

General Pathology 1 January 17, Monday, 2005 Masashi Fukayama

<http://pathol.umin.ac.jp/>

Refer to <http://www-medlib.med.utah.edu/WebPath/webpath.html>

What is pathology?

pathomorphology (pathologic anatomy, pathologic histology, pathologic cytology)
human pathology, cellular pathology, molecular pathology, experimental pathology,
diagnostic pathology: autopsy pathology, surgical pathology, biopsy pathology

Methods of human pathology

macroscopic observation/ tissue processing
preparation of samples for light microscopy (fixation, embedding, slicing, staining)
immunohistochemistry/in situ hybridization
gene analysis of pathologic samples

Introduction of diseases in terms of their morphology

classification of diseases: degeneration, circulatory disorder, anomaly, inflammation, neoplasm
cell and tissue repair, circulatory disturbance, genetic diseases and developmental anomaly, inflammation and immune abnormality, tumors

Case 1

Age: early 60s Sex: male

[past history] Diagnosed as diabetic mellitus six years ago. Conducted diet therapy and administered oral antidiabetic.

[present illness] The patient started to feel chest pain at breakfast, six months prior to the onset. The pain usually subsided within a few minutes. It happened a few times a month, but there was no particular sign of increase in frequency. After half an hour of farm work on the same day, he suddenly felt penetrating chest pain, which lingered for quite sometime. He was diagnosed by his family doctor as having myocardial infarction and was placed under medical treatment. Early in the morning of the fourth day after the first attack, he developed A - V block and was admitted to a cardiovascular internal medicine department. With a temporary pace maker, his heart rate was in 60s. At 2:00 a.m. on the sixth day, he suddenly developed ventricular tachycardia and ventricular fibrillation, which resulted in cardiac arrest. Died at 3:57 a.m.

Case 2

Age: early 40s Sex: male

[present illness] No previous illness. The patient experienced a fever of 40 degrees for a few weeks. Unable to lower the temperature, he was admitted to a nearby hospital. He was treated with various antibiotics, but nothing worked. Due to deterioration of his general condition, he was transferred to our ward three weeks after his admission. According to his family member who was not living with him, two out of four of his poll parrots were found dead around the time of his illness. On admission, weight loss; muscle atrophy in the distal portion of the extremities; fungal infection in left of neck, upper arms, pubic region, and both feet; bronchial sounds in the whole lung field were recognized. Venturi mask was used due to PO_2 30, PCO_2 35, pH 7.60, under nasal canula oxygen 1.5L/min. Powerful antibiotics and antituberculosis drugs were administered. None of sputum culture, bone marrow puncture or serum examinations such as anti-virus antibody values revealed any significant disease-causing agents. He died in spite of the intensive care of two-week duration.

Case 3

Age: late 20s Sex: female

[present illness] The patient developed polyarthritis one year ago. Butterfly erythema appeared on her face. She had had an occasional temperature of 38 degrees for four months. Due to increasing general lassitude, she was hospitalized. Proteinuria (+3), pancytopenia, anti-DNA antibody positive, antinuclear antibody positive, low titer of serum compliment factor.

Case 4

Age: early 60s Sex: male

[present illness] The patient underwent subtotal gastrectomy for gastric cancer. Nine months after surgery, loss of appetite, abdominal pain, and icterus were recognized. Percutaneous transhepatic biliary drainage was performed and icterus did once improve. However, infection from IVH and sepsis aggravated the condition and icterus worsened again. Developed fever, arrhythmia and new heart murmur. Consciousness deteriorated. Died in 12 months postoperatively

Life, death and pathology

The system of body and disease

Hierarchy of body

Hierarchy of disease

hierarchy	cystic fibrosis	chronic bronchitis, pulmonary emphysema
gene	CF gene mutation	??
cell	disturbance of chloride channel	?
tissue	mucous plug, gland tissue destruction	inflammation of gland and lung tissue, destruction
organ	bronchitis, pulmonary emphysema (disturbance of sweat gland, pancreas)	bronchitis, pulmonary emphysema
system	chronic respiratory failure	chronic respiratory failure

The process of life and pathology

1. Death

hierarchy of death

definition of somatic death:

brain death, time-lag between brain death and the death of other organs – organ transplantation

postmortem changes

death of tissues and cells

apoptosis and necrosis

reproducing and non-reproducing cells -- classification of somatic cells in terms of their proliferation potency and differentiation potency

2. Life span

life span and aging

Gompertz's mortality curve

mitotic limits--Hayflick limit

M1 stage, M2 stage

distal portion of chromosome (telomere) and distal replication problem

3. Aging

senile changes:

a model of somatic aging: Werner syndrome, *klotho* mouse

4. Lesions and diseases associated with aging

- 1) atrophy
- 2) lipofuscin
- 3) dementia
- 4) arteriosclerosis
- 5) osteoporosis
- 6) cancer