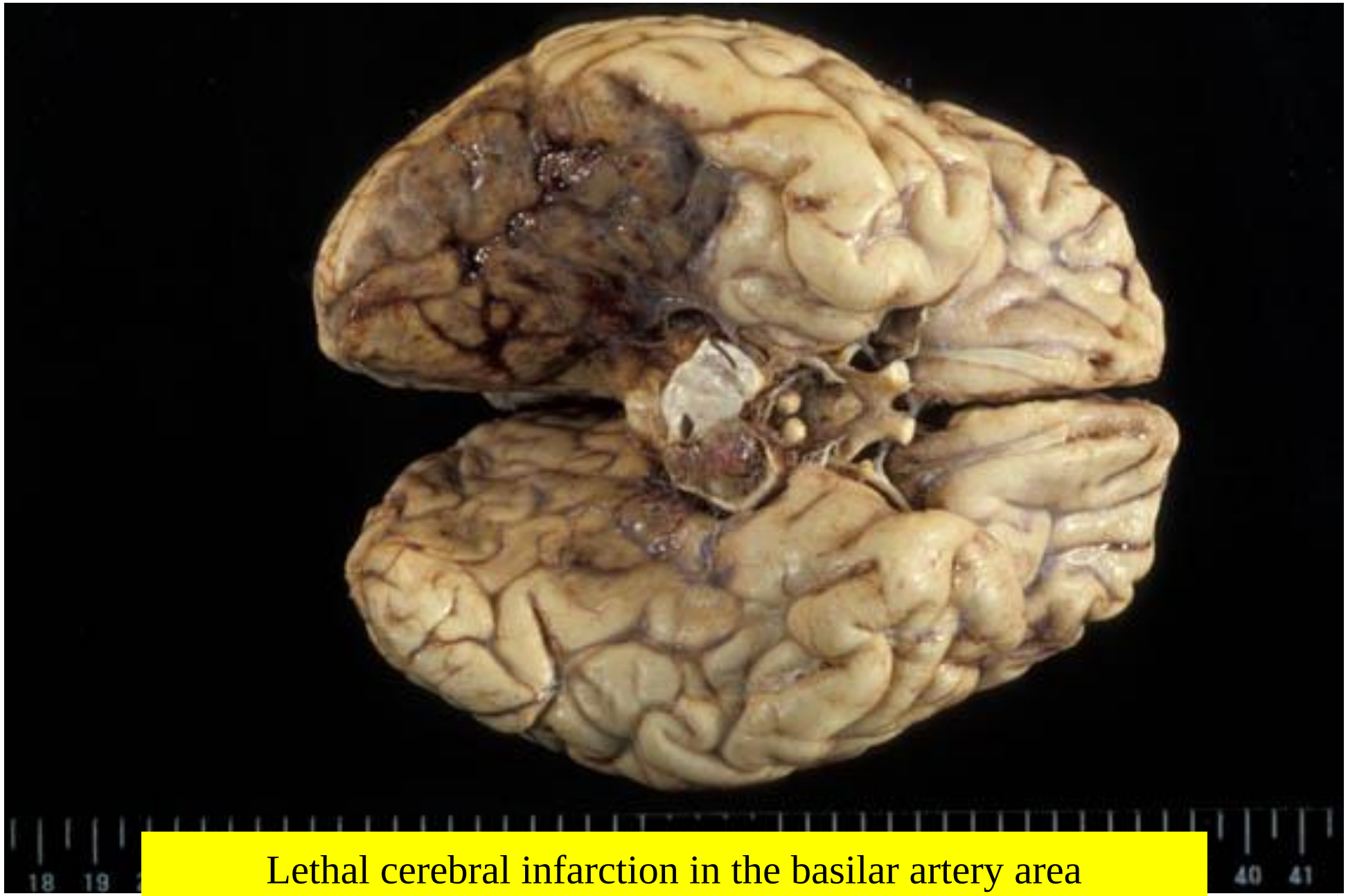
Obstructive coronary atherosclerosis in a case of obesity with diabetes mellitus (H&E)

Acute myocardial infarction in a case of obesity with diabetes mellitus (gross appearance)

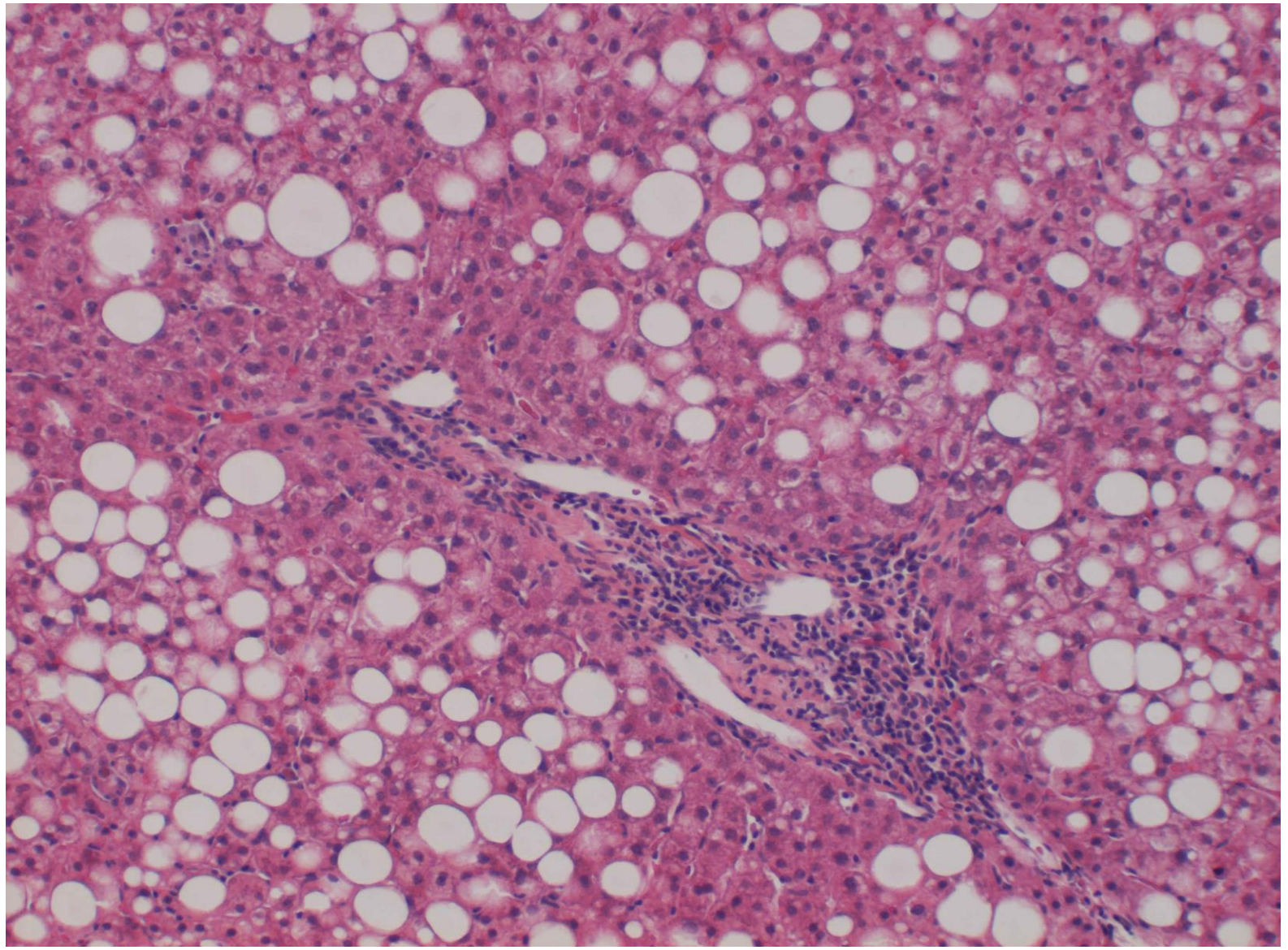


Acute myocardial infarction in a case of obesity with diabetes mellitus (H&E)

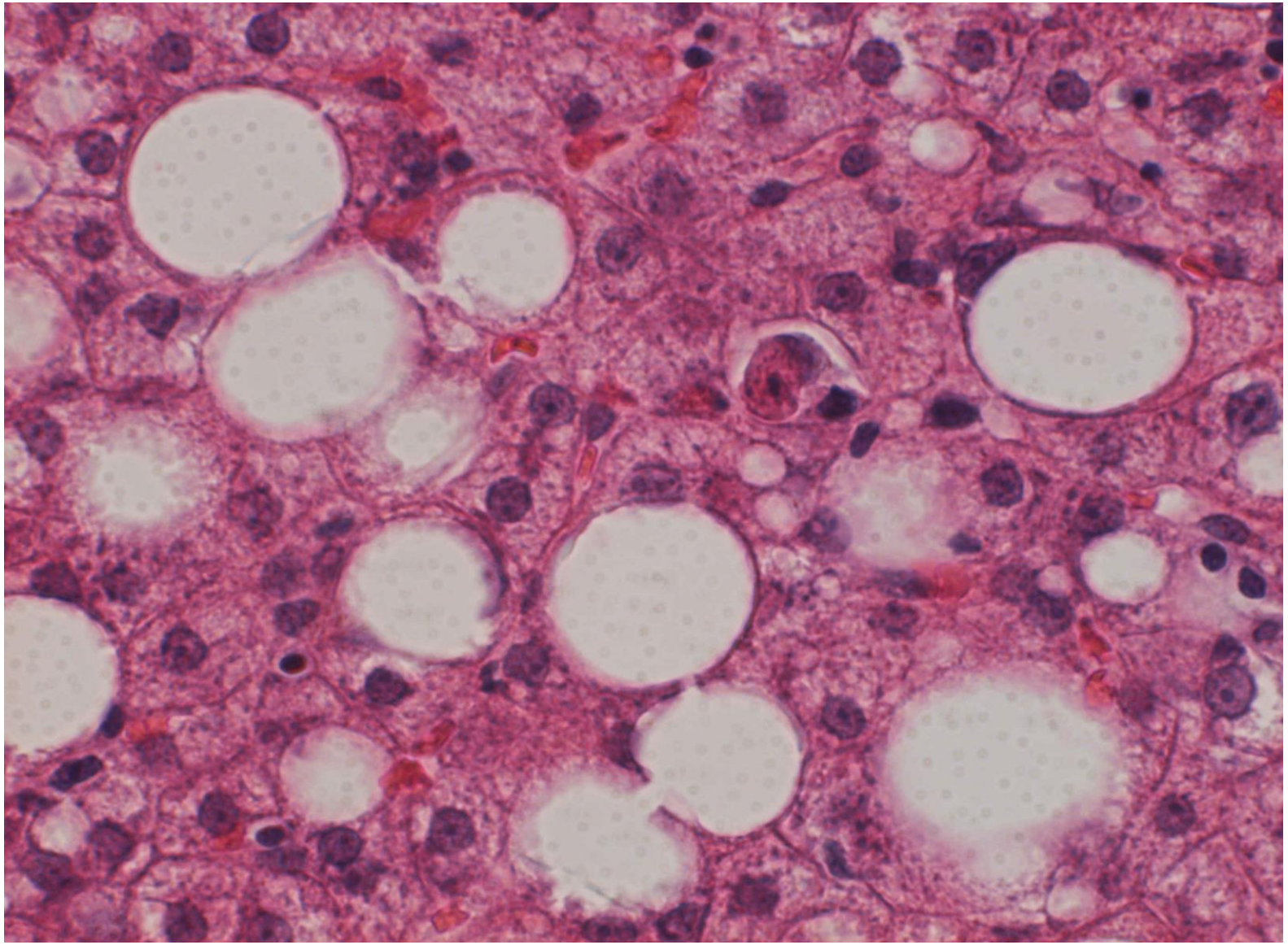
Cerebral infarction (frontal section after formalin fixation, gross appearance)



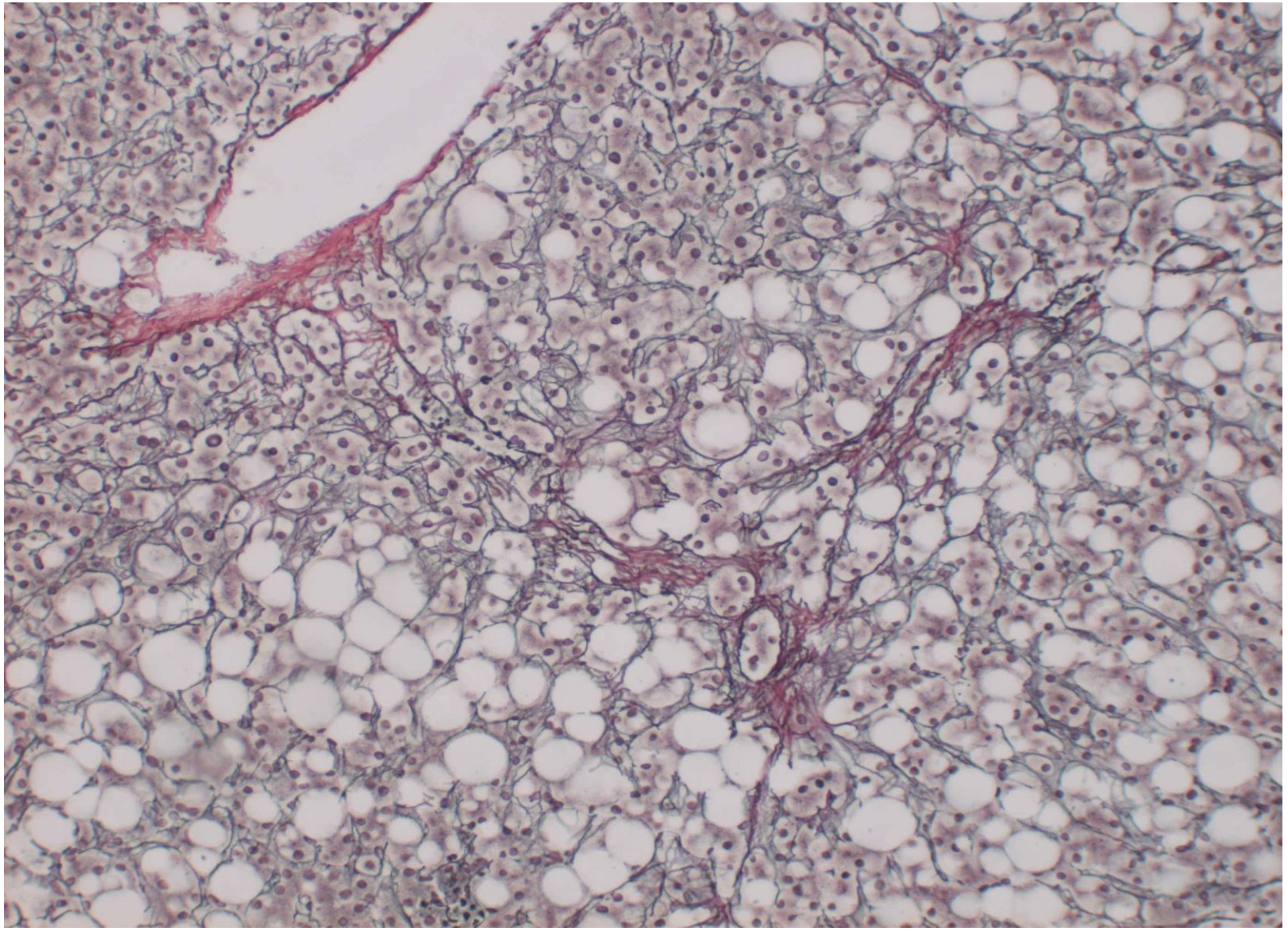
Lethal cerebral infarction in the basilar artery area
in a case of obesity and diabetes mellitus (gross appearance)



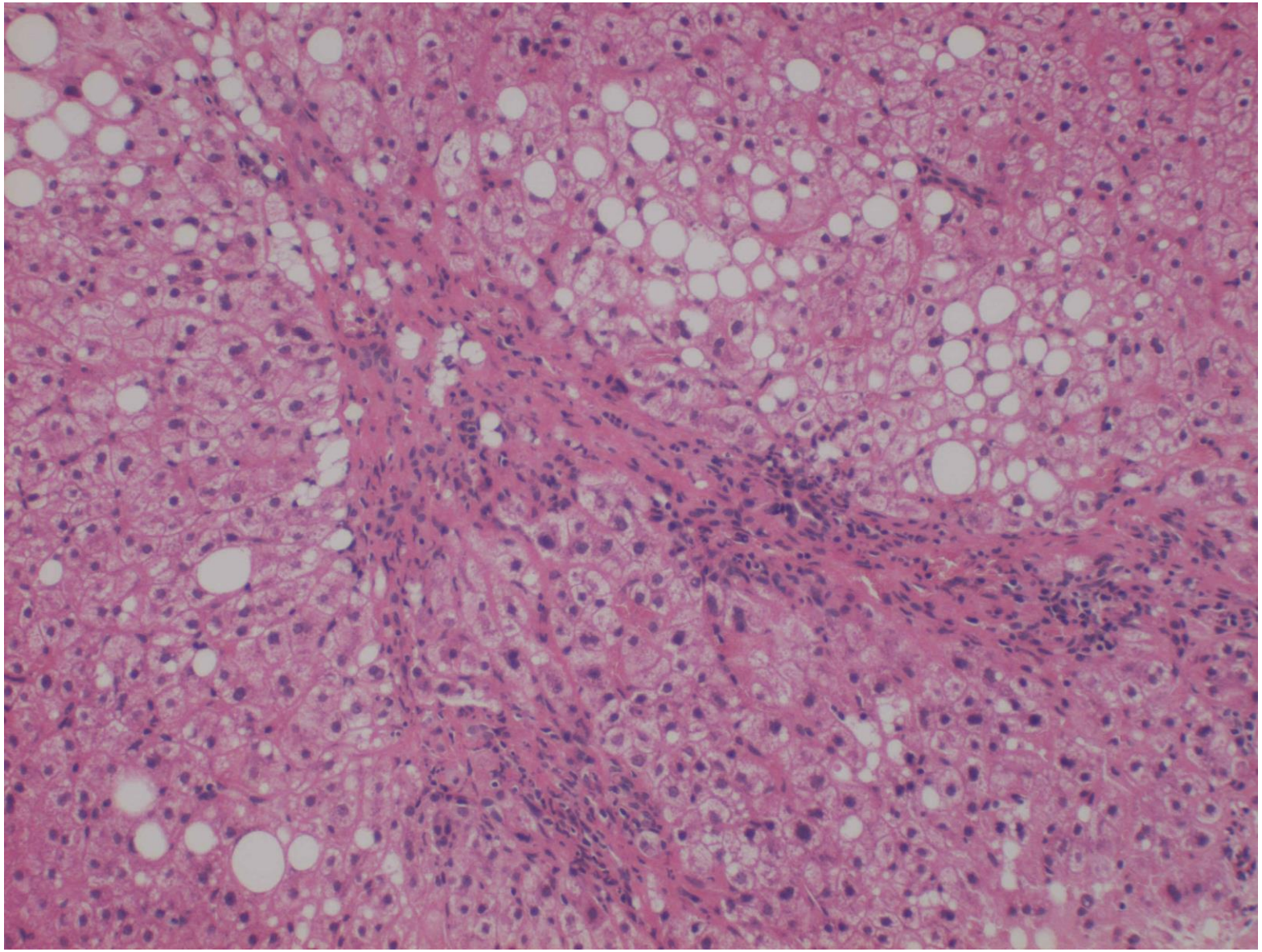
Non-alcoholic steatohepatitis (NASH) in a 44 y-o male patient with obesity.
Fatty change of large droplet type and portal inflammation are seen. H&E-1



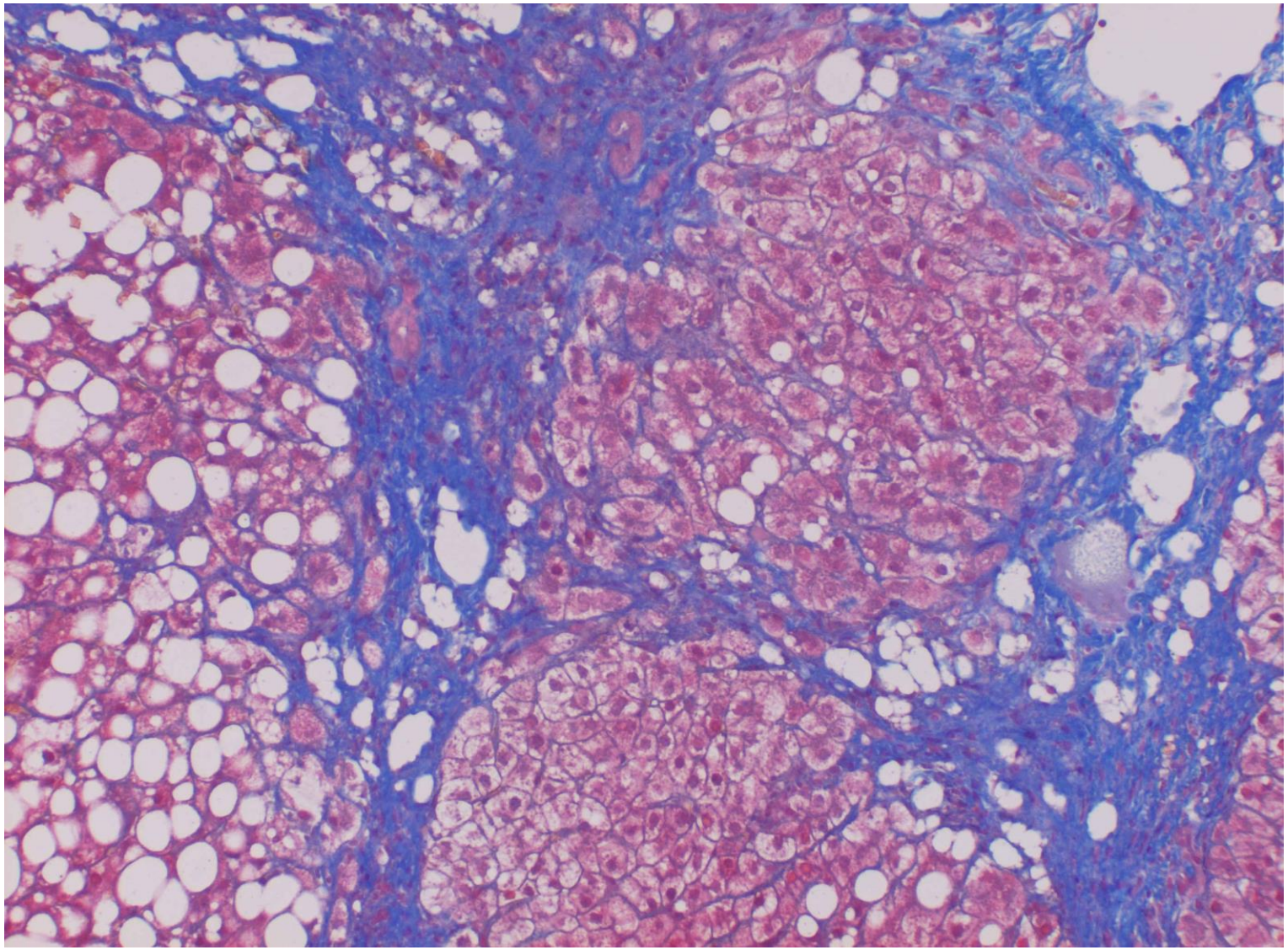
Non-alcoholic steatohepatitis (NASH) in a 44 y-o male patient with obesity. Fatty change of large droplet type and acidophil body formation are seen. H&E-2



Non-alcoholic steatohepatitis (NASH) in a 44 y-o male patient with obesity.
Meshwork reticulin fibrosis is seen around the central vein. Silver impregnation



Non-alcoholic steatohepatitis (NASH) in a 63 y-o female patient with obesity. Fatty change of large droplet type and septating fibrosis are seen. H&E



Non-alcoholic steatohepatitis (NASH) in a 63 y-o female patient with obesity. Septating fibrosis with cirrhotic nodule formation is seen. NASH often progresses to non-viral liver cirrhosis. Azan staining