Diarrhea in Adults

- **Acute diarrhea is one of the most common medical complaints in any population.**

- **In all patients with acute diarrhea the attention to fluid and salt intake is important.**

Most GIT infections are transmitted by food and water contamination

Fecal-oral cycle can
be broken by:

-*Proper sewage disposal*

-*Disinfection of drinking water*

-*Proper food preparation and storage*

unhygienic living conditions

Definitions and Syndromes in Infectious Diarrhea

- Acute diarrhea can be defined as a new onset of three or more than 3 unformed stools during a 24-hour time period.

- The duration of an acute diarrhea is always less than 14 days. Acute diarrhea is frequently associated with one or more enteric symptoms like nausea, vomiting, increase in abdominal gas, abdominal pain or cramps, tenesmus, fecal urgency, or passage of stools containing gross blood and mucus.

Acute Diarrhea

Diarrhea of < 2 weeks duration is most commonly caused by invasive or noninvasive pathogens and their enterotoxins.

Acute noninflamatory diarrhea
- Watery, non-bloody (stool)
- Usually mild, self-limited
- Caused by virus or noninvasive bacteria
- Diagnostic evaluation is limited

- **9/1**

Acute inflamatory diarrhea
- Blood or pus, (stool)
- Usually caused by an invasive or toxin producing bacterium
- Diagnostic evaluation requires routine stool bacterial culture.

Acute non-inflamatory diarrhea

- In temperate climate acute non-inflammatory diarrhea in adults may be caused by **Rotaviruses**, or more commonly by **Noroviruses**, **Caliciviruses, Astroviruses**.

- Several agents of food poisoning, such as *Clostridium perfringens*, *Bacillus cereus*, and *Staphylococcus aureus*, also commonly cause non-inflammatory diarrheal syndromes in adults.

Food Poisoning

Campylobacter	2 to 5 days	Meat and poultry. Contamination occurs during processing if animal feces contact meat surfaces.
Clostridium botulinum	12 to 72 hours	Home-canned foods with low
Clostridium perfringens	8 to 16 hours	Meats, stews and gravies.
Escherichia coli (E. coli) O157:H7	1 to 8 days	Beef contaminated with feces during slaughter.
Salmonella	1 to 3 days	Raw or contaminated meat, poultry, milk or egg yolks. infected food handler.
Shigella	24 to 48 hours	Seafood and raw, ready-to-eat produce. food handler.
Bacillus cereus	1 to 6 hours	reheated fried rice
Staphylococcus aureus	1 to 6 hours	Meats and prepared salads, cream sauces, and cream-filled pastries. Can be spread by hand contact, coughing and sneezing.

Food Poisoning

- *Symptoms can develop rapidly, within 30 minutes, or slowly, worsening over days to weeks.*

- *Most of the common contaminants can cause:*

  nausea, vomiting, diarrhea, and abdominal cramping.

- *Usually food poisoning is not serious and the illness runs its course within 24-48 hours.*

Food Poisoning Treatment

1. Control Nausea and Vomiting

- Avoid solid foods until vomiting ends. Then eat light, bland foods, such as saltine crackers, bananas, rice, or bread.

- Sipping liquids may help avoid vomiting.

- Don't eat fried, greasy, spicy, or sweet foods.

2. Prevent Dehydration

- Drink clear fluids, starting with small sips and gradually drinking more.

- If vomiting and diarrhea last more than 24 hours, drink an oral rehydration solution.

Le Petit Journal
LE CHOLÉRA

Cholera

- *Vibrio cholerae* serotypes that produce cholera toxin.

- Often, people get cholera from eating fish that is not cooked enough (*contaminated water*).

- The toxin causes diarrheal disease. Secretory diarrhea may result in torrential outpouring of fluid into the intestine with a risk of subsequent hypovolaemic shock and renal failure and death.
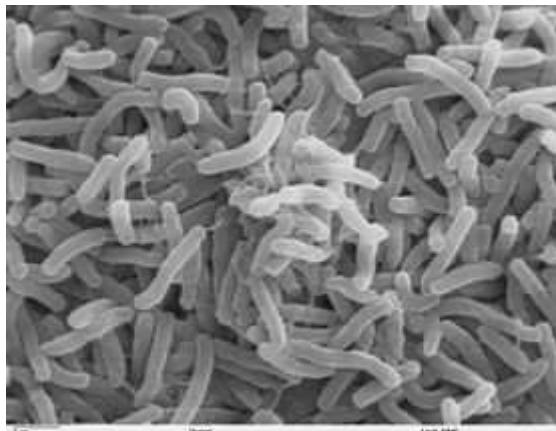
Cholera

- **Cholera** is an infection of the intestine by the bacterium *Vibrio cholerae*.
- Symptoms: may range from none, to mild, to severe.The classic symptom is large amounts of watery diarrhea that lasts a few days. Vomiting and muscle cramps may also occur. Diarrhea can be so severe that it leads within hours to severe dehydration and electrolyte imbalance.This may result in sunken eyes, cold skin, decreased skin elasticity, and wrinkling of the hands and feet. The dehydration may result in the skin turning bluish. Symptoms start two hours to five days after exposure.
- Cholera affects an estimated 3–5 million people worldwide and causes 58,000–130,000 deaths a year as of 2010

Typical "rice water" diarrhea

A rapid dipstick test is available to determine the presence of V. cholerae
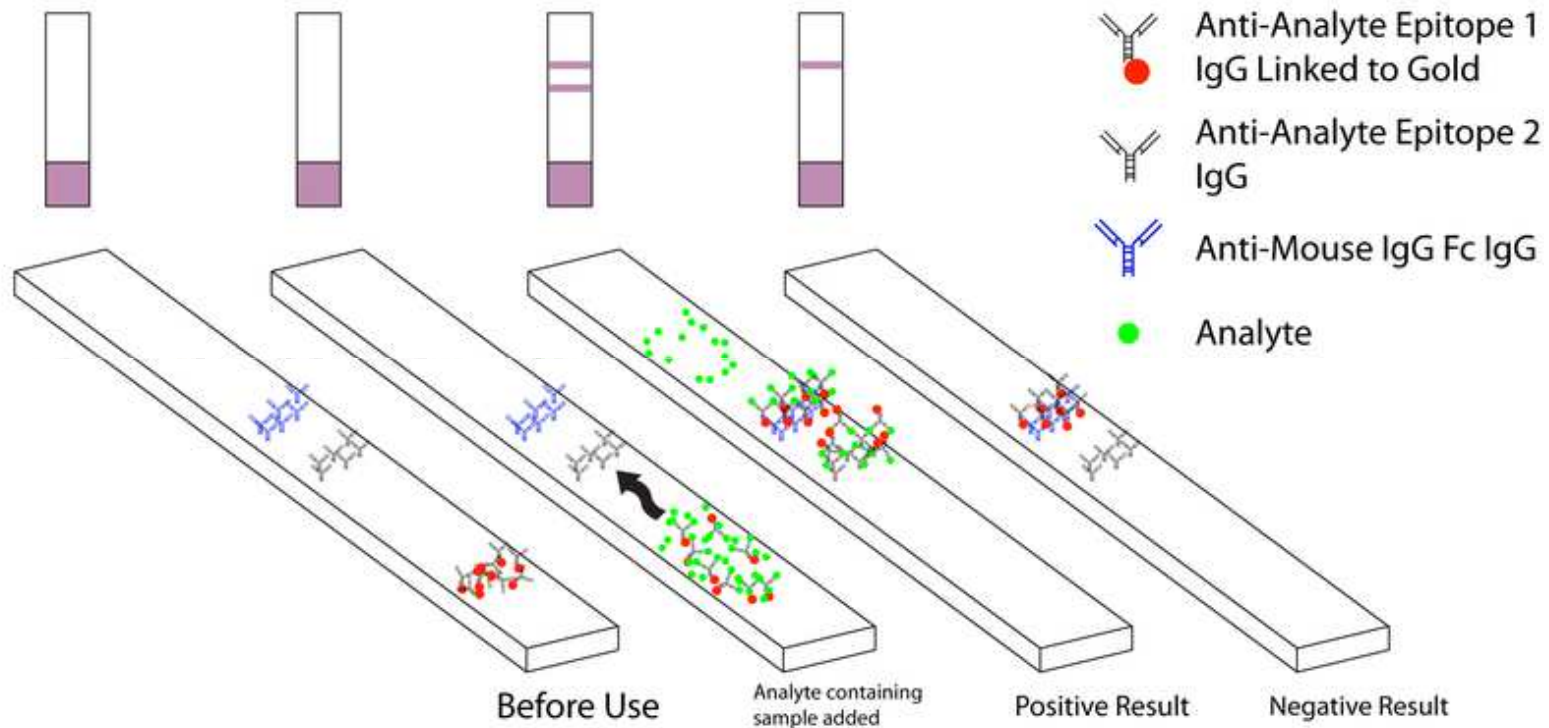
Treatment

- Oral rehydration therapy (ORT)
- Intravenous rehydration may be necessary.
- Ringer's lactate is the preferred solution, often with added potassium
- **Antibiotics (Testing for resistance):**
- **Doxycycline**, cotrimoxazole, erythromycin, tetracycline, chloramphenicol,
- **Vaccine: Preventive inoculation against cholera in 1966**
- **A number of safe and effective oral vaccines for cholera are available.**

Escherichia coli
traveler's diarrhea

- Travelers' diarrhea (TD) is the most common illness affecting travelers. Each year between 20%-50% of international travelers, an estimated 10 million persons, develop diarrhea.

- The primary source of infection is ingestion of fecally contaminated food or water.

- Enterohemorrhagic strains such as *E. coli* produce Shiga toxin

What treatments are effective for travelers' diarrhea?

- TD usually is a self-limited disorder and often resolves without specific treatment.
- Clear liquids are routinely recommended for adults. (ORT)
- Travelers who develop three or more loose stools in an 8-hour period---especially if associated with nausea, vomiting, abdominal cramps, fever, or blood in stools---may benefit from antimicrobial therapy.
- Antibiotics usually are given for 3-5 days.
- Currently, fluoroquinolones are the drugs of choice.
- Commonly prescribed regimens are 500 mg of ciprofloxacin twice a day or 400 mg of norfloxacin twice a day for 3-5 days.

Viral Gastroenteritis

- Rotavirus

  moderate to severe vomiting followed by watery diarrhea and fever.

  It is the most common cause of food poisoning in infants and children

- Norovirus

  the most common viral cause of adult food poisoning transmitted from water, shellfish, and vegetables contaminated by feces.
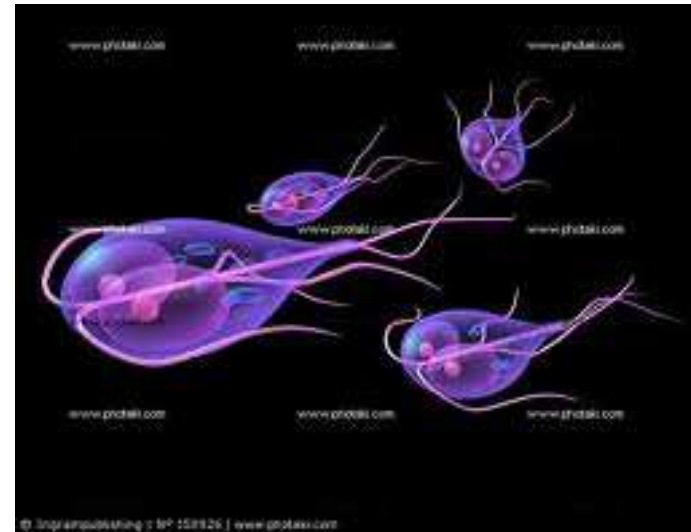

- Treated with rehydration (ORT)

Giardiasis

- Transmitted by contaminated water (Symptoms of giardiasis normally begin 1 to 3 weeks after becoming infected.)

- Diagnosed by microscopic examination of stool for ova and trophozoite.

- Treated with metronidazole.

Symptoms
- Diarrhea
- Gas or flatulence
- Greasy stool that can float
- Stomach or abdominal cramps
- Upset stomach or nausea
- Dehydration

microscopic parasite

Cryptosporidiosis

- *Cryptosporidium parvum (protozoan parasite)* in contaminated water
- Transmitted by oocysts
- Diagnosed by acid-fast staining of stool or ELISA
- Treated with oral rehydration, Nitazoxanide has been FDA-approved for treatment of diarrhea caused by Cryptosporidium in people with healthy immune systems and is available by prescription. Alinia

Cryptosporidium is one of the most frequent causes of waterborne disease among humans in the United States.

The first signs and symptoms of cryptosporidium infection usually appear within a week after infection and may include:

Watery diarrhea
Dehydration
Lack of appetite
Weight loss
Stomach cramps or pain
Fever
Nausea
Vomiting

Parasites - Amebiasis (also known as Entamoeba histolytica infection)

Amebiasis is caused by *Entamoeba histolytica*, a protozoan that is found worldwide. Only about 10% to 20% of people who are infected with *E. histolytica* become sick from the infection.

How is amebiasis diagnosed?

- Several stool samples from several different days.

Treatment:

Metronidazole is the mainstay of therapy for invasive amebiasis.

Transmitted by contaminated water or food.

The symptoms are often quite mild and can include loose feces, stomach pain, and stomach cramping.

Amebic dysentery is a severe form of amebiasis associated with stomach pain, bloody stools, and fever.
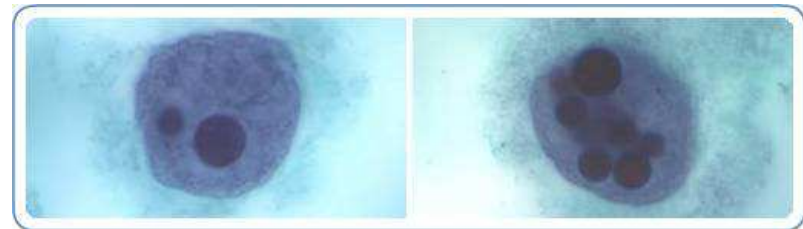
Acute inflamatory diarrhea

The presence of fever and bloody diarrhea (dysentery) indicates colonic tissue damage caused by invasion.

(Shigellosis, Salmonellosis, Campylobacter or Yersinia infection, amebiasis) or toxin (C. difficile, E.coli O157:H7)

Shigellosis

- *Shigellosis is a bacterial infection that affects the digestive system. Shigellosis is caused by a group of bacteria called Shigella.*
- *The Shigella bacterium is spread through contaminated water or food or through contact with contaminated feces. The bacteria release Shiga toxins that irritate the intestines.*
- *The primary symptom of shigellosis is diarrhea.*
- *Shiga toxin causes inflammation and bleeding*

Shigella

Epithelial cells lining intestinal tract

1 Shigella enter an epithelial cell

2 Shigella multiply inside the cell

3 Shigella invade neighboring epithelial cells, thus avoiding immune defenses

4 An abscess forms as epithelial cells are killed by the infection. The bacteria rarely spread in the bloodstream.

Mucosal abscess
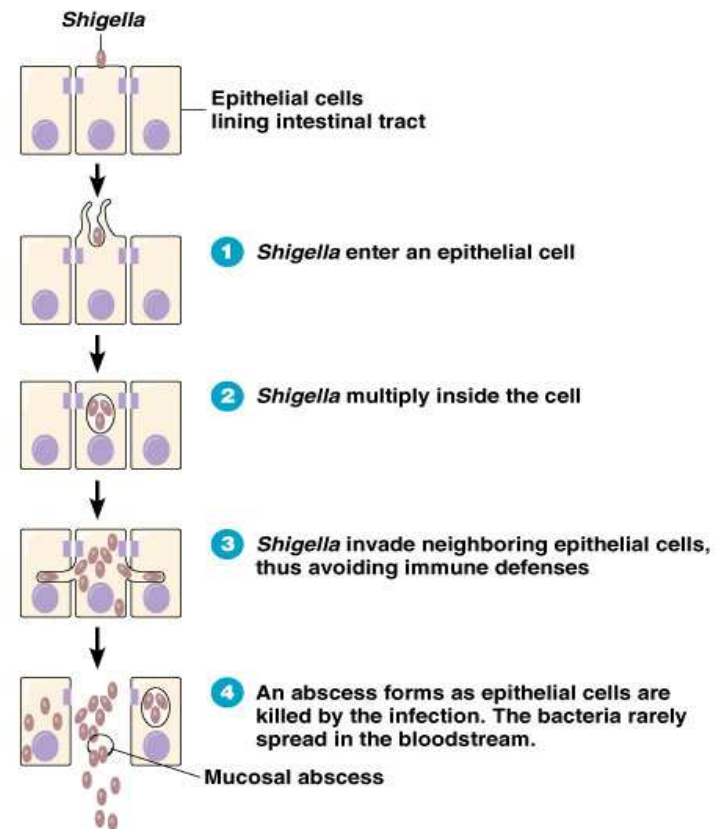
Figure 25.8

Treatment for Shigellosis

- Combating dehydration is the main goal of treatment for most cases of shigellosis.

- It is important to drink plenty of fluids, especially electrolyte solutions, many of which are available over the counter.
- Moderate-to-severe infection may require medical treatment.

- Confirmation of *Shigella:*

Drug options antibiotic medications:
- azithromycin (Zithromax)
- ciprofloxacin (Cipro)
- co-trimoxazole (Bactrim)

Campylobacter Gastroenteritis

spiral-shaped bacteria

- *Campylobacter jejuni* (Usually transmitted *eating raw or undercooked poultry meat,* cow's milk).

- Most people who become ill with campylobacteriosis get diarrhea, cramping, abdominal pain, and fever within two to five days after exposure to the organism. The diarrhea may be bloody and can be accompanied by nausea and vomiting.

- Treatment: *Campylobacter* recover without any specific treatment. Moderate-to-severe infection may require medical treatment: Azithromycin and fluoroquinolones (e.g., ciprofloxacin)

What if Chickens Wanted to Rule the World...would they   Sabotage Eggs?

Eggs have been the most common food source linked to SE infections.

Salmonellosis
Salmonella serotype Enteritidis

- *Anyone can get a Salmonella infection, but the elderly, infants, and persons with impaired immune systems are at increased risk for serious illness.*

- **Transmitted by:**

- Poultry, pork, beef and fish (seafood), if the meat is prepared incorrectly or is infected with the bacteria after preparation. Infected eggs, egg products, and milk when not prepared, handled, or refrigerated properly.

- Tainted fruits and vegetables

- Symptoms:

- diarrhea, fever, vomiting, and abdominal cramps 12 to 72 hours after infection.

- In most cases, the illness lasts four to seven days, and most people recover without treatment. In some cases, the diarrhea may be so severe that the patient becomes dangerously dehydrated and must be hospitalized.

Figure 25.9

TREATMENT

- Salmonella gastroenteritis is typically self-limiting, and antibiotics should not be used in most cases.

- All patients with gastroenteritis should be assessed for volume depletion and electrolyte imbalances.

- Antibiotics for these high-risk groups include an oral fluoroquinolone, azithromycin, trimethoprim/sulfamethoxazole, or amoxicillin.
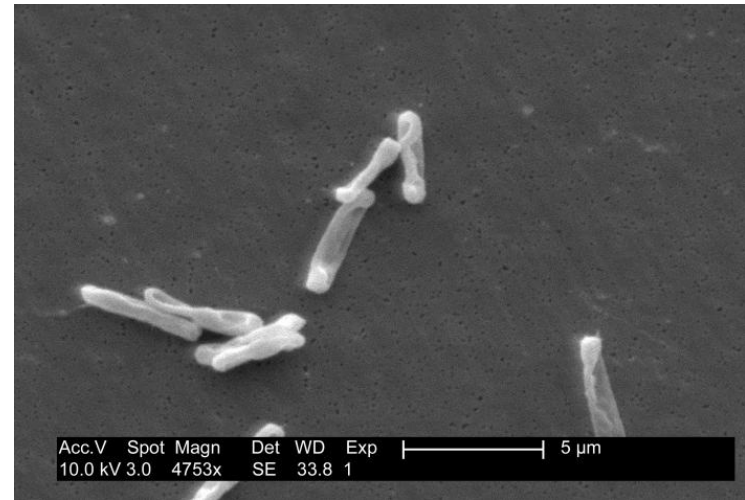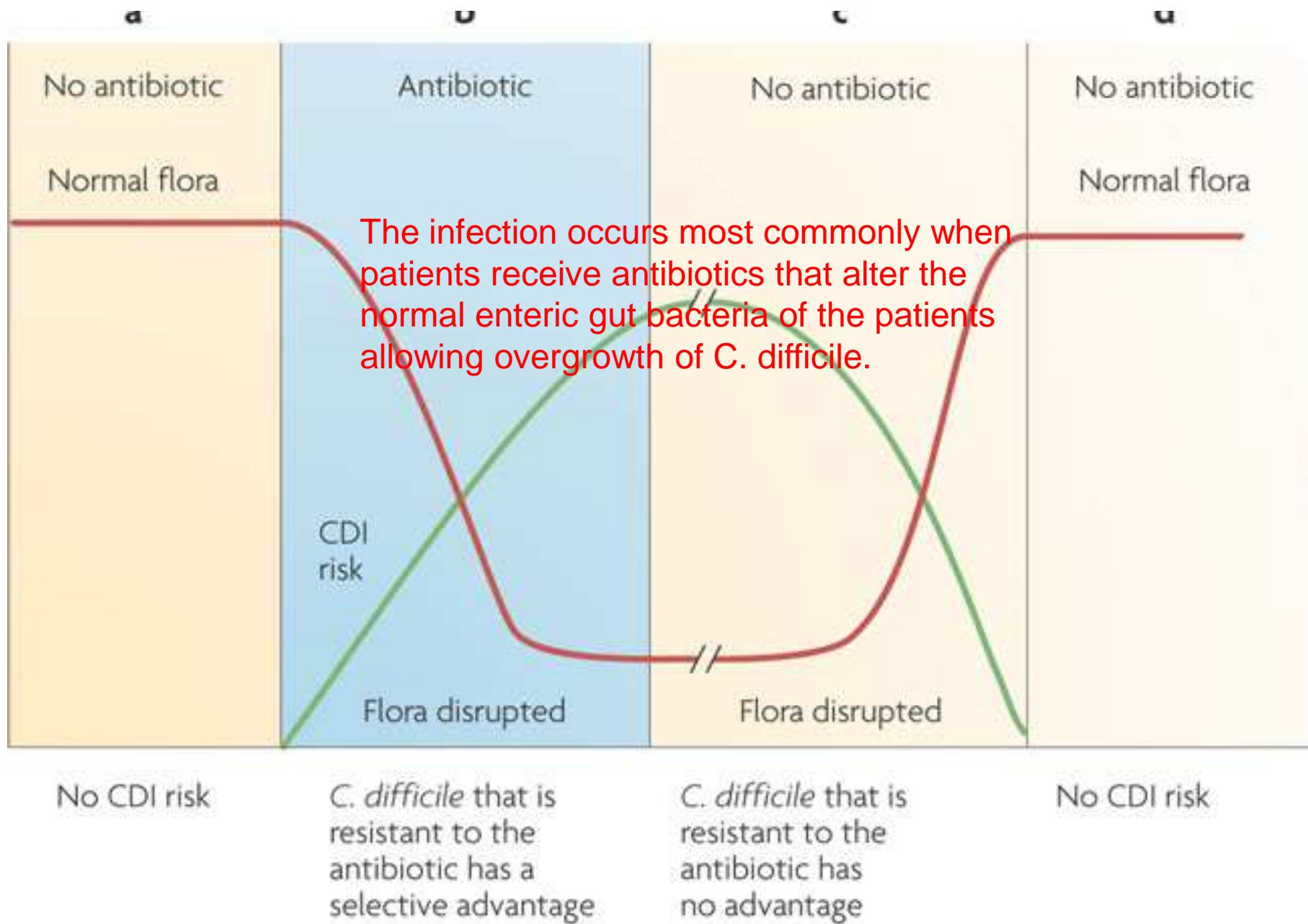
Clostridium difficile
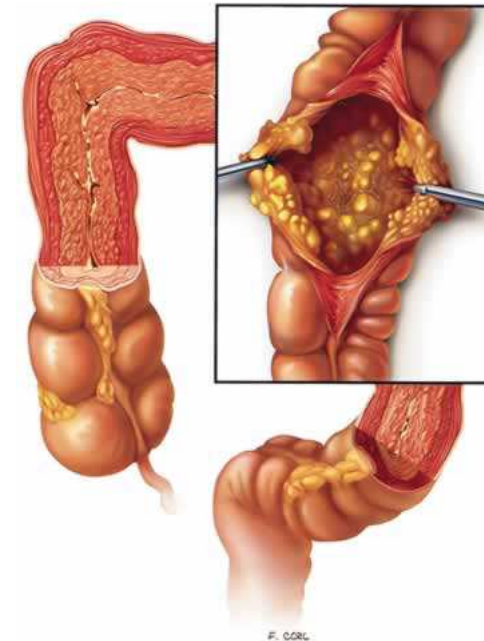
Clostridium difficile

(G+, anaerob)

- Clostridium difficile infection (CDI) is a bacterial disease of the gastrointestinal tract caused by C. difficile, a toxinproducing, Gram-positive, anaerobic, spore-forming bacillus. The infection occurs most commonly when patients receive antibiotics that alter the normal enteric gut bacteria of the patients allowing overgrowth of C. difficile.

- (Pseudomembranous Colitis , PMC, CDI)

- The PMC may be caused by any antibiotic.

a No antibiotic — Normal flora — No CDI risk

b Antibiotic — Flora disrupted — C. difficile that is resistant to the antibiotic has a selective advantage

c No antibiotic — Flora disrupted — C. difficile that is resistant to the antibiotic has no advantage

d No antibiotic — Normal flora — No CDI risk

CDI risk

The infection occurs most commonly when patients receive antibiotics that alter the normal enteric gut bacteria of the patients allowing overgrowth of C. difficile.

Nature Reviews | Microbiology

Antibiotic-associated diarrhea (AAD)

- In form one, there is no significant pathogen or toxin of the diarrhea which begins during the administration of antibiotics; usually dose-related, however, after leaving the antibiotic the diarrhea immediately stops.

- In form 2, it is caused by C. difficile,

- The antibiotic modifies the normal intestinal flora which causes unlimited growth of C. difficile.

- The CDI develops into pseudomembranous (PMC) colitis,

- In the severe form of the PMC the patient can have watery, bloody stools 15-30/ day.

- The diarrhea is usually accompanied by colicky abdominal pain, fever, leucocytosis. Mortality: 10%

The bacterial characteristics

- 1935: Hall and O 'Toole (Bacillus difficilis)

- Gram + spore-forming, anaerobic rods.

- It can be found in the environment (soil, water, waste water, hay, sand), animal and human intestinal tract.

- The vegetative form of it quickly destroyed by the air but the spores (resistant to heat, dryness and chemical effects).

C. difficile (toxins)

- The toxin-A and toxin-B BI/NAP1/027.

- Both toxins activate proinflammatory monokines such as interleukin 1 (IL-1) and tumor necrosis factor (TNF) production.

- B-toxin is very efficient cytopathogenic toxin.

- The harmful effects of these toxins directly or indirectly can generate microcirculatory disturbance that causes colon mucosal damage and bleeding.

C. difficile colonization rate

- It can be detected in 2-3% of the healthy adults
- In the cases of antibiotic-associated diarrhea with a positive toxin assay 90-100% of the stool culture is also positive .
- Pathogens can be detected in 5-15% of hospitalized adults without diarrhea getting antibiotic therapy,
- The pathogen spores are very often present in surgical intensive care units (chairs, instruments etc) as well. For this reason, C. difficile disease is typically considered nosocomial infections.

Table 1. CDI Rates and Mortality Increase With Patient Age

Age	CDI rate per 1000 admissions	Attributable 30-day mortality rate, %
<40 y	3.5	2.6
41–50 y	11.2	1.2
51–60 y	20.0	3.2
61–70 y	24.4	5.1
71–80 y	38.3	6.2
81–90 y	54.5	10.2
>90 y	74.4	14.0

Adapted from Loo et al.[2]
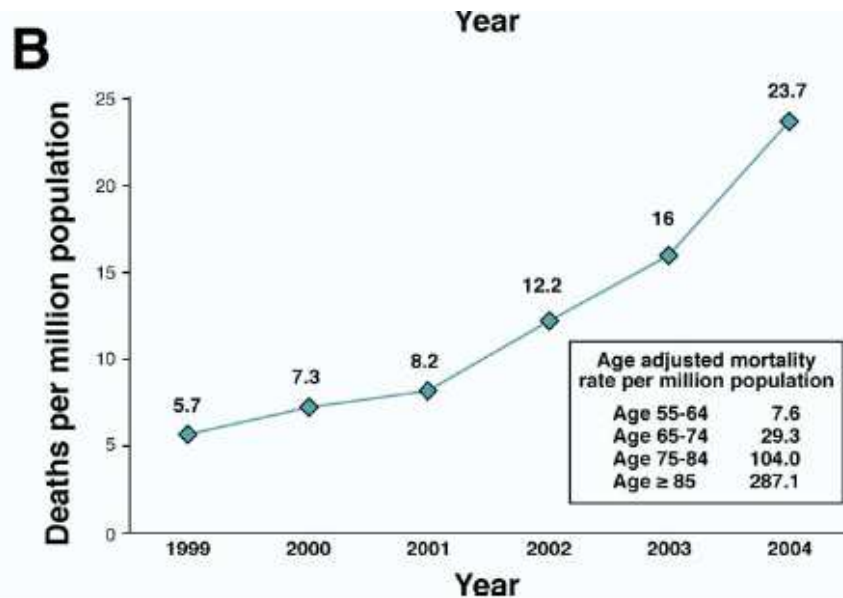
Figure 2. Frequency and mortality of CDI. (A) National estimates of US short-stay hospital discharges with C difficile infection as any listed diagnosis or the primary hospitalization diagnosis, based on the national inpatient sample[117] and unpublished data, 2008). (B) C difficile–related mortality based on listings on US death certificates from 1999 to 2004, with age-adjusted mortality rates per million people for the same years (shown in box).[118]

Epidemiology

GASTROENTEROLOGY 2009;136:1913–1924

The incidence of C difficile infection has tripled in the past 10 years.

Risk Factors

1. Antibiotic treatment
2. Reduction in colonization resistance
3. Old age> 65 years
4. Severe illness (septic, malignancy, immunosuppression)
5. PPI, Antidepressants, Methotrexate
6. Nasogastric tube, PEG
7. The intensive care unit or nursing management
8. Invasive interventions
9. Long hospitalization
10. Immunocompromised condition
11. Intestinal ischemia
12. (IL) -8 genpolymorfism

Clostridium difficile spores and vegetative cells are ingested

- Spores
- Vegetative cells

Most vegetative cells are killed in the stomach, but spores can survive the acid environment

Stomach

Colon

C. difficile multiplies in the colon

Small bowel

C. difficile spores germinate in the small bowel upon exposure to bile acids

Flagellae facilitate C. difficile movement; a polysaccharide capsule discourages phagocytosis

Gut mucosa facilitates adherence to the colonic epithelium

Dr. Krizsán Gergely [ScienceDaily, 2011. február 03.](#)

Pseudomembrane

Fibrin

Colonic epithelial cells

Mucin

Mucosa

Blood vessel

Neutrophils and monocytes
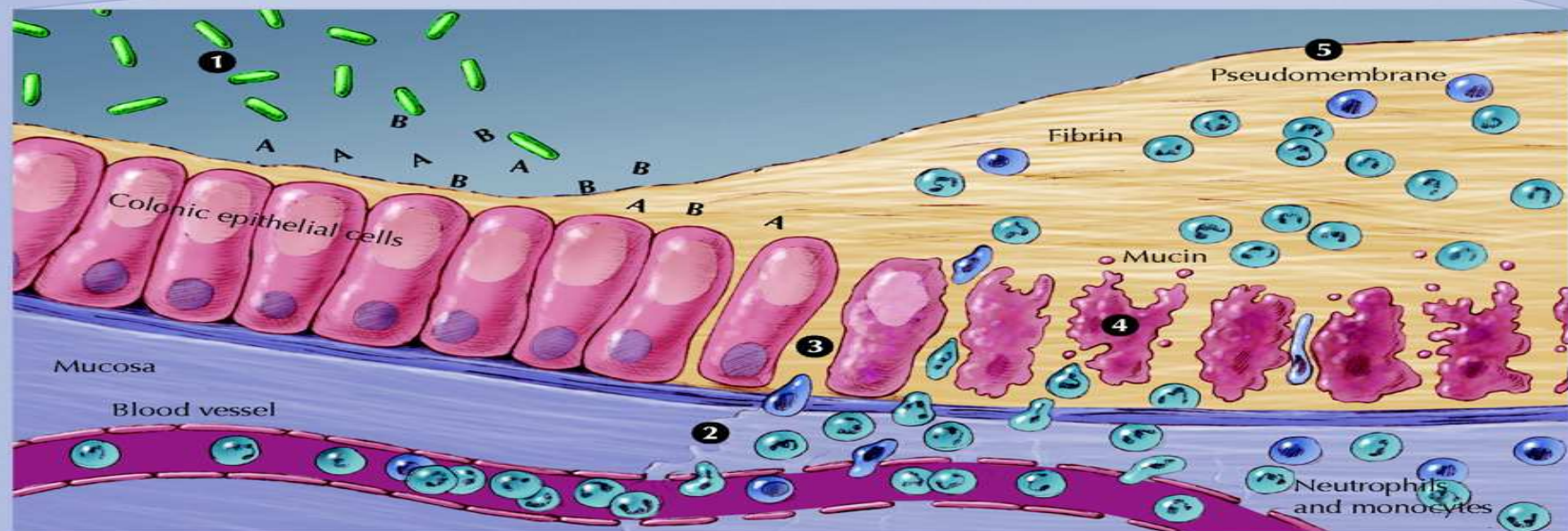
C. difficile vegetative cells produce toxins A and B and hydrolytic enzymes (**1**). Local production of toxins A and B leads to production of tumour necrosis factor-alpha and proinflammatory interleukins, increased vascular permeability, neutrophil and monocyte recruitment (**2**), opening of epithelial cell junctions (**3**) and epithelial cell apoptosis (**4**). Local production of hydrolytic enzymes leads to connective tissue degradation, leading to colitis, pseudomembrane formation (**5**) and watery diarrhea.

Antibiotic-associated diarrhea (AAD)

Pseudomembranous colitis (PMC) C. difficile
- - Severe diarrhea >15 or (paralytic condition)
- - lethargy
- - Fever (> 38.5 ° C), chills
- - Hemodynamic instability, severe cases of septic shock
- - Dehydration, electrolyte imbalance
- - Severe abdominal or diffuse abdominal tenderness, abdominal meteorism
- - Toxic megacolon (3%)

Diagnostic microbiology tests

Metodhs		Sensitivity / specificity	Advantages	Disadvantages
Citotoxin assay	Toxin B	+++ / +++	Gold standard	slow: 24-48 h requires tissue culture
Enzim immunoassay	Toxin A or A+B	++ / +++	fast simple specific	less sensitive
Latexagglutiná-ció	bacterial enzyme	+ / +	fast simple specific	low sensitivity specificity
Stool culture		+++ / +	sensitive	slow: 2-5 days nonspecific
	Clostr. difficile			
PCR	toxin A vagy B gének	+++ / +++	sensitive specific	special laboratory

Diagnosis

The colonoscopy is most secure way in the detection of disease. In most cases the distal colon is involved in the PMC; in this case the sigmoidoscopy is sufficient, however, in one third of the cases only the right colon is involved, so if possible, the entire colon should be examined.

Endoscopically:

2-10 mm diameter,
- Prominent
- Adherent
- Yellow plaques
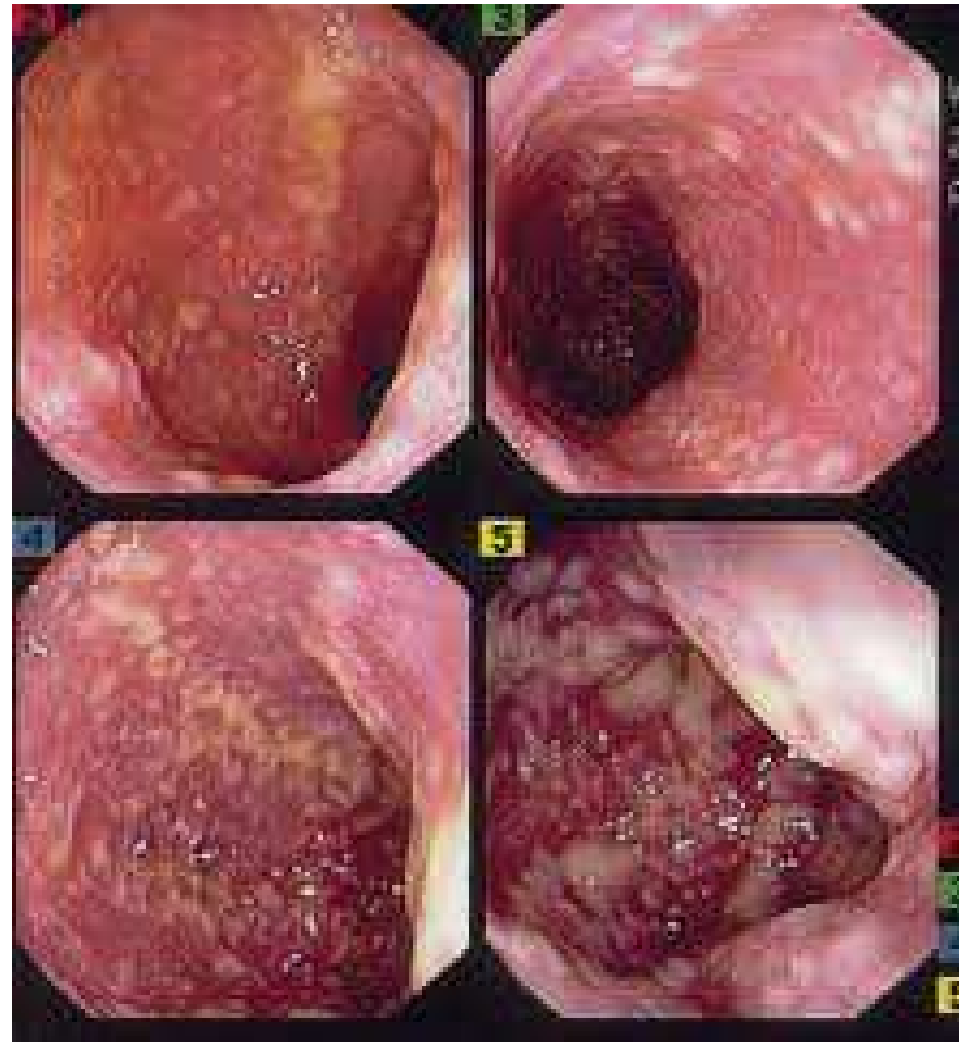
Treatment

- The incidence of C difficile infection has tripled in the past 10 years. Partly become virulent pathogens were partially responsive patients. The literature distinguishes four clinical forms:

- short-term colonization,

- acute diarrhea,

- fulminant diarrhea,

- recurrent infection,

- The current treatment options have not had the full success.

How *C. difficile* Spreads.

Doctor's Office

George, a 68-year-old man, goes to the doctor's office and is diagnosed with pneumonia. He is prescribed antibiotics, drugs that put him at risk for *C. difficile* infection for several months.

Hospital

One Month Later

George breaks his leg and goes to a hospital. A health care worker spreads *C. difficile* to him after forgetting to wear gloves when treating a *C. difficile* infected patient in the next room.

Rehab Facility

Does not wear gloves

Two Days Later

George transfers to a rehabilitation facility for his leg and gets diarrhea. He is not tested for *C. difficile*. The health care worker doesn't wear gloves and infects other patients.

SOURCE: CDC, 2012

Hospital

Wears gloves

Three Days Later

George goes back to the hospital for treatment of diarrhea and tests positive for *C. difficile*. He is started on specific antibiotics to treat it. Health care workers wear gloves and do not spread *C. difficile*. George recovers.

Treatment

	Lab result	Recommendation
First episode of mild to moderate	WBC 15 ezer/µl Kreatinin < 150 µmol/l	Metronidazol 3x500mg per os 10-14 days
First serious episode	Fvs szám > 15 ezer/µl Kreatinin >150 µmol/l	Vancomycin 4x125mg per os 10-14 days
First episode of serious complications	Hypotonia Shock Ileus, megacolon	Vancomycin 4x125 mg per os or NGT+ metronidazol 3x500mg iv + vancomycin enema
Relapse - first **20-27%**		The earlier effective treatment to be administered.
Relapse - second (over 60%)		Vancomycin 4x125mg (4x500 mg) per os 10-14 days, or every third day 125mg daily intermittent- Fidaxomicin 2x200 mg /10 days **Fecal transplantation ??**

Fecal Transplant

- high recovery rate ~ 92%
- low recurrence rate ~ 6%

- safe
- cost effective
- simple
- fast
- potentially life-saving

Donors

- Suitable:

- In close contact with the patient, but he or she does not live in the same household

  - - Healthy
  - - Young
  - - Voluntary

Fecal Transplant

feces in a centrifuge

Benefits of NG, NJ tube,

- There is no serious risk of perforation
- It does not require professional tools (endoscope)
- Not too burdensome

Benefits Colonoscopy,

- No contaminated small bowel syndrome
- No pneumonia
- No regurgitation, aspiration
- Large quantities of transplantable
- Accumulates at the infection site
- Transplantation can be used in the event of subileus
- the gastric acid does not reduce the effect of fecal transplant.

Indications

- First serious relapse after a successful treatment of severe pseudomembranous colitis

- Third recurrence after a successful treatment of pseudomembranous colitis

- Treatment-resistant chronic pseudomembranous colitis, which causes protein losing enteropathy

- As a potentially less costly and less invasive alternative, the Calgary researchers processed feces in a centrifuge, decanting the supernatant layer until it contained only bacteria, then encapsulated it in 3 layers of gelatin. In this way, the pills were unlikely to leak until they reached the small intestine. The researchers made each pill individually.

PREVENTION

TAKARÍTÁS
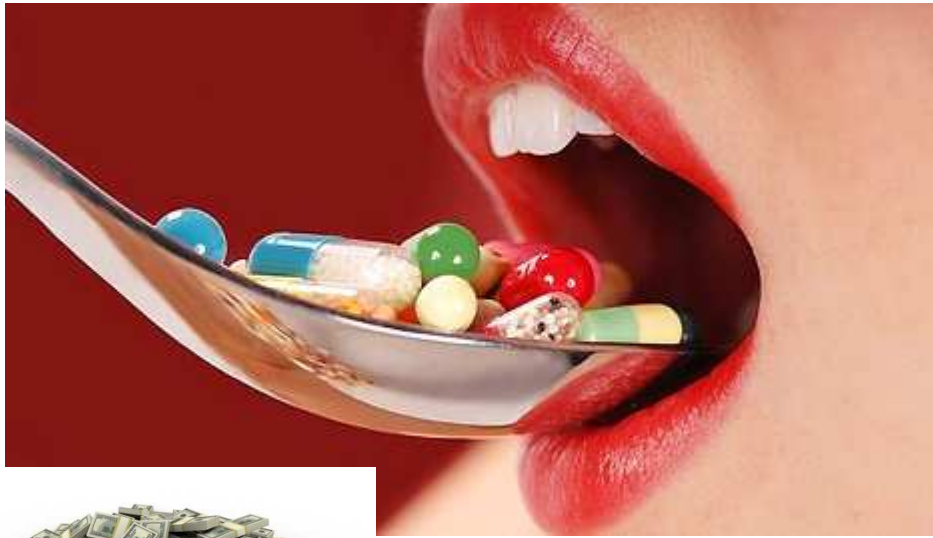
PREVENTION
against
CDI

- Single-contact-comfort room,
- Designated toilet
- Cohort isolation possible (ward, department)
- Qualified staff
- Personalized tools
- Cleaned and disinfected immediately (after use tools)
- Disposables apply
- The isolation can be unlocked after 48 hours (after recovery)

Figure 7.3. Sample patient room.

Hand hygiene, protective clothing, environmental disinfection

- Careful handwashing with soap - after removal of gloves
- Alcohol-based hand disinfectants are not recommended

Protective Device

- Gloves
- Cape and apron

- Continuous disinfection with sporocid spectrum disinfectant (chlorine)
- Disinfecting the frequently touched surfaces
- Toilet is a frequent source of Cl. Difficile spores
- Final disinfection

Biliary pancreatitis

Gall stone

Gastrointestinal Problems

Common sites of gallstones.
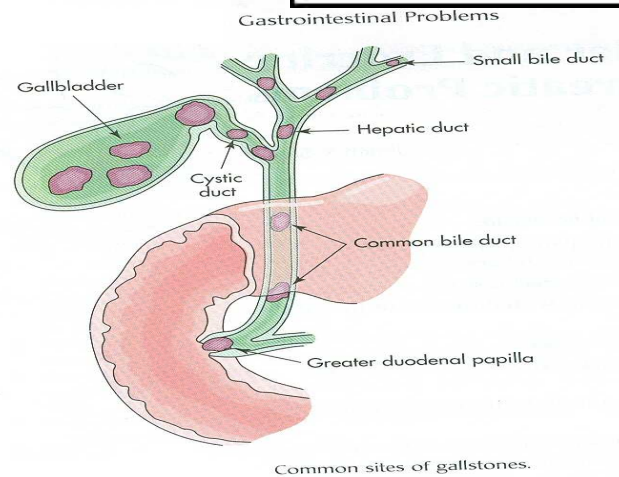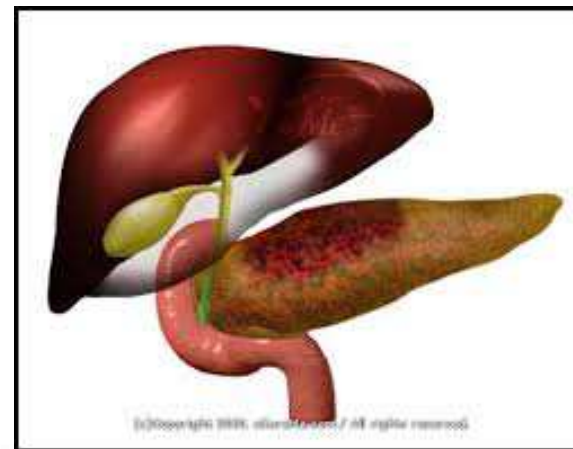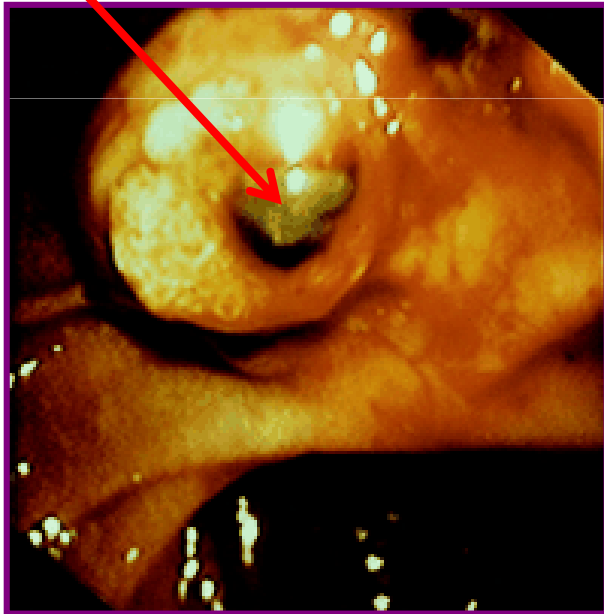
Pancreatitis

- Pancreatitis is a disease in which the pancreas becomes inflamed. Pancreatic damage happens when the digestive enzymes are activated before they are released into the small intestine and begin attacking the pancreas.

- In most cases, acute pancreatitis is caused by gallstones or heavy alcohol use. Other causes include medications, infections, trauma, metabolic disorders, and surgery. In up to 30% of people with acute pancreatitis, the cause is unknown.

?

- **What are the diagnostic criteria of biliary pancreatitis ?**

- **What is the optimal method for biliary tract imaging ?**

- **When is early ERCP indicated ?**

What are the diagnostic criteria of biliary pancreatitis in patients with AP ?

- Abnormal liver function tests
  - ALT elevation of > 3 x normal
  - Sebi > 3 x normal
  - Amylase > 1000 IU/L
- Ultrasound
  - Gallstone
  - Cholangitis

What is the optimal method for biliary tract imaging ?

- ERCP:

- Ultrasound :

- MRCP:

- EUS:

Endoscopic Retrograde Cholangiopancreatography (ERCP)
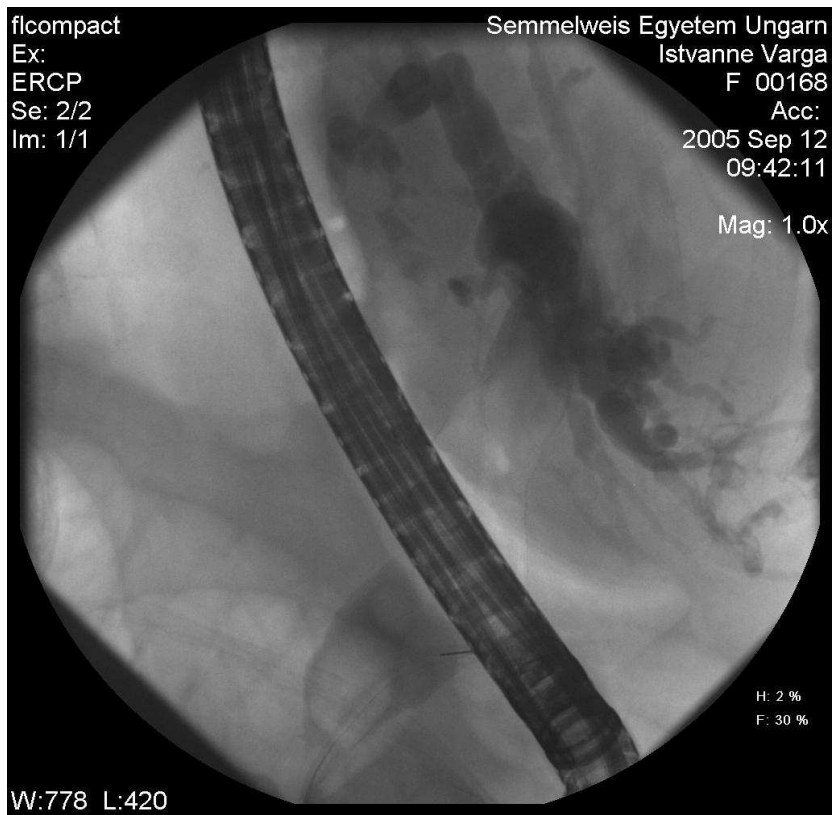
- ERCP
  - Gold standard
  - Potential serious complications
  - Sensitivity: 100%

Abdominal Ultrasound
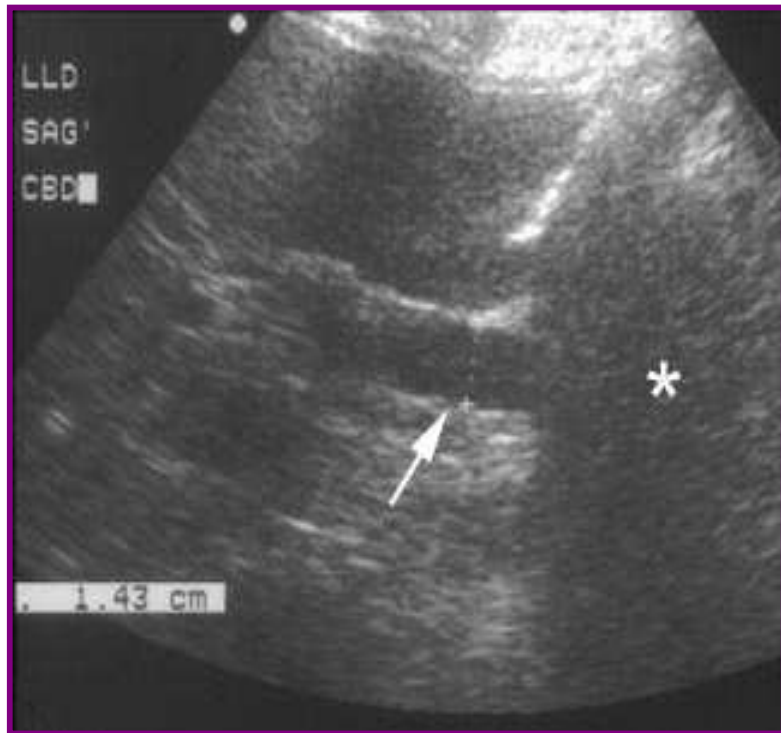
	Sensitivity
• GB stone	60-80%
• CBD stone	30-60%

Magnetic Resonance Cholangio-Pancreatography (MRCP)

- Sensitivity of > 90%

Endoscopy Ultrasound (EUS)
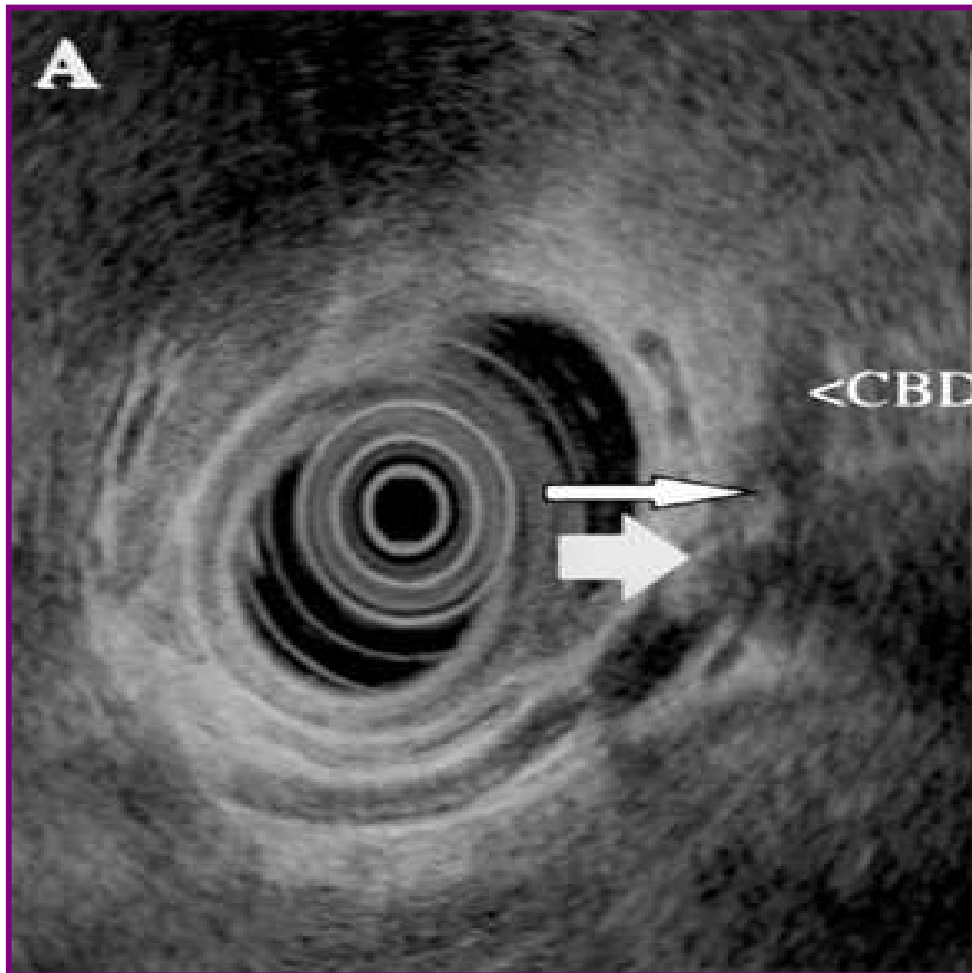
- EUS
  - Sensitivity of > 95%
  - Specificity of > 95-100%

When is early ERCP indicated ?

- Concomitant **cholangitis** (Evidence A)

- Significant **persistent biliary obstruction** (bilirubin > 5 mg/ dl) (Evidence A)

- ERCP in **severe biliary pancreatitis** without biliary sepsis or obstruction (Evidence B)

Neoptolemos et al 1988; Fan NEJM 1993; Folsch NEJM 1997

ERCP

A

Scope

Esophagus →

Stomach

Gallbladder

Duodenum

Pancreas

B

Viewing
major papilla
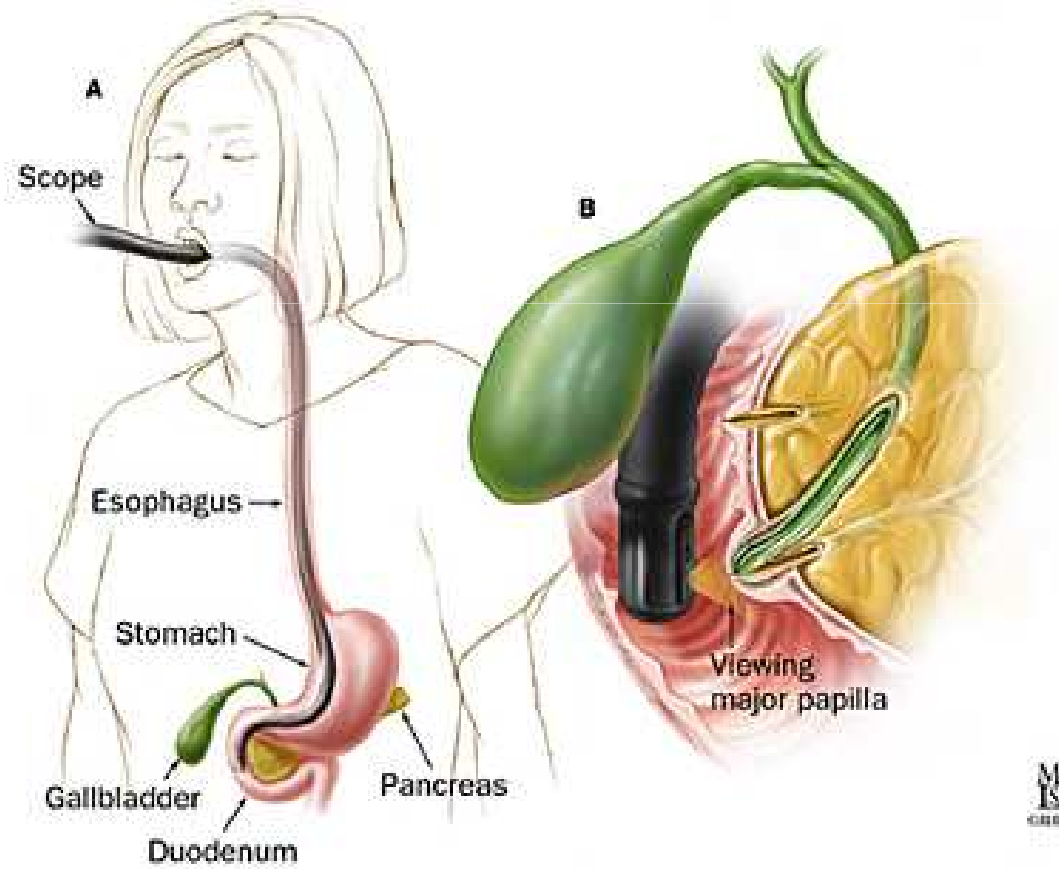
Contraindications

Absolute contraindication:

- The uncooperative patient

Contraindications

- Recent attack of acute pancreatitis, within the past several weeks
- Recent myocardial infarction
- Inadequate surgical back-up
- History of contrast dye anaphylaxis

Relative contraindications:

- Poor health condition for surgery
- Severe cardiopulmonary disease
- Ascites

Major complications of ERCP and endoscopic sphincterotomy

- **Pancreatitis**   Amylase at least three times normal at more than 24 hours after the procedure, requiring admission or prolongation of planned admission to two to three days   Hospitalization of 4 to 10 days Hospitalization of more than ten days, hemorrhagic pancreatitis, phlegmon or pseudocyst, or intervention (percutaneous drainage or surgery)

- **Bleeding**   Clinical, not just endoscopic evidence of bleeding, hemoglobin drop <3 g, and no need for transfusion   Transfusion (four units or less), no angiographic intervention or surgery   Transfusion (five units or more), or intervention (angiographic or surgical)

- **Cholangitis**   >38ºC for 24 to 48 hours Febrile or septic illness requiring more than three days of hospital treatment or endoscopic or percutaneous intervention   Septic shock or surgery

- **Perforation**   Possible, or only very slight leak of fluid or contrast, treatable by fluids and suction for three days or less   Any definite perforation treated medically for 4 to 10 days   Medical treatment for more than 10 days, or intervention (percutaneous or surgical)
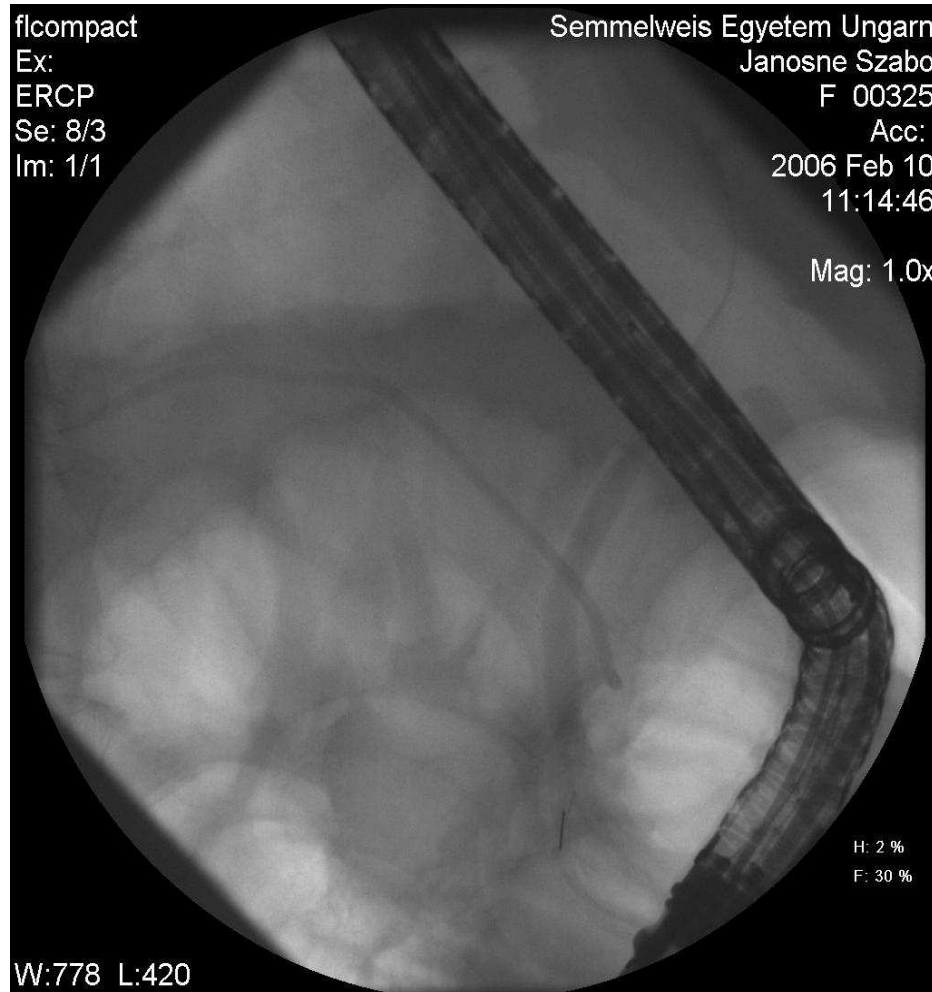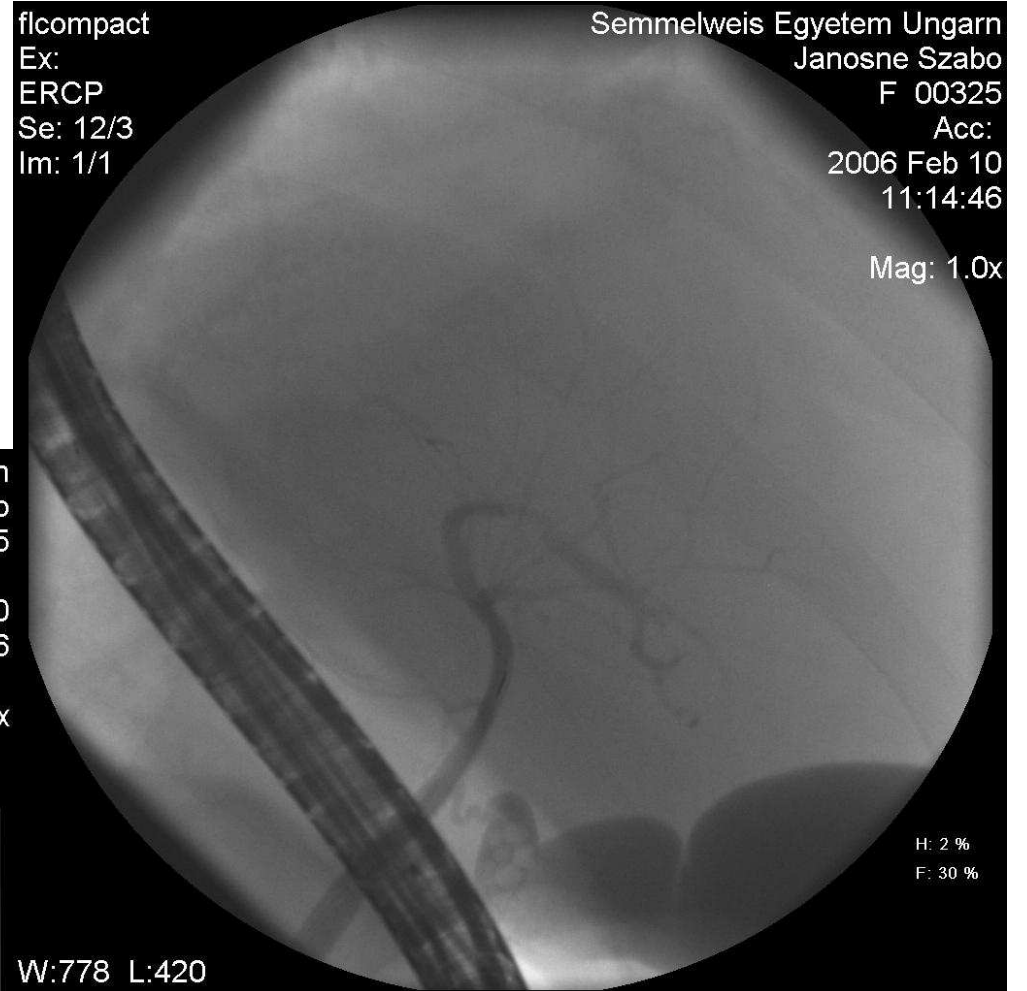
Stones d.cysticus
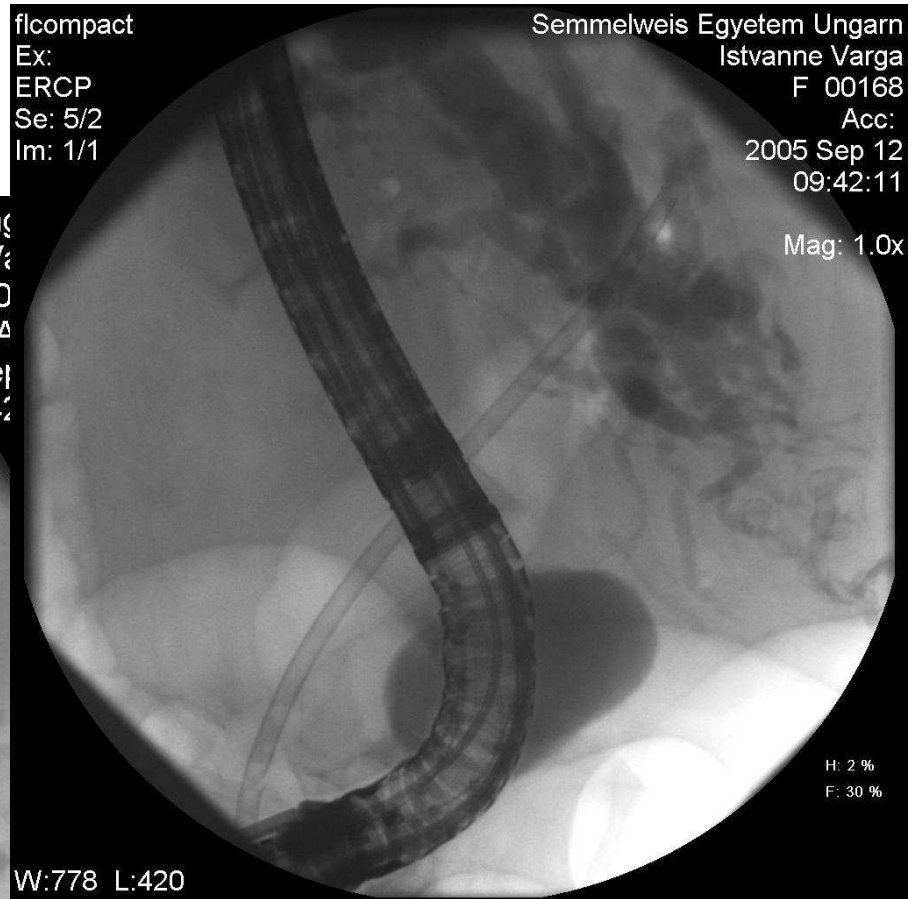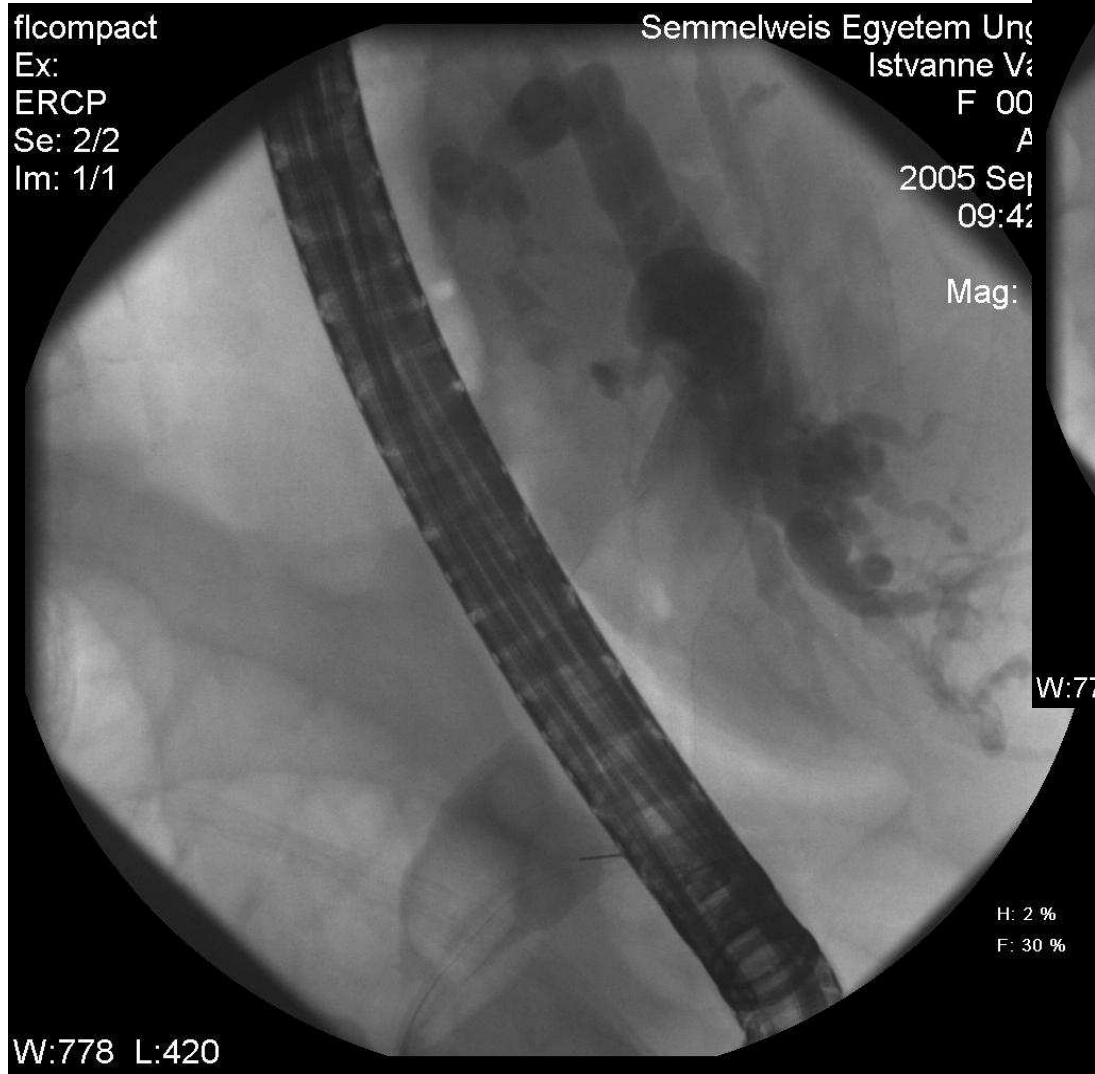
Choledocholith (put in stent)

solve bile flow
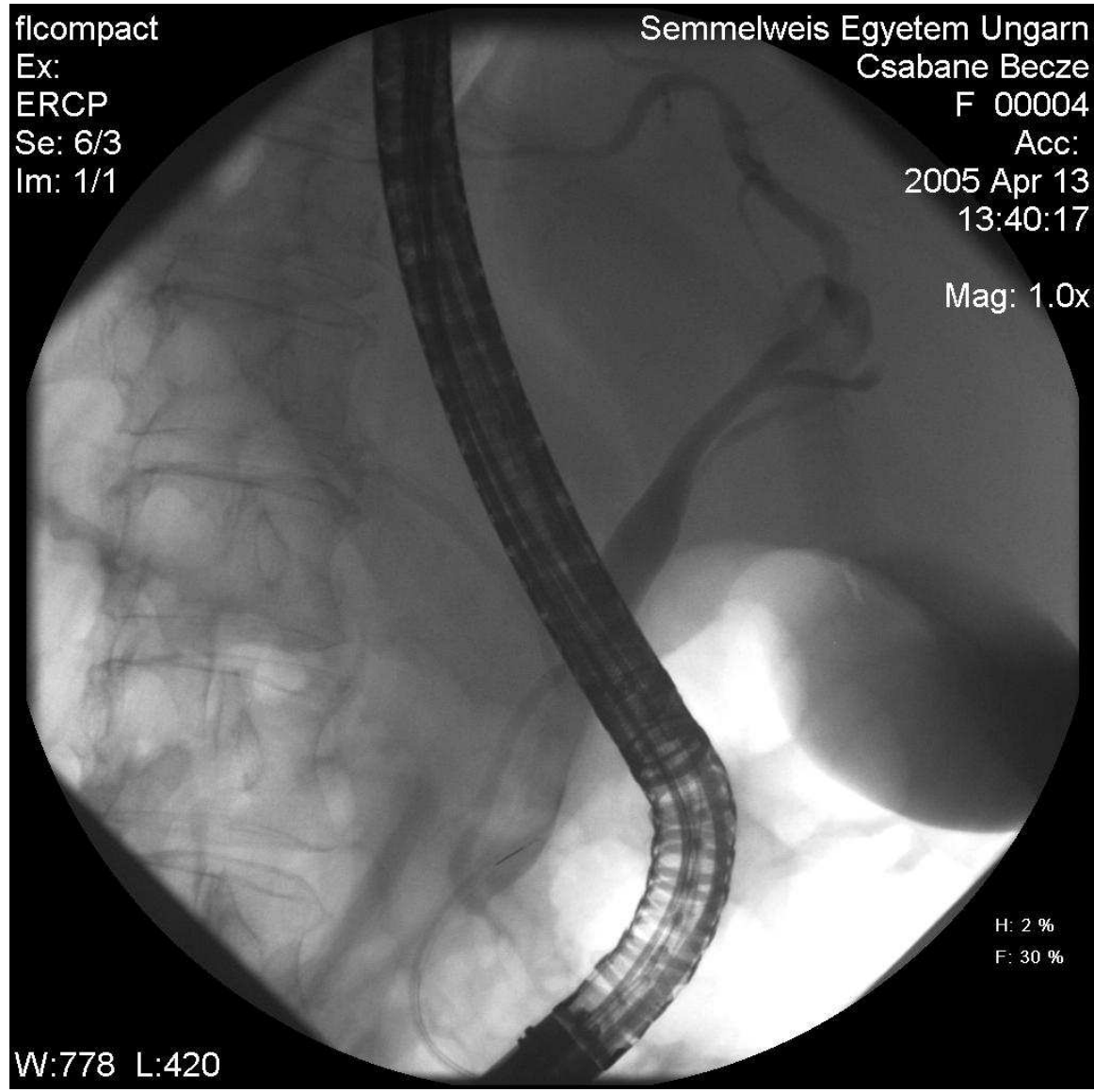
Sludge in CBD (dense bile)

Double stenosis
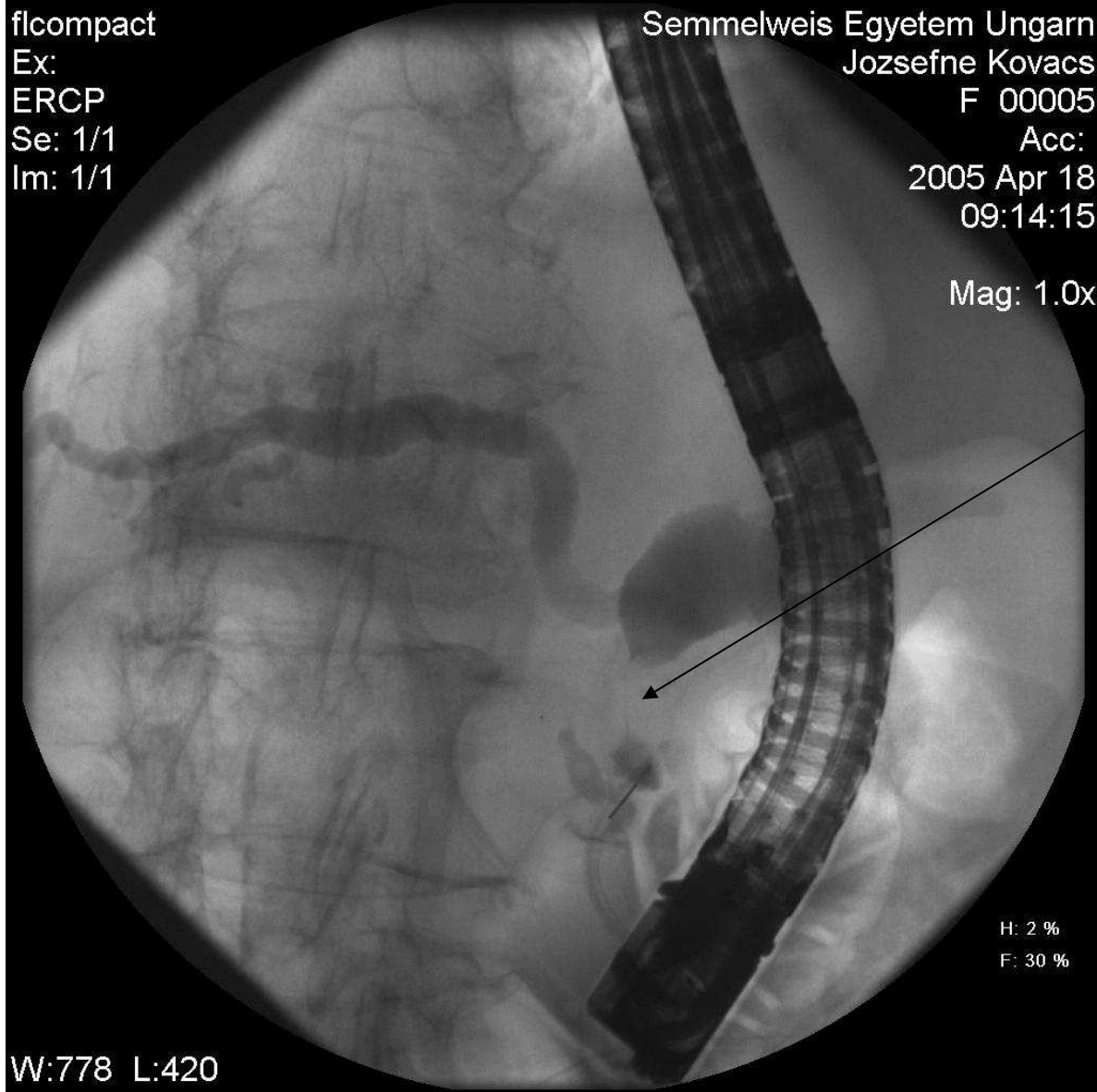
Tumor head of pancreas
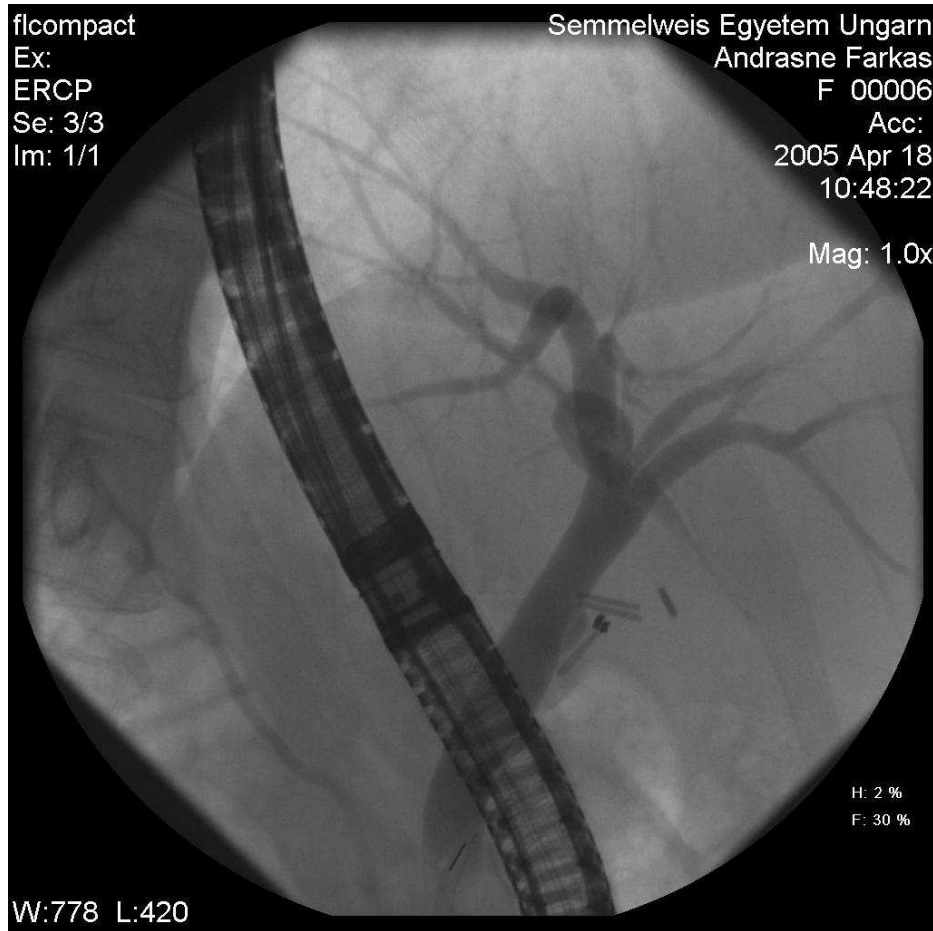
St. post LC
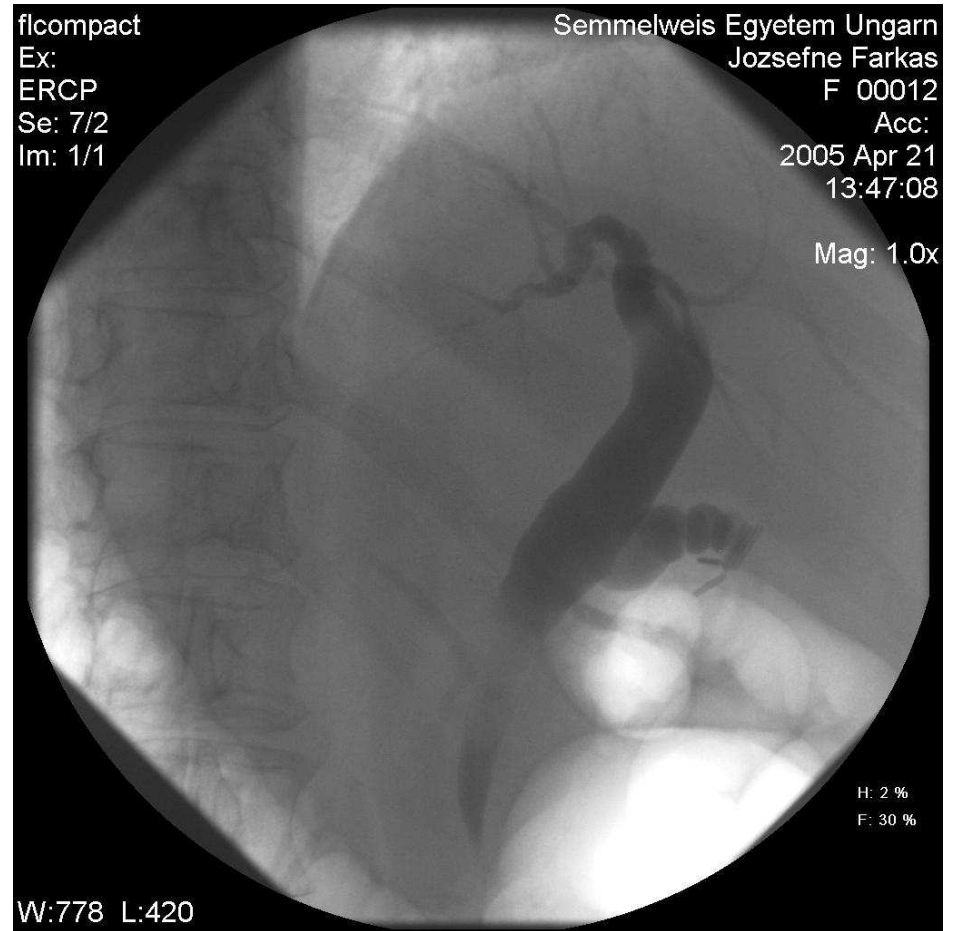
Vater papilla stenosis
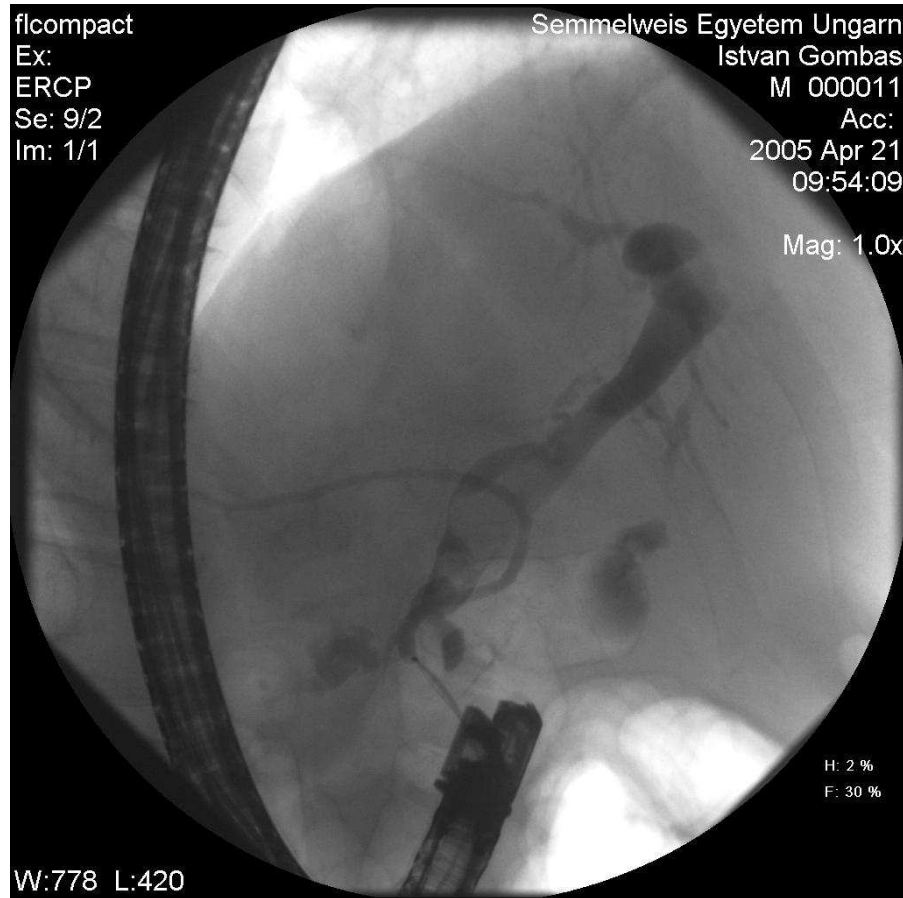
Choledocholithiasis
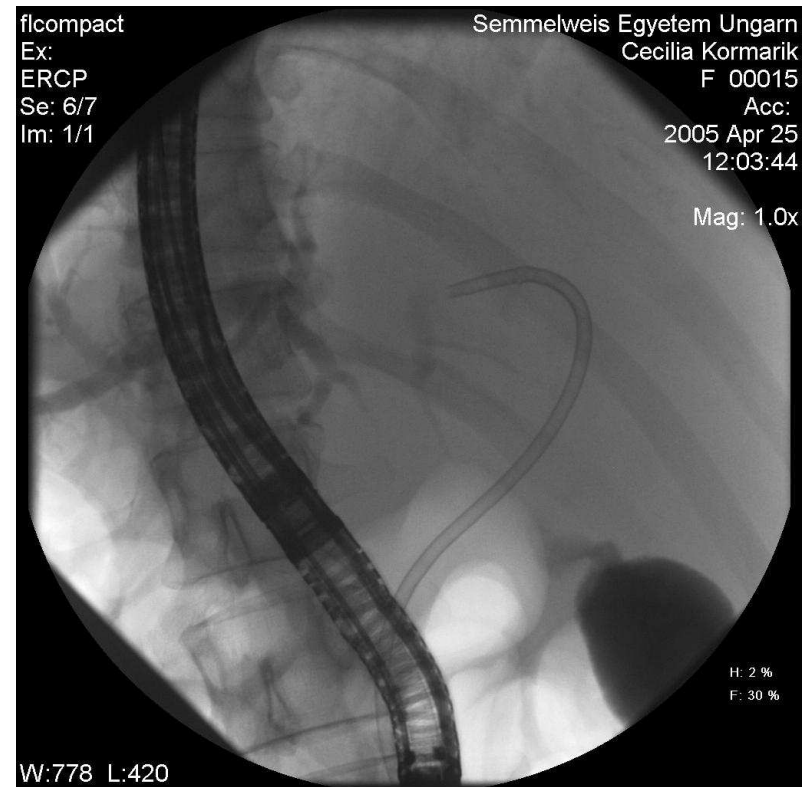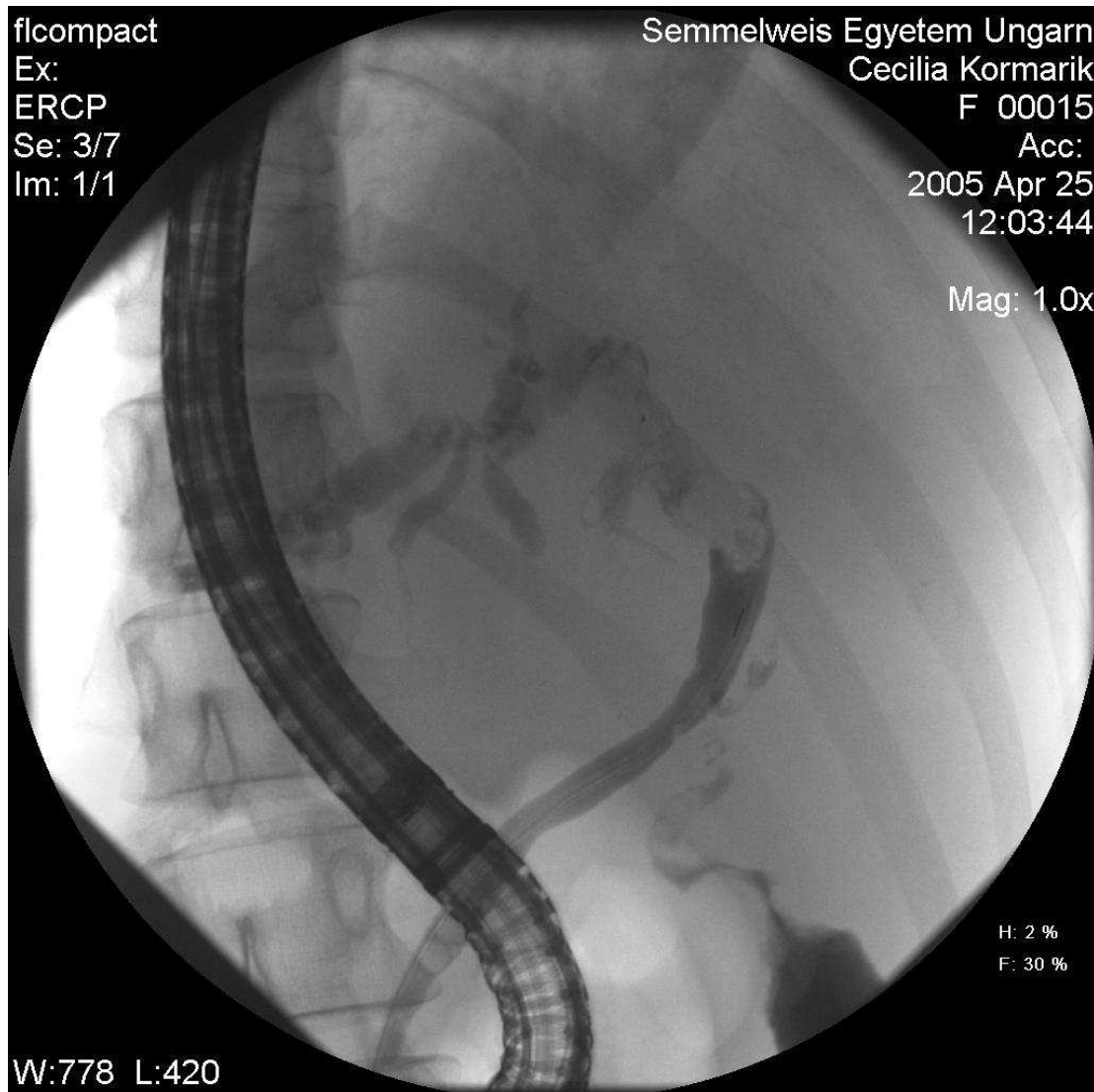
Cholecysta npl.

Primary Sclerosing Cholangitis

(PSC)
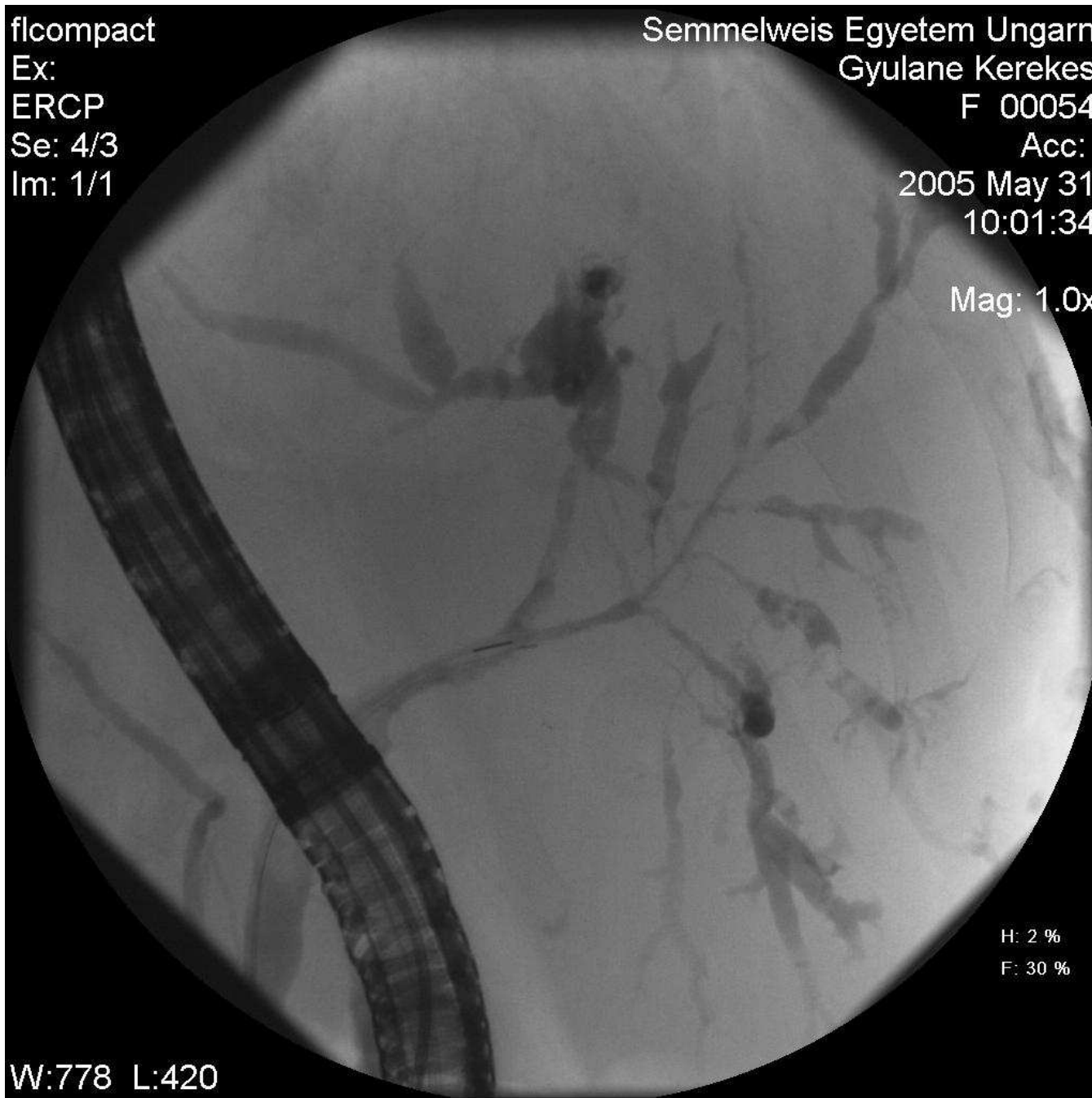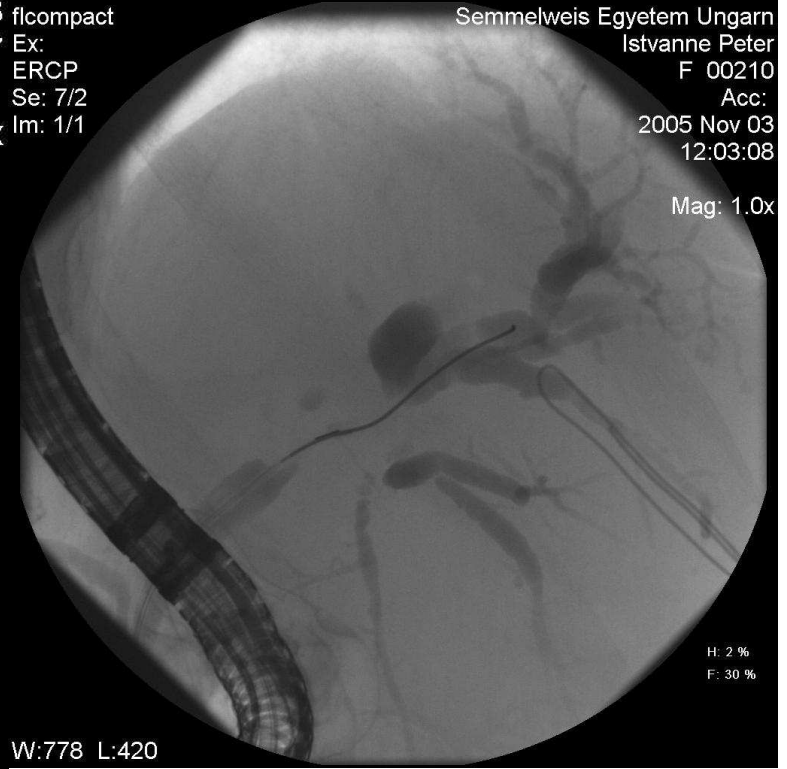
CBD npl.

Gallstones
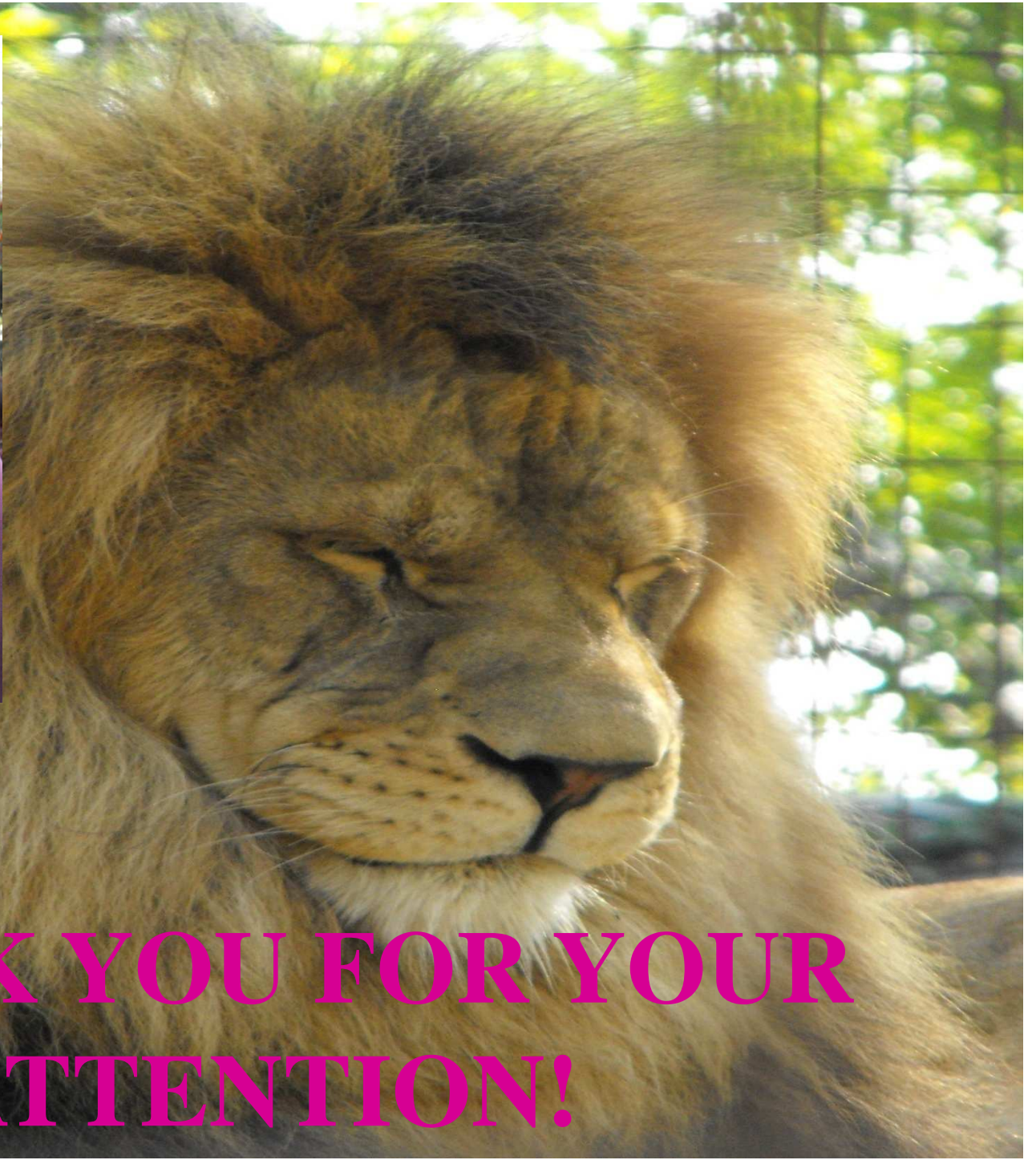
THANK YOU FOR YOUR ATTENTION!