

Roles of pathology and pathologists

Pathology is a science clarifying the mechanisms of the diseases and disease processes.

In Japan, Pathology has been regarded as a field of the basic medicine in the medical schools and as a field of laboratory medicine in the hospitals. The division of Diagnostic Pathology was approved as the certified clinical department in 2008.

Thereafter, the department of Diagnostic Pathology has been established as a clinical department in the Medical University.

Pathology

Pathology = Pathos + Logos

Pathos = passion

Logos = logics

1) Pathology is science of passion!

2) Pathology is science with pathos (sorrow/grief)!

3) Pathology is science of disease/illness

**Aristotele's Rhetoric (the negotiation technique):
Ethos, Pathos and Logos**

What is normal?

Dictionary says that “normal” means invariability (not different from others)

Are they normal?

- 1) Gulliver in Lilliput (a land of dwarfs)
- 2) Aged persons without wrinkles on the face
- 3) Aged persons without intestinal metaplasia of the gastric mucosa
- 4) Wild animals without intestinal parasites

Four roles of pathologists

① Clinical practice

(Pathological diagnosis for patients)

② Education

(Medical and post-medical teaching)

③ Research

④ Enlightenment

(Information transmission toward the society)

Disease entities

Endogenous diseases (Hereditary disorder)

Exogenous diseases (Trauma, intoxication and
infection)

How to classify diseases

- 1) Metabolic disorders and cellular injuries
- 2) Congenital anomalies
- 3) Circulatory disturbances
- 4) Inflammation
- 5) Immune disorders and allergy
- 6) Infections
- 7) Neoplasms
- 8) Trauma and intoxication

Exogenous diseases

Examples of histopathological analysis of exogenous diseases are shown below.

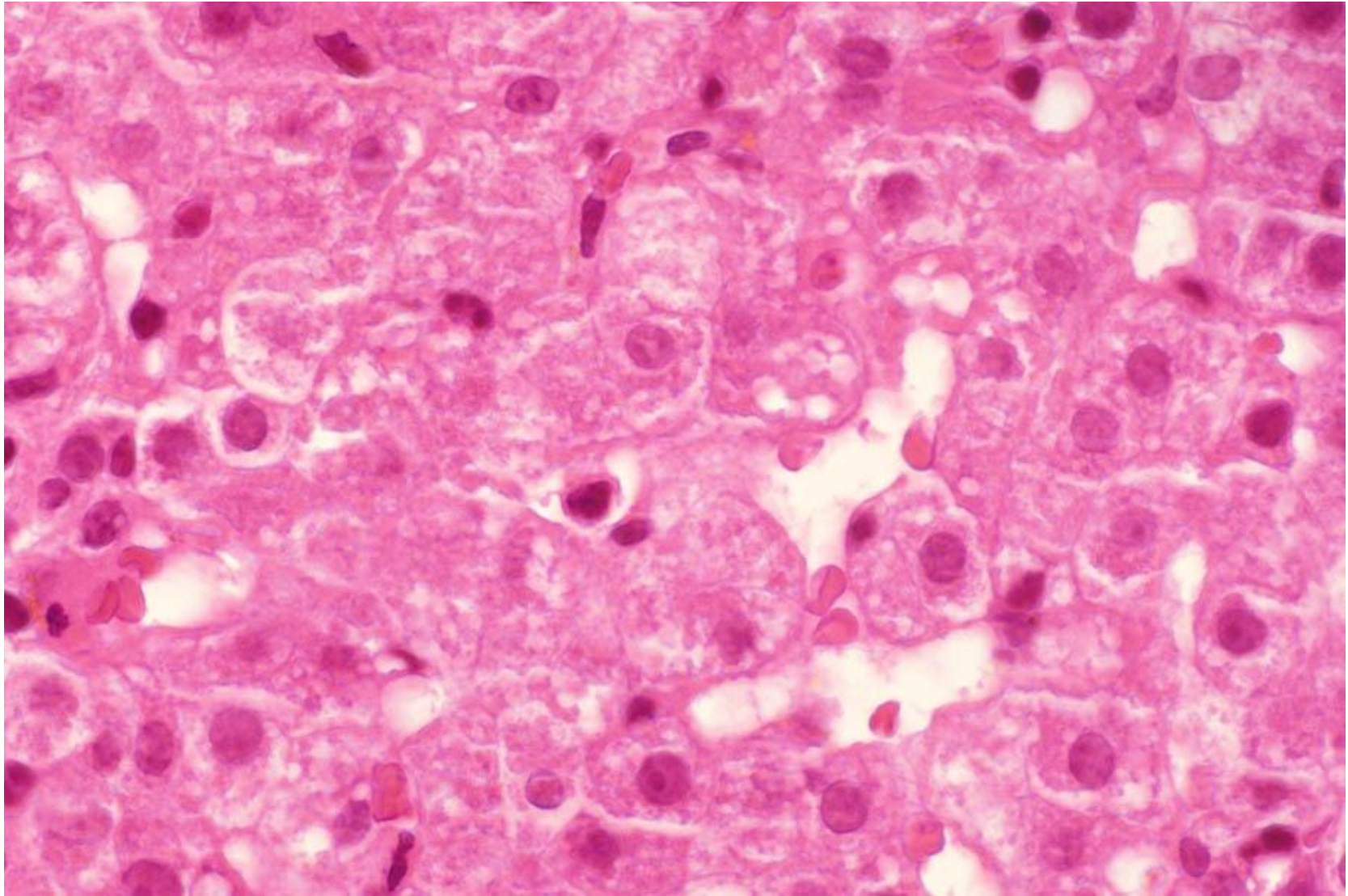
1) Reye syndrome: aspirin use in infancy

2) 5-fluorouracil (5-FU) intoxication:

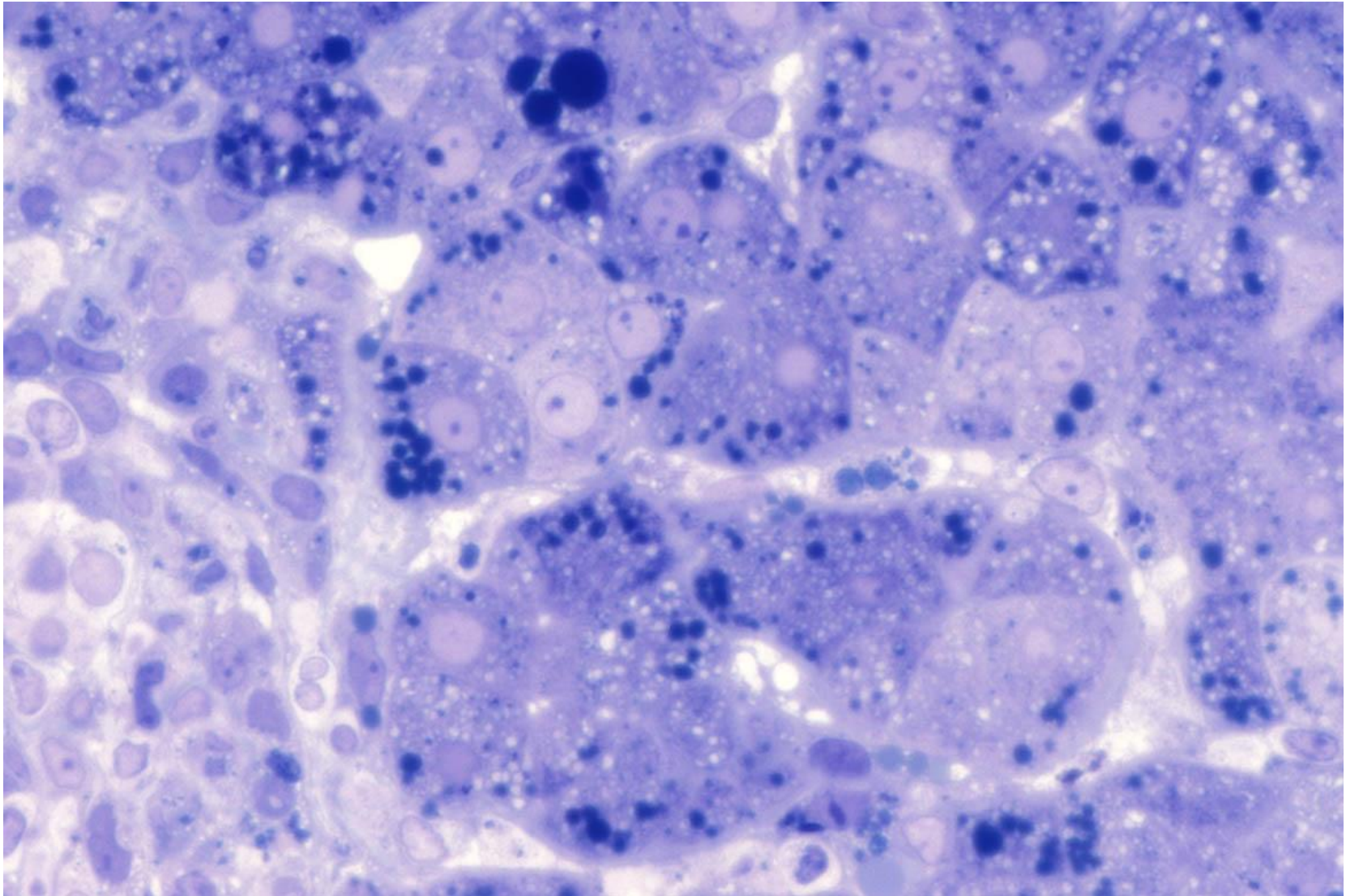
iatrogenic injury of gastrointestinal mucosa



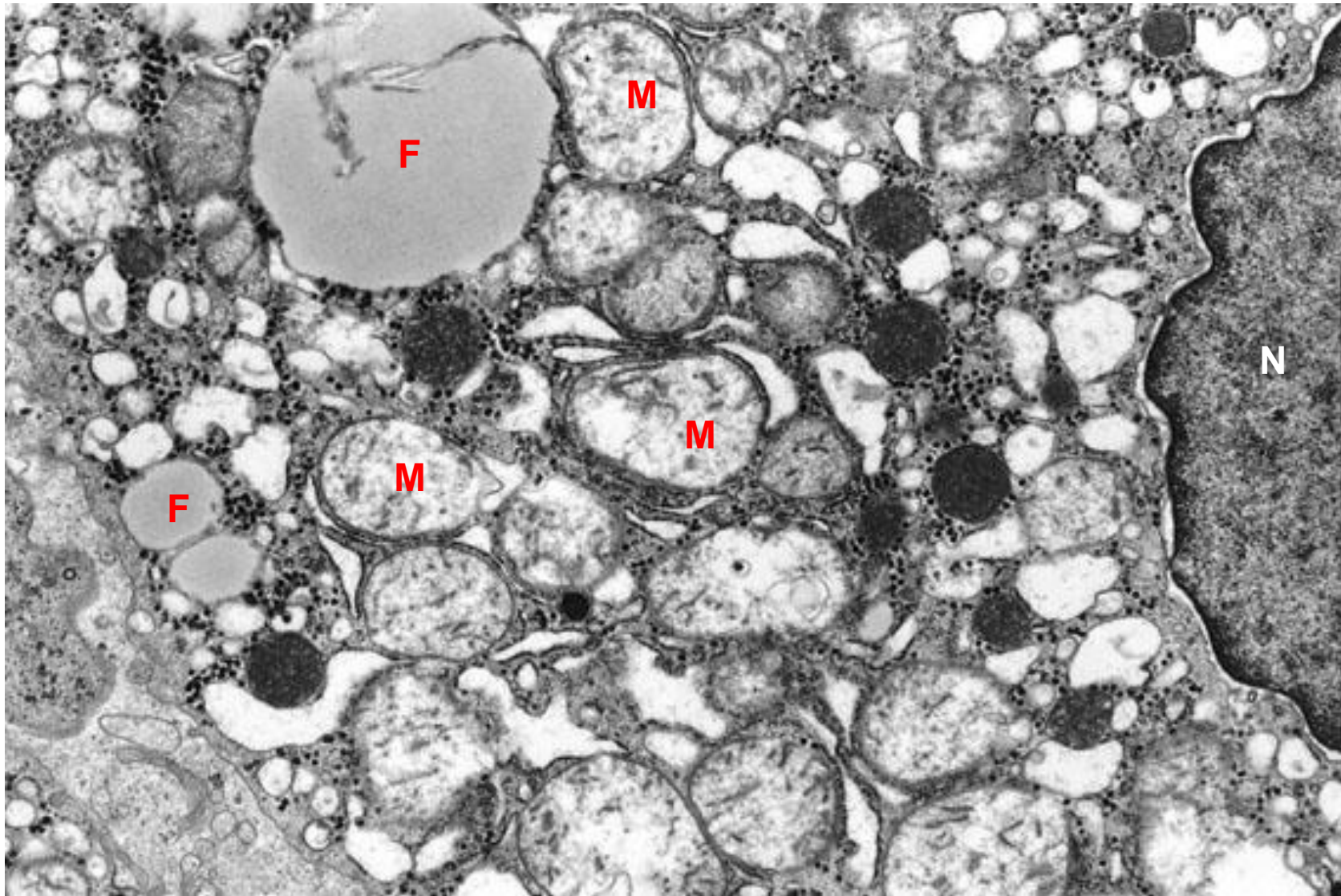
Reye syndrome: fatty liver in a 6-year-old girl. Aspirin was taken against influenza-related high fever. Never use aspirin against fever in children.



Reye syndrome (Liver, Fine droplets fatty change, HE)



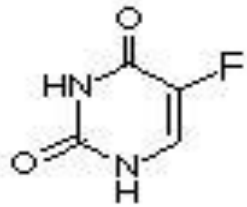
Reye syndrome (Liver, toluidine blue staining)



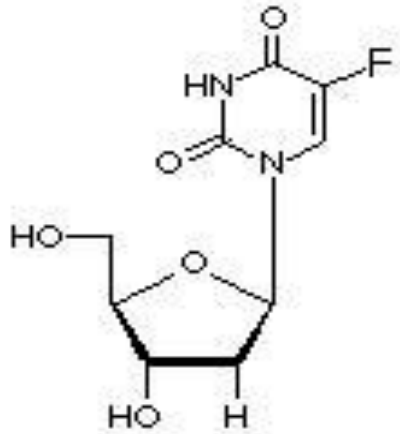
Reye syndrome (EM study of hepatocyte: mitochondrial injury). The cristae of mitochondria are destroyed. F = fat droplets, M = mitochondria



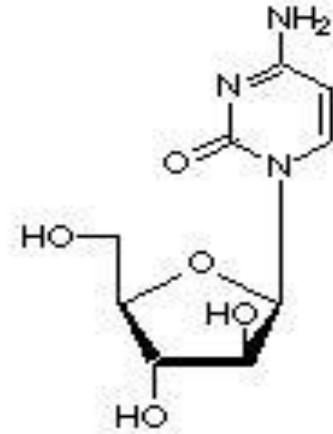
Reye syndrome (brain swelling: acute encephalopathy)



5-fluorouracil



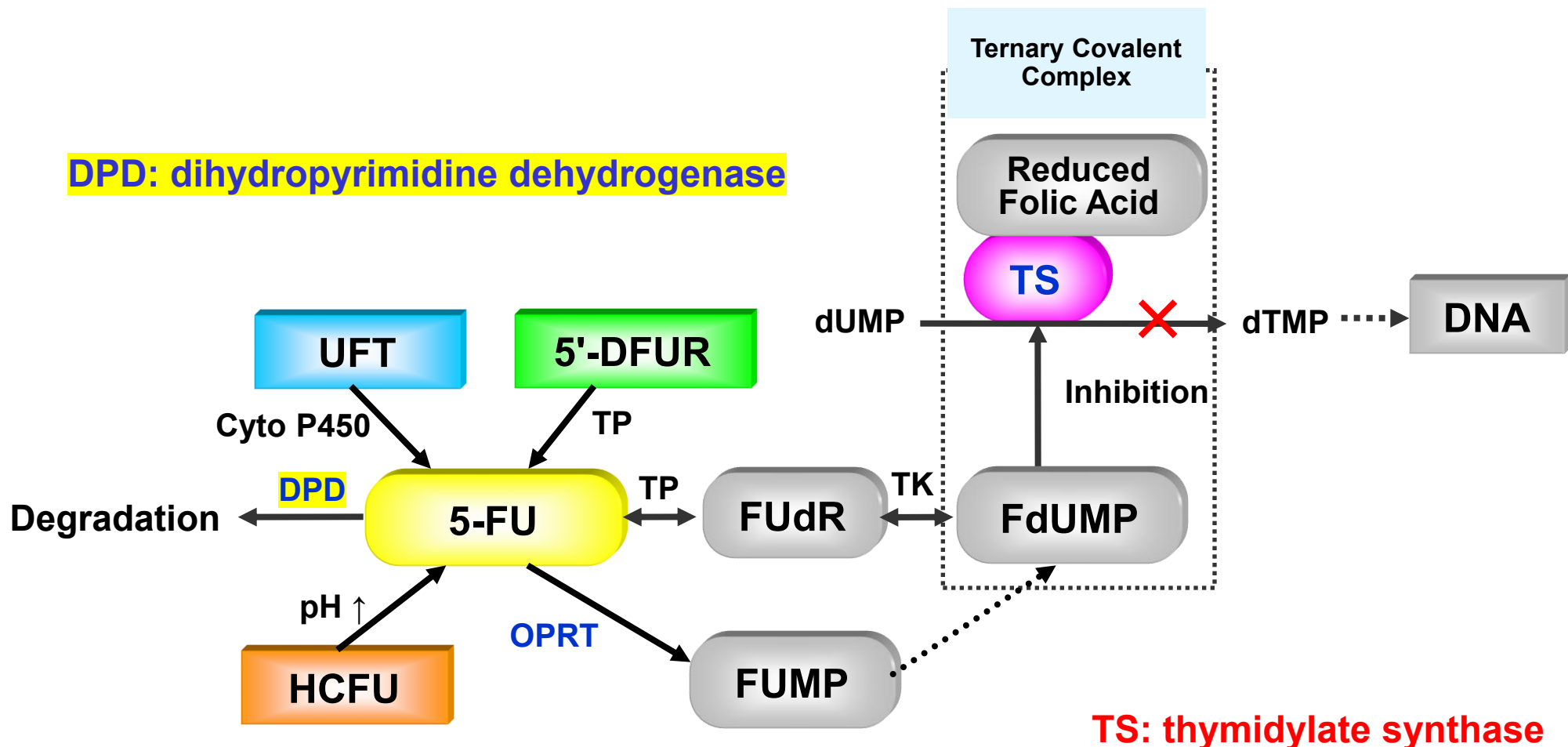
5-fluoro-2'-deoxyuridine



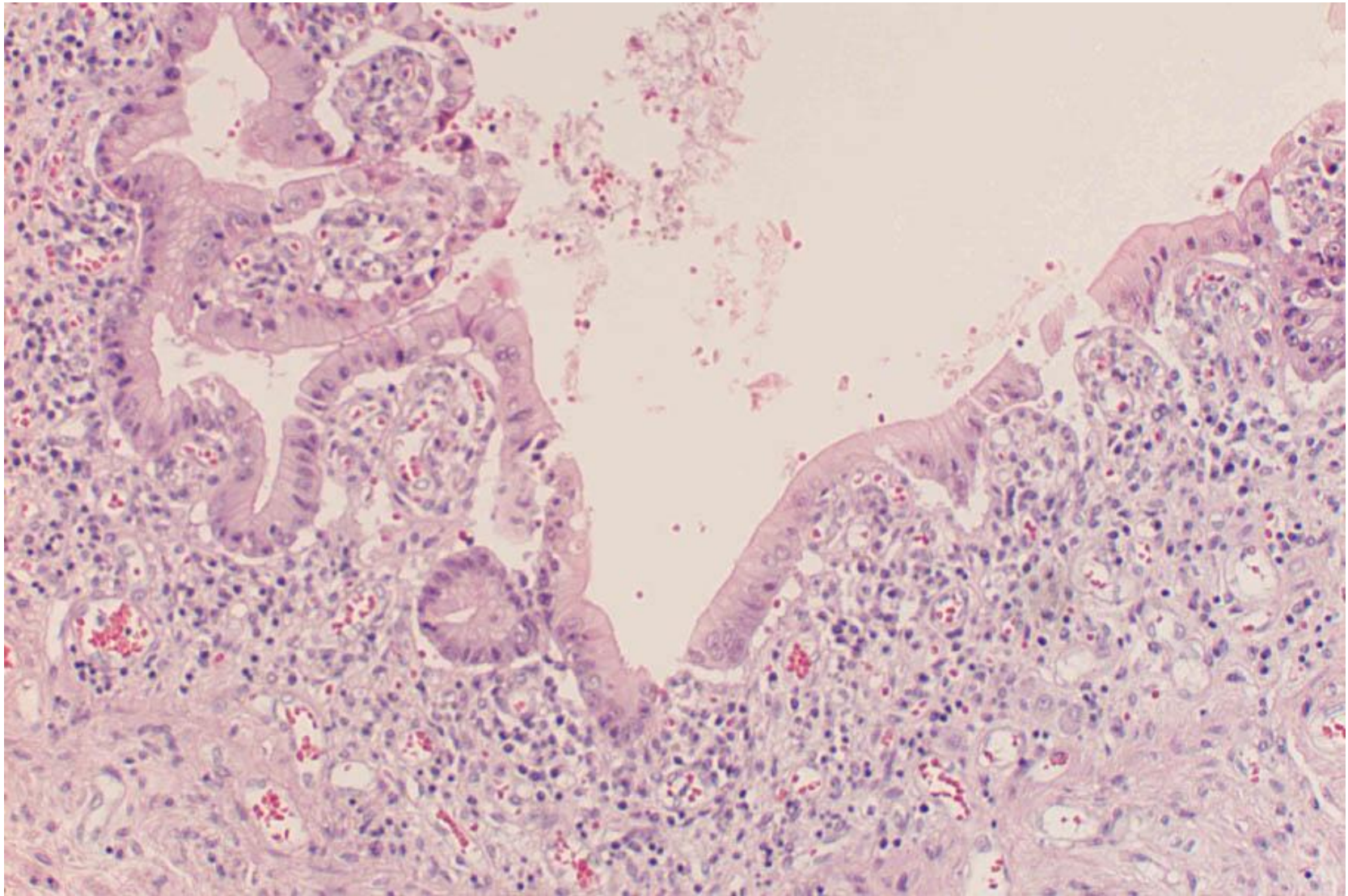
arabinofuranosyl cytosine

DNA synthesis inhibitor: 5-fluorouracil (5-FU)

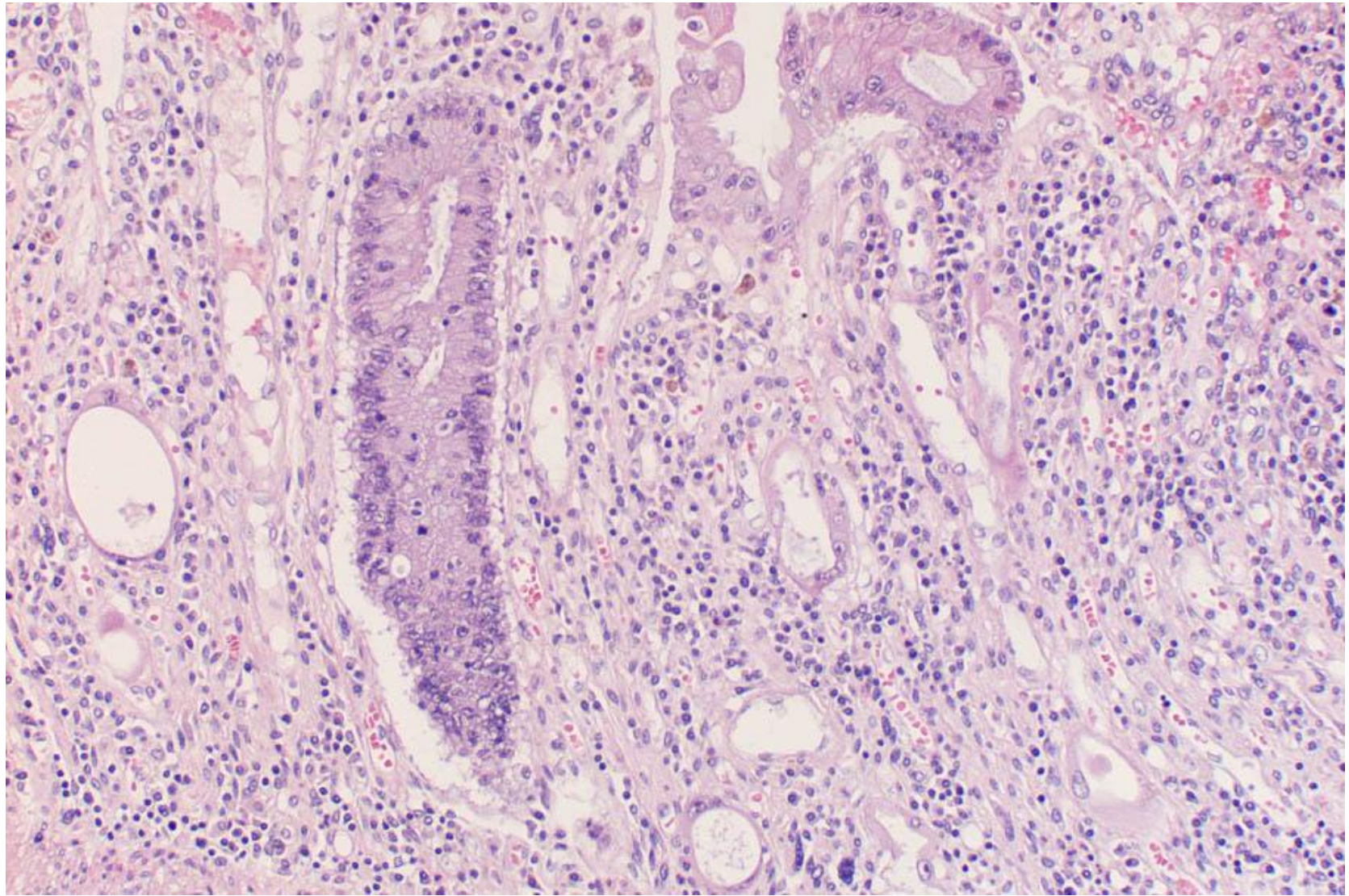
DPD: dihydropyrimidine dehydrogenase



**Mechanism of DNA synthesis inhibition
by 5-FU and 5-FU prodrugs**



5-FU-induced mucosal injury (small bowel, H&E), probably in case of DPD (5-FU degrading enzyme) deficiency. The aged female patient with bile duct carcinoma continued to take 5-FU orally, in spite of persistent and severe diarrhea. DPD: dihydropyrimidine dehydrogenase



5-FU mucosal injury(colon, H&E) , probably in case of DPD (5-FU degrading enzyme) deficiency. Advanced loss of crypts is observed as an adverse reaction. DPD: dihydropyrimidine dehydrogenase

Three kinds of cells in the body

Renewing cell	Thymic cortex, Germinal center lymphocyte, Hematopoietic cell, Epidermis, Hair follicle cell, Gastrointestinal epithelial cell, Endometrium, Spermatogonia, Cancer cell
Stabilized cell	Hepatocyte, Renal tubular cell, Pneumocyte, Mammary ductal cell, Glial cell, Endothelial cell, Mesothelial cell, Smooth muscle cell, Fibroblast, Adipocyte, Schwann cell, Osteoblast
Stable cell	Neuron, Striated muscle cell, Cardiomyocyte, Ovum

The regenerating cells are highly susceptible to anti-cancer drugs and X-ray irradiation.