

## 9 Telepathology by improved telecommunication

### Development of telepathology by improved telecommation

#### Pathological diagnosis

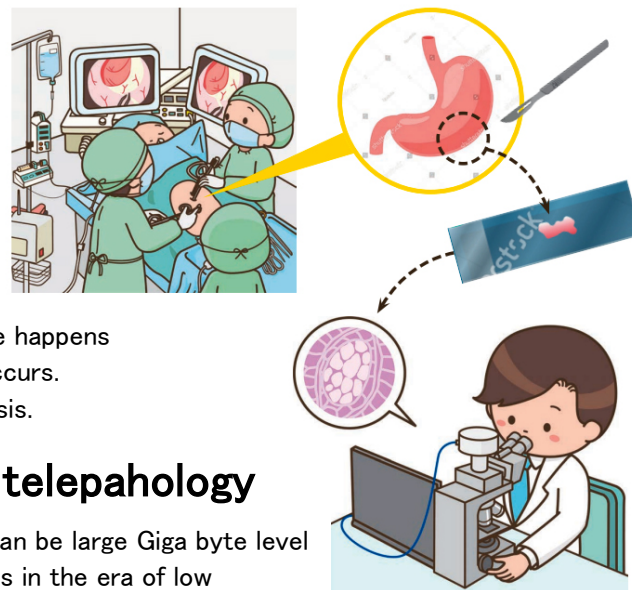
Making specimens of organ systems and observing it under microscope. Number of pathologist are small compering other specialist of doctors.

#### Regarding rapid diagnosis

Determine the area for removal during operation. If mistake happens recurrence of malignant tumor which is related to death occurs.  
Lack of pathology can be complemented by remote diagnosis.

#### Telecommunication speed and telepahology

The total digital image data of the pathological specimen can be large Giga byte level volume excepting cross sectional images. Remote diagnosis in the era of low telecommunication speed was carried out by transmitting selected minimum images.



	History of communication network	History of telepathology	Telecommunication speed
1964	Jun-ichi Nishizawa applied patent of optical communicatuion using focused optical fiber		
1970	Corning Ltd (USA) commercialized optical fiber for communication		
1981	Commercialization of optical fiber communication by Nippon Telegraph and Telephone Corp.		
1984		Experiment of telepathology by transmitting still image using analog telephone line	300 bps
1992		Demonstration experiment of telepathology (HD movie + remote operation of microscope) using optical fiber of Tohoku electric power corp. between Tohoku University and Sendai city hospital	178 Mbps (in terms of digital)
1988	Start of ISDN service	Telepathology by transmitting still image using telephone line became popular, Tohoku Univ. – Kesennuma hospital line started in 1994.	64 Kbps
1999	Commercial ADSL internet service frst in Japan		
2001	Authentic optical access (max 10 Mbps) by NTT		
2002	Authentic optical access (max 100 Mbps) by NTT		
2004		Demonstration experiment of telepathology using VGS movie + remote operation of microscope	8 Mbps
2008		Commercialization of telepathology using FHD movie + remote operation of microscope	16 Mbps
2009		Commercialization of WSI (Whole Slide Imaging) in which pathological specimen is digitalized with high magnification	
2010	Experiment using communication satellite (Kizuna) for high speed internet by JAXA	Demonstration experiment of telepathology using communication satellite	

### Pathological diagnosis enabled by optical fiber

Diagnosis took time at slow communication era because amount of information was small and transmission took time. Transmission capacity and speed of microscopic image increased by optical fiber in 1992, which enabled remote diagnosis and assured surgery in local hospital. This application of the optical fiber in medicine has been used not only for the pathological diagnosis and teleoperation but also transmission of CT and MRI images and home medical care widely.