

# 藥癮病人相關感染疾病的 臨床表現與處置

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May 3, 2024

# 大綱

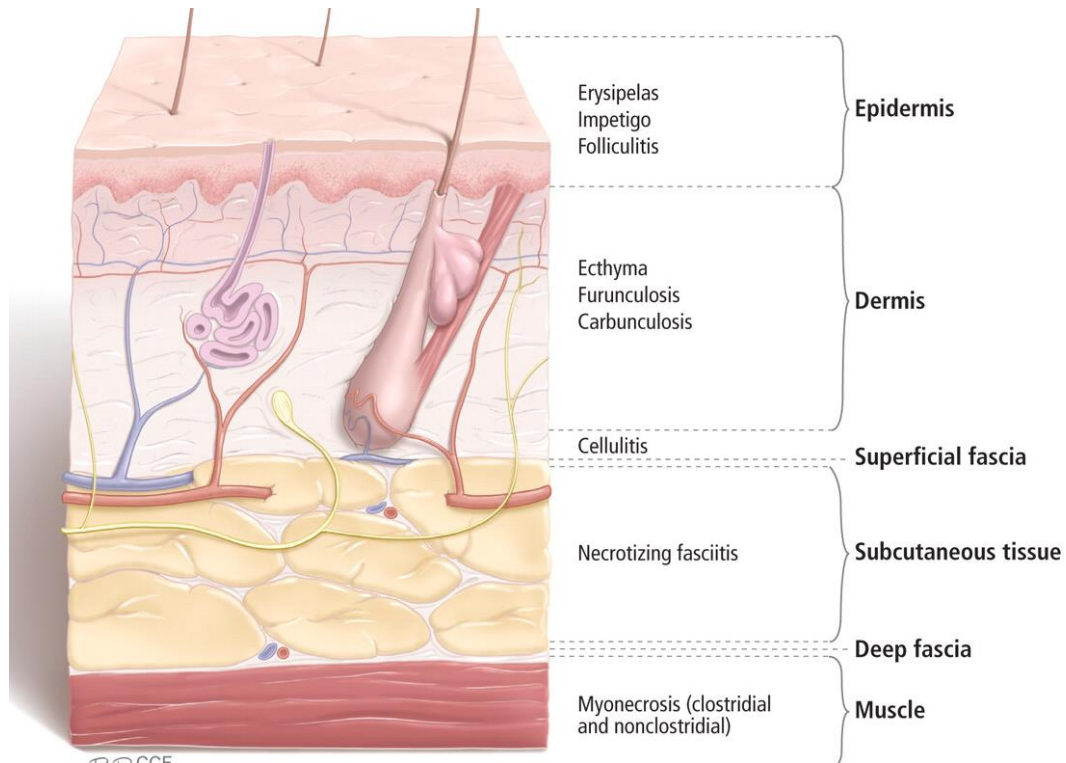
- Skin and soft tissue infection (軟組織感染)
- Bone and joint infection
- Infective endocarditis (IE, 感染性心內膜炎)
- HIV infection
- MTB infection

# 大綱

- **Skin and soft tissue infection (軟組織感染)**
- Bone and joint infection
- Infective endocarditis (IE, 感染性心內膜炎)
- HIV infection
- MTB infection

# Skin and Soft tissue infection - epidemiology

- The most common infectious complication of IDU is skin soft tissue infections (SSTIs). Infections can range from uncomplicated cellulitis, to abscesses, deep tissue necrosis and necrotizing fasciitis.
- A lifetime prevalence of SSTIs range from 6-69% in intravenous drug user (IDU).



# Skin and Soft tissue infection

- The common cause of SSTI is poor hygiene during injection site preparation.
- Other risk factors of skin infection:
  - ✓ female sex
  - ✓ older age
  - ✓ more frequent injecting
  - ✓ number of years injecting
  - ✓ number of attempts required to inject into the vein
  - ✓ Injecting a combination of heroin and cocaine (speedball)
  - ✓ syringe reuse or sharing
  - ✓ drawing blood into the syringe before intravenous injection of the drug
  - ✓ malnutrition
  - ✓ other immune disorders



# Skin and Soft tissue infection – clinical presentation



Cellulitis



Necrotizing fasciitis



Necrotic ulcer

- Most common pathogen are G(+) organisms related to nonsterile injection techniques, such as *S. aureus* and *Streptococcus spp.*
- Oral flora, such as *S. anginosus* group and anaerobes such as *Veillonella*, *Fusobacterium*, *Prevotella* species, and *Eikenella corrodens* are also common pathogens.

# Skin and Soft tissue infection - clinical presentation

- Clinical presentation:
  - ✓ Redness
  - ✓ Swelling
  - ✓ Tenderness
  - ✓ local heat
  - ✓ Fatigue
  - ✓ Fever and/or chills
- Signs of severe infection
  - ✓ hemorrhagic bullae
  - ✓ crepitus
  - ✓ cutaneous gangrene
  - ✓ severe pain



# Skin and Soft tissue infection - clinical presentation

- Infection sites: arms or legs (most frequently for injection, particularly the antecubital fossa of the non-dominant arm).
- Unusual sites, eg, abdomen, groin, scrotum and neck, due to injections in the jugular or femoral veins.
- SSTI usually presentation with cellulitis, abscess or skin ulcer. Necrotizing fasciitis is rare but life threatening.



# Skin and Soft tissue infection – diagnosis and management

- Diagnosis: usually made clinically
- ✓ Ultrasound, CT or MRI can be helpful in assessing deep tissue involvement.
- ✓ Wound culture and blood culture is considered for pathogen identification
- Management: antibiotics +/- surgical intervention

# Skin and Soft tissue infection?? - case sharing

- 35 y/o man, amphetamine use for several years, intermittent use
- Underlying with HIV under anti-retroviral therapy
- Linear skipping papules over bil. forearm, previous IV puncture sites, noted for 5 days
- No fever, mild tenderness, mild itching



# pathergy reaction

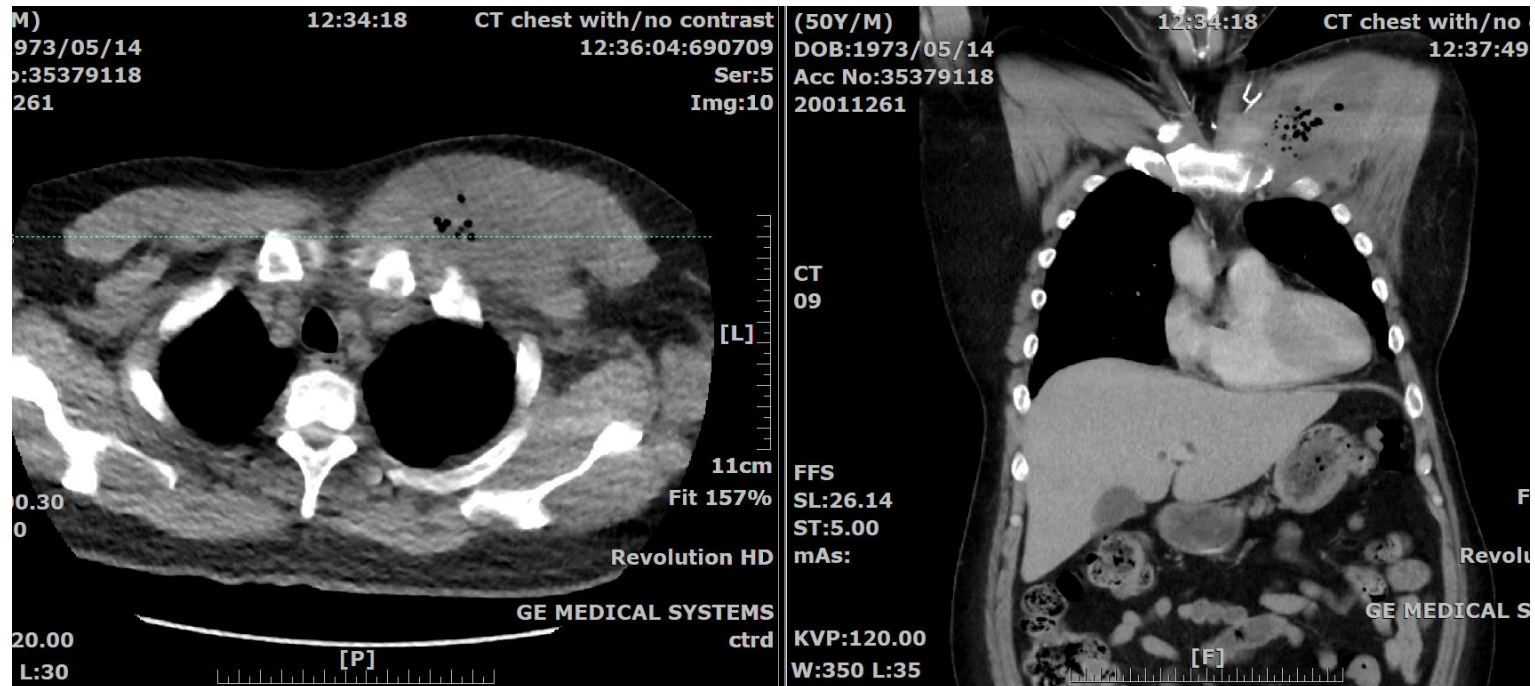
- **Non-specific** hyperreactivity response to needle induced trauma
- 24-48 hrs after sterile-needle prick
- papule or pustule formation

# 大綱

- Skin and soft tissue infection (軟組織感染)
- **Bone and joint infection**
- Infective endocarditis (IE, 感染性心內膜炎)
- HIV infection
- MTB infection

# Osteomyelitis - case sharing 1

- 50 y/o man
- Intravenous drug user (IDU) with heroin for years
- Fever with 1 month and progressive left chest wall painful mass noted for 1 month. And visit out ER on 20231227. Fever(-)
- Chest CT 20231228
- s/p debridement
- Pus/C: *S. aureus*, MSSA
- B/C(-)
- s/p IV Oxacillin for 4 week, followed by oral Abx



# Osteomyelitis - case sharing 2

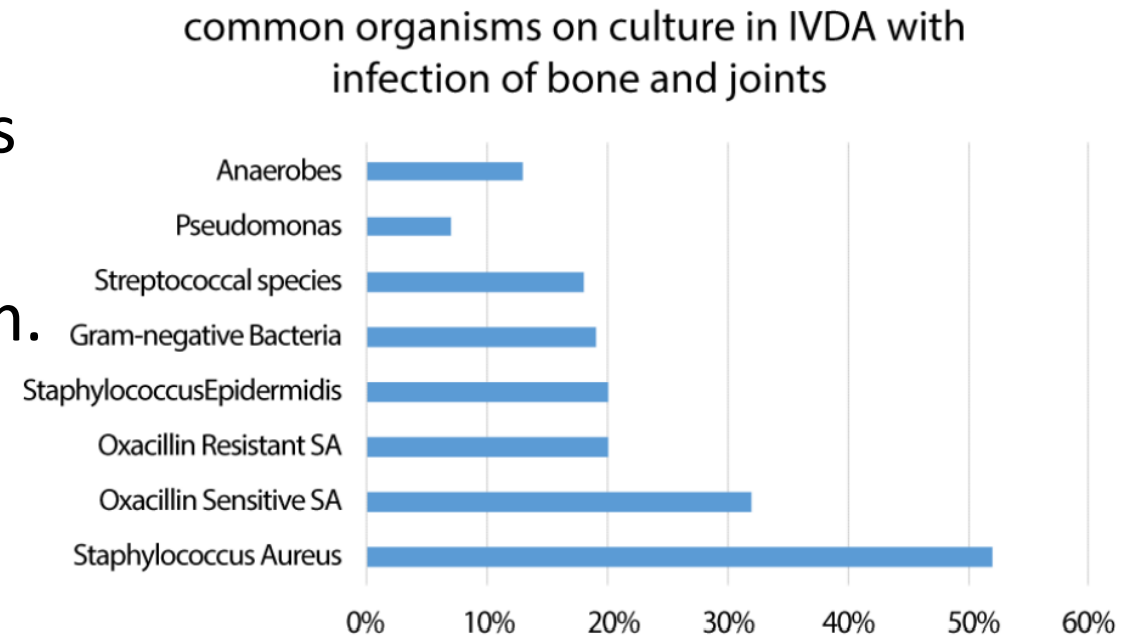
- 51 y/o woman
- Intravenous drug user (IDU) with heroin for years, under methadone replacement therapy
- Sudden onset low back pain with right thigh numbness sensation for 2+ weeks, clinical progression with right lower leg weakness and intermittent fever for 1 week
- L-spine MRI 20231012: suspected septic arthritis of right L2/L3 facet joint, with epidural abscess and right psoas muscle abscess, about 8 cm in size
- s/p debridement on 1019
- 1019 Pus/C: *S. aureus*, MSSA
- 1013 B/C\*2: MSSA
- s/p IV Abx (Oxacillin, cefazolin, cefepime) for 4 week, followed by oral Abx
- TTE, TEE: no evidence of vegetation

# Osteomyelitis - case sharing 3

- 40 y/o man
- Intravenous drug user (IDU) with heroin for years
- Sudden onset low back pain for 2 months, with progressive lower limbs weakness in recent 1 month. Ever admitted to local hospital and spondylodiscitis is suspected
- C-L spine MRI 20220711: infective spondylodiscitis involving C6-7, L5-S1 with small epidural abscess formation
- s/p debridement with C-spine fixation on 0721
- 0721 Pus/C: *S. aureus*, MSSA
- 0711 B/C\*2: MSSA
- s/p IV Oxacillin for 4 week, followed by oral Abx
- TTE: no evidence of vegetation

# Osteomyelitis - epidemiology

- Bone and joint infections in IDU, usually in the tissue areas that surround injections sites.
- A lifetime prevalence of osteomyelitis is around 0.5-2%.
- *S. aureus* is the most common organism.



DC Allison et al. Clin Orthop Relat Res. 2010  
Larney S et al. Drug Alcohol Depend. 2017



# Osteomyelitis – pathogenesis and clinical presentations

- pathogenesis: hematogenous dissemination, direct injection into periosteum or injection through infected skin and subcutaneous tissue
- Clinical presentations:
  - ✓ Pain and disability
  - ✓ Fever

# Osteomyelitis – diagnosis and treatment

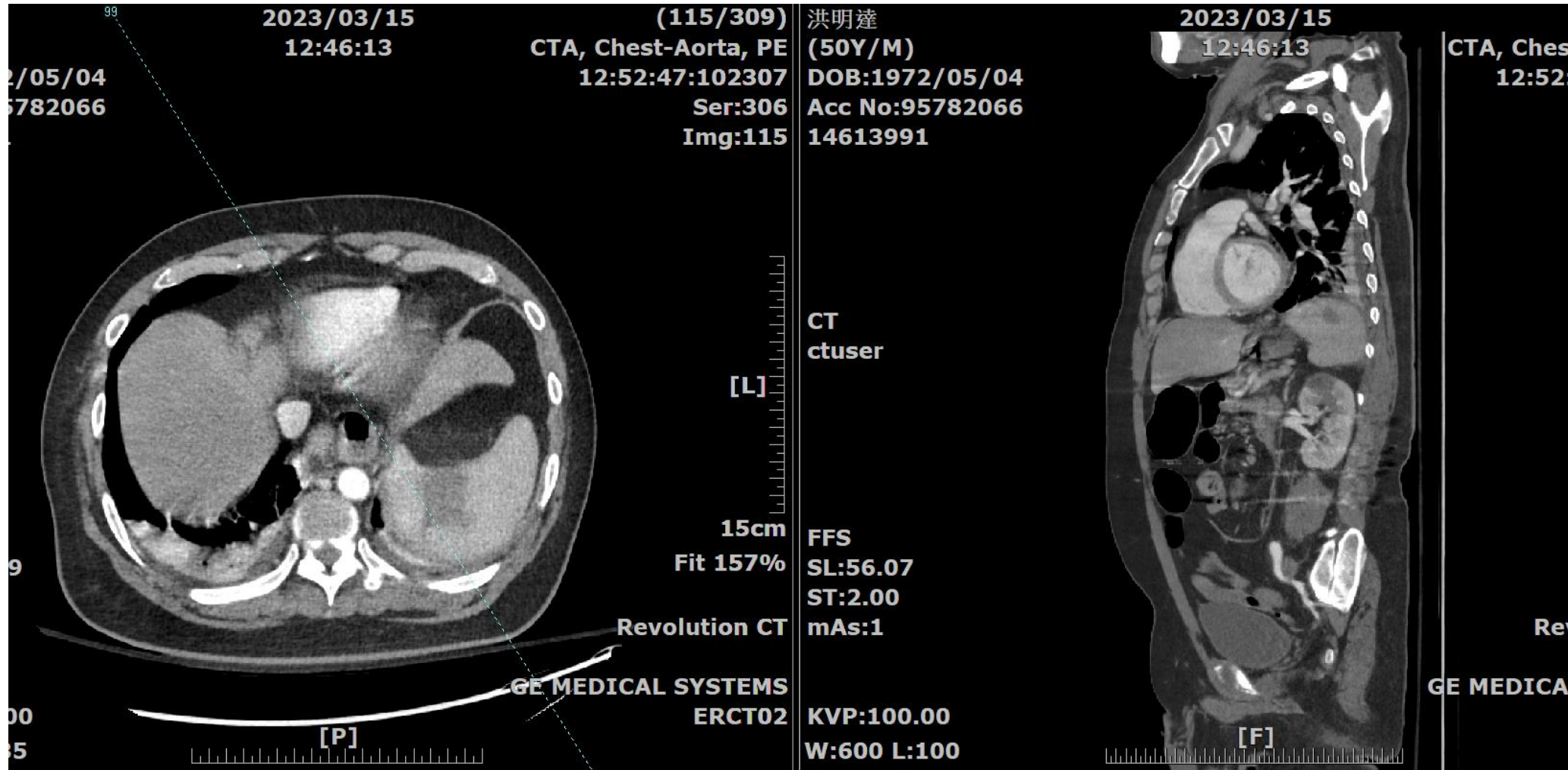
- Diagnosis:
  - ✓ Blood culture: frequently negative, it's transient bacteremia in osteomyelitis
  - ✓ ESR: elevated ESR is present in about 80% of patients with osteomyelitis
  - ✓ Image study: X-ray, CT scan, MRI, bone scan
  - ✓ Pus/joint fluid aspiration and culture
- Treatment: antibiotics +/- surgery

# 大綱

- Skin and soft tissue infection (軟組織感染)
- Bone and joint infection
- **Infective endocarditis (IE, 感染性心內膜炎)**
- HIV infection
- MTB infection

# Infective endocarditis - Case sharing 1

- 50 y/o man
- Low back pain for 3 weeks and fever noted at ER (20230314)
- PHx: IDU with heroin under methadone replacement therapy, HBV-HCV coinfection, Hx of infective spondylodiscitis of L2-3, with epidural abscess, MSSA bacteremia, s/p debridement on 20190223
- P.E.: E4V5M6, RHB with pan-diastolic murmur
- 0314 B/C\*2: *E. faecalis*, *S. haemolyticus*
- 0316 TTE: suspected presence partial healed vegetations over aortic valve, severe AR
- 0322 TEE: the aortic valve is tricuspid in morphology with mobile vegetation over LV and aortic site with severe aortic regurgitation. Presence of vegetation over anterior mitral leaflet with mild mitral regurgitation
- 0324 L-spine MRI: No evidence of infectious spondylodiscitis involving L-spine.



- 0315 CTA: wedge-shaped hypo-attenuating area in the upper portion of left kidney, consider kidney infarction. wedge-shaped hypo-attenuating area in the spleen, consider spleen infarction. Splenomegaly.

# Infective endocarditis - Case sharing 1

- Imp: infective endocarditis, aortic valve and mitral valve, *E. faecalis* related with spleen and left kidney infarction, with RF s/p ETT + MV
- s/p AVR on 20230330

# Infective endocarditis - Case sharing 2

- 46 y/o man
- Was found unconscious on the street and sent to local hospital initially
- PHx: IDU with heroin under methadone replacement therapy. HIV/HCV/HBV infection. HIV (diagnosed in 2007) under irregular anti-retroviral therapy
- B/C showed MSSA bacteremia in local hospital and huge vegetation noted over right heart, and bil. multiple pul. emboli
- 20220730 B/C\*2: MSSA
- 20220802 TTE: no evidence of vegetation. TEE: hold due to HIV status
- 20220830 Brain MRI: no evidence of ischemic stroke, no evidence of hemorrhage

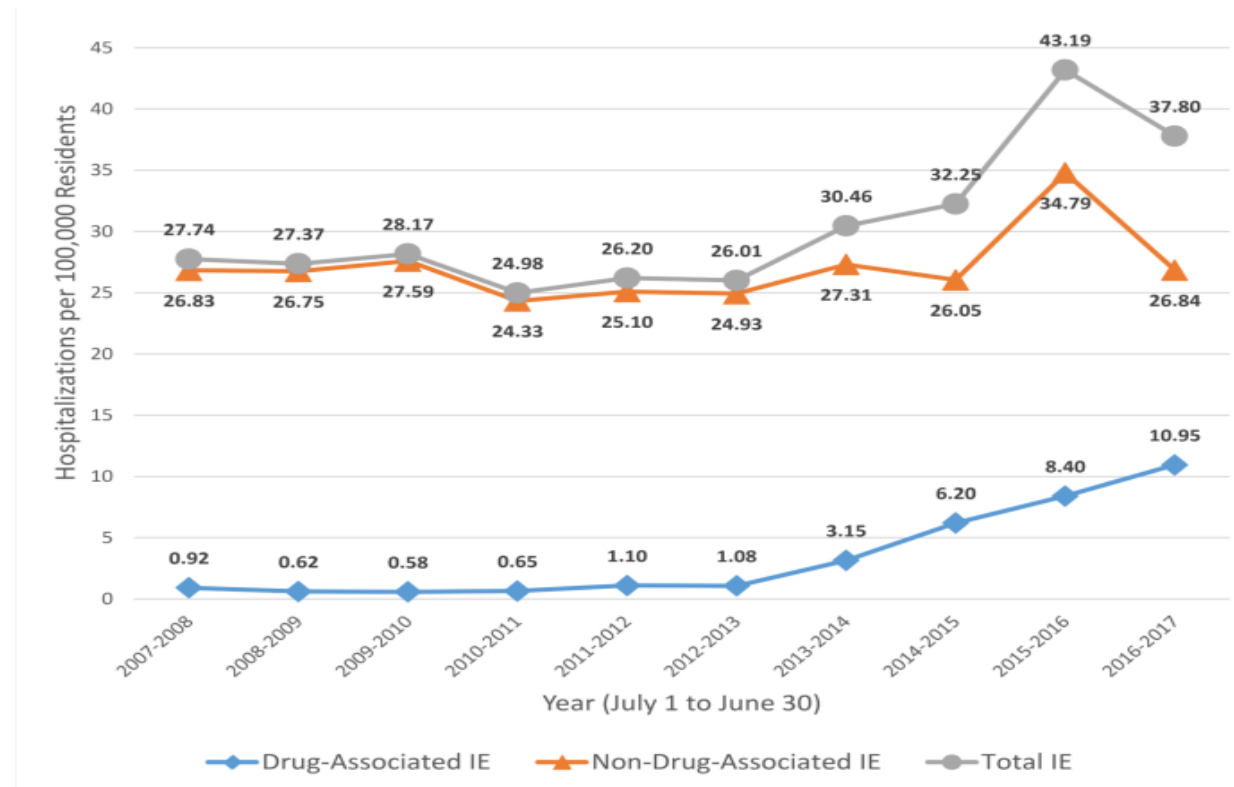
# Infective endocarditis - Case sharing 2

- Imp: # infective endocarditis, favor right heart valve, *S. aureus* related with bil. pul. emboli
  - # HIV, re-on anti-retroviral therapy(TAF/FTC/BIC)
- Treatment: IV Abx for 6 weeks (Oxacillin, Ertapenem)



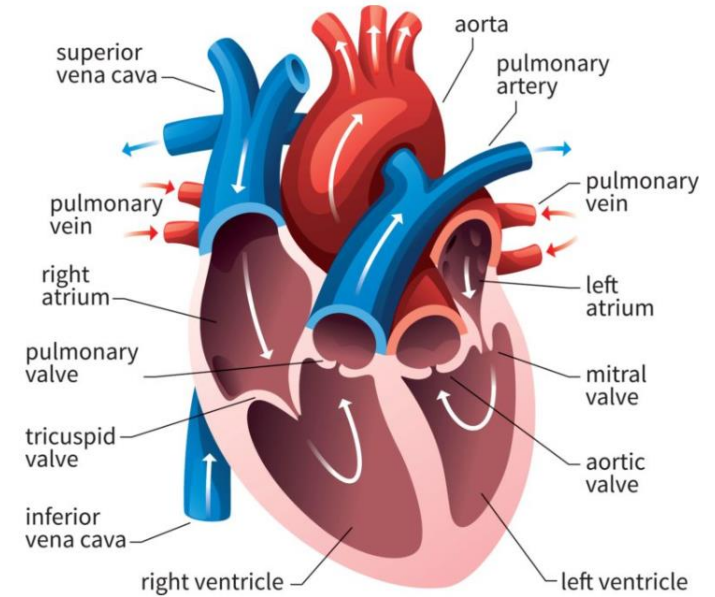
# Infective endocarditis - epidemiology

- The incidence of IE in injection drug user is raising and more common in male.
- 2007-2017, all hospitalized IE, in North Carolina, US, 22825 IE
- Consistent with increasing deaths from heroin and synthetic narcotics.

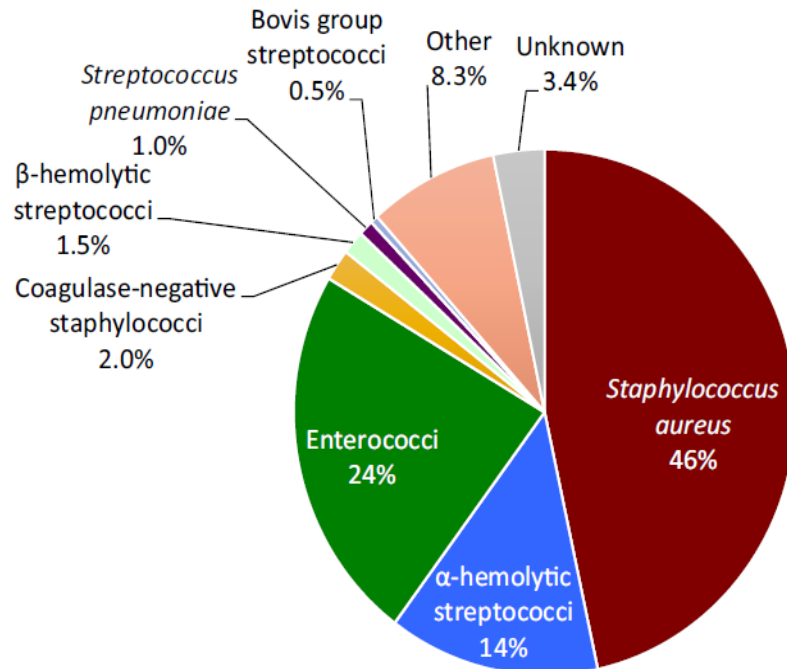


# Infective endocarditis - epidemiology

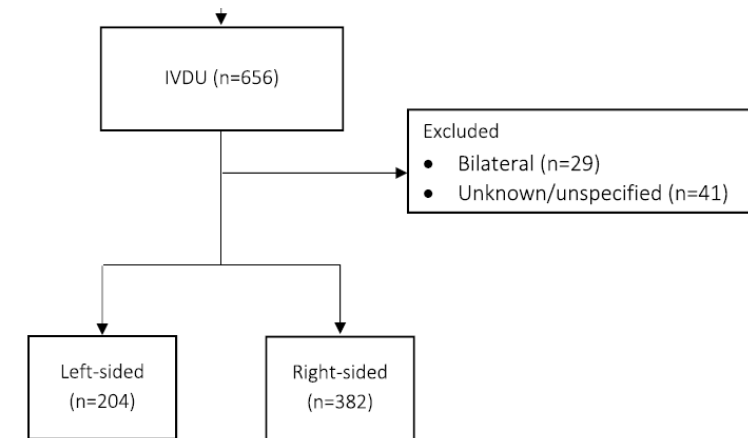
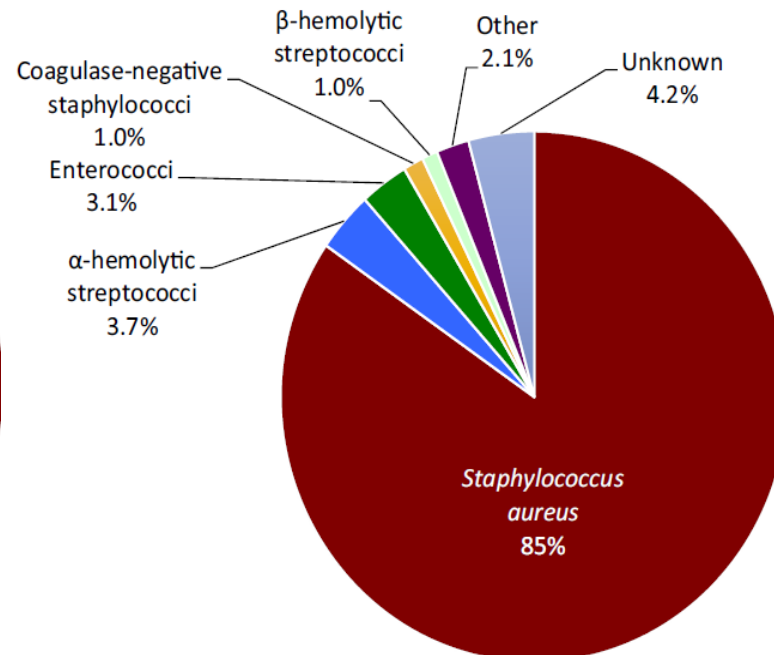
- 90% right-sided infective endocarditis are people who inject drugs.
- *S. aureus* is the most common cause of IE in people who inject drug.



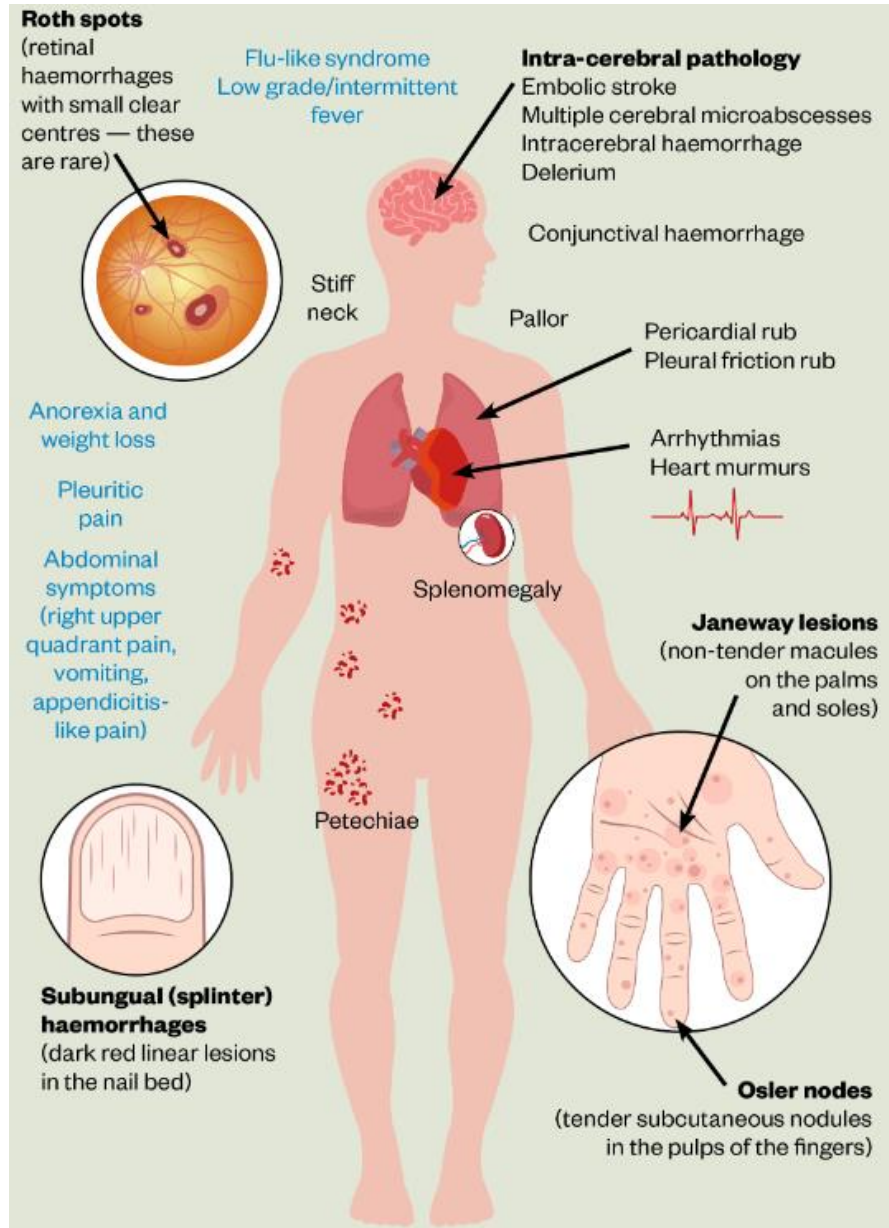
Left-sided IE



Right-sided IE



# Infective endocarditis – clinical presentation



FEATURE	FREQUENCY, %
Fever	80–90
Chills and sweats	40–75
Anorexia, weight loss, malaise	25–50
Myalgias, arthralgias	15–30
Back pain	7–15
Heart murmur	80–85
New/worsened regurgitant murmur	20–50
Arterial emboli	20–50
Splenomegaly	15–50
Clubbing	10–20
Neurologic manifestations	20–40
Peripheral manifestations (Osler's nodes, subungual hemorrhages, Janeway lesions, Roth's spots)	2–15
Petechiae	10–40

# Infective endocarditis – clinical presentation

Janeway lesion (non-tender)



Osler's nodes (tender)



**Osler's Nodes:** Painful, erythematous nodules associated with bacterial endocarditis.  
Photo credit, Josh Fierer, M.D.

# Infective endocarditis – clinical presentation

Roth's spots



Conjunctival petechiae

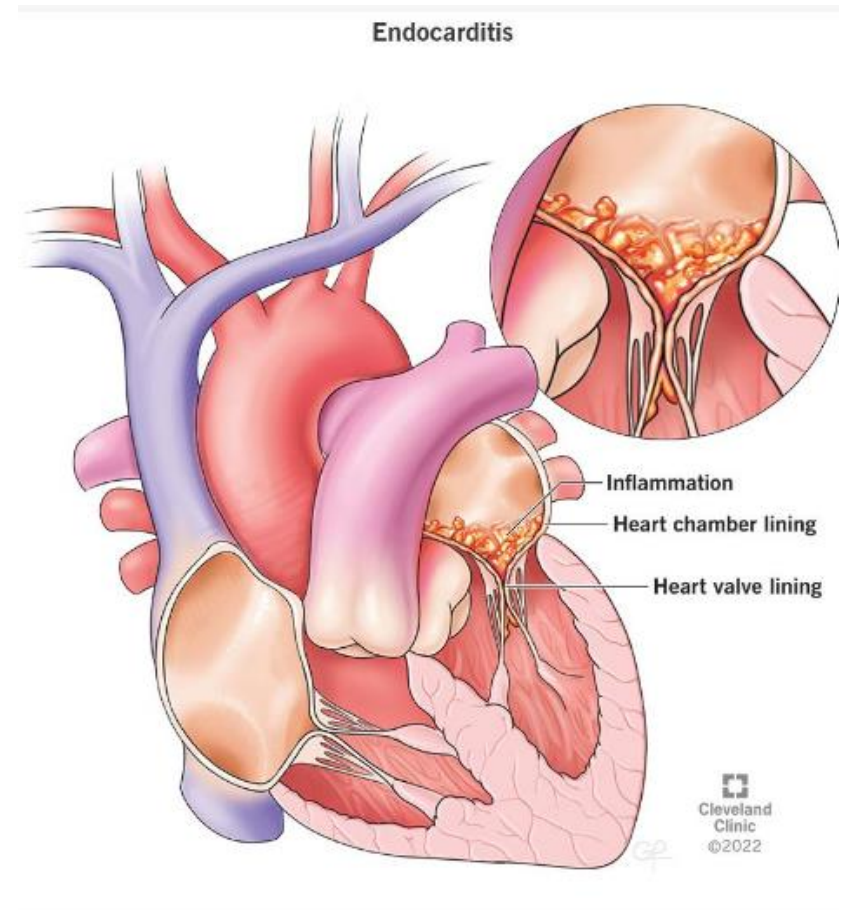


Septic emboli



# Infective endocarditis – diagnosis & treatment

- Modified Duke criteria, 2023
- Repeat B/C, echocardiogram, PET...etc
- Transthoracic echocardiography (TTE): noninvasive, detect vegetations in 65-80% patients with IE, cannot image vegetations < 2mm in diameter
- Transesophageal echocardiography (TEE): detect vegetations in > 90% patients with IE
- Treatment: antibiotics and/or surgery



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- **HIV infection**
- MTB infection

# HIV infection - Case sharing 1

- 46 y/o man
- Four limbs spasm noted for 2 days, visit local hospital and then referred under the suspicion of heroin withdrawal syndrome
- PHx: IDU with heroin for more than 10 years, HIV infection noted or years
- 20230920 ER: BUN/Crea=39/3.75, CK=715, renal sono: no renal stone, no hydronephrosis
- HIV western blot test(+), HIV VL=332 copies/ml, CD4=276
- HCVAb(+, ever s/p DAA Tx), HAVAb(-), HBsAg(-)
- 20230922 BUN/Crea=22/0.72, renal function improved after hydration

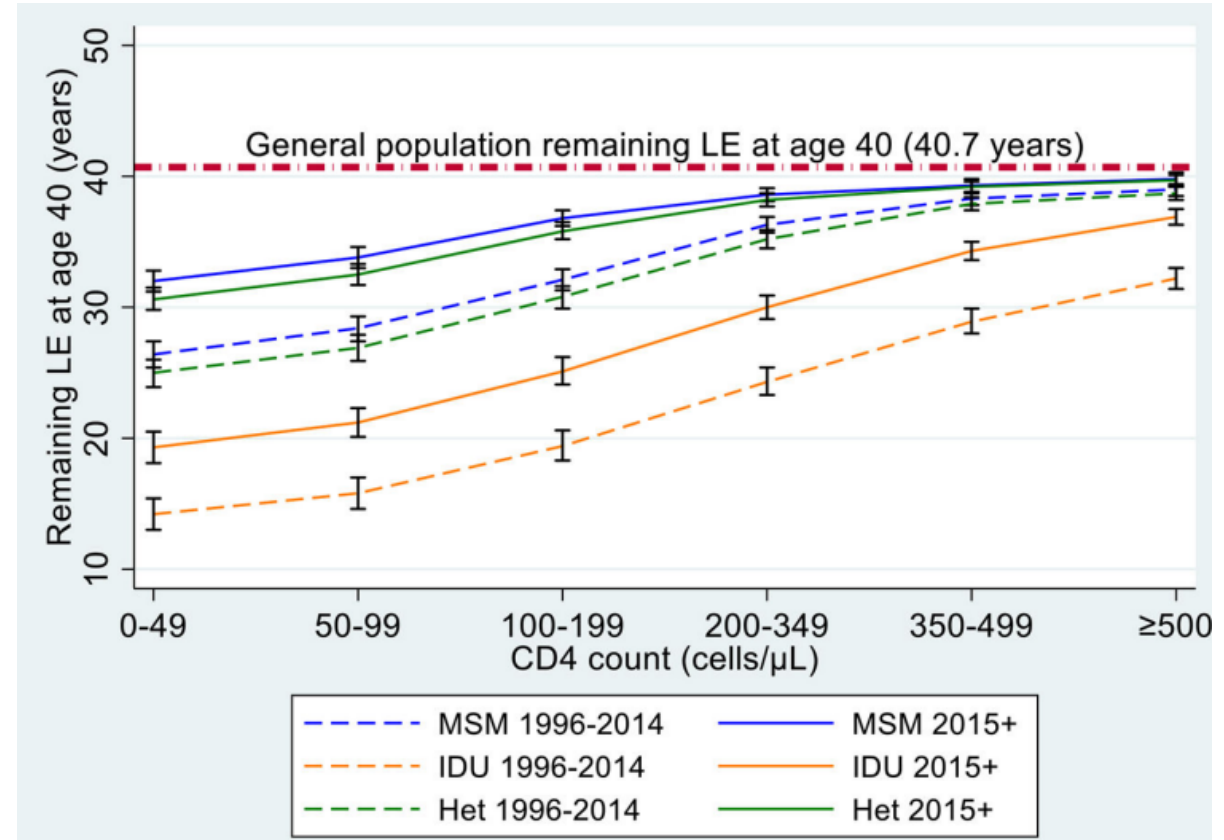


# HIV infection - Case sharing 1

- Imp: # HIV-HCV coinfection
  - # AKI, favor dehydration related, improved after hydration
  - # Heroin use disorder
- Treatment: start anti-retroviral therapy with Dovato(3TC/DTG)

# HIV infection - epidemiology

- Approximately 39 million people living with HIV/AIDS in 2022, with 1.3 million people becoming newly infected with HIV in 2022 globally.
- The life expectancy of PLWH improved over time and even approaching general population.



# HIV infection - epidemiology

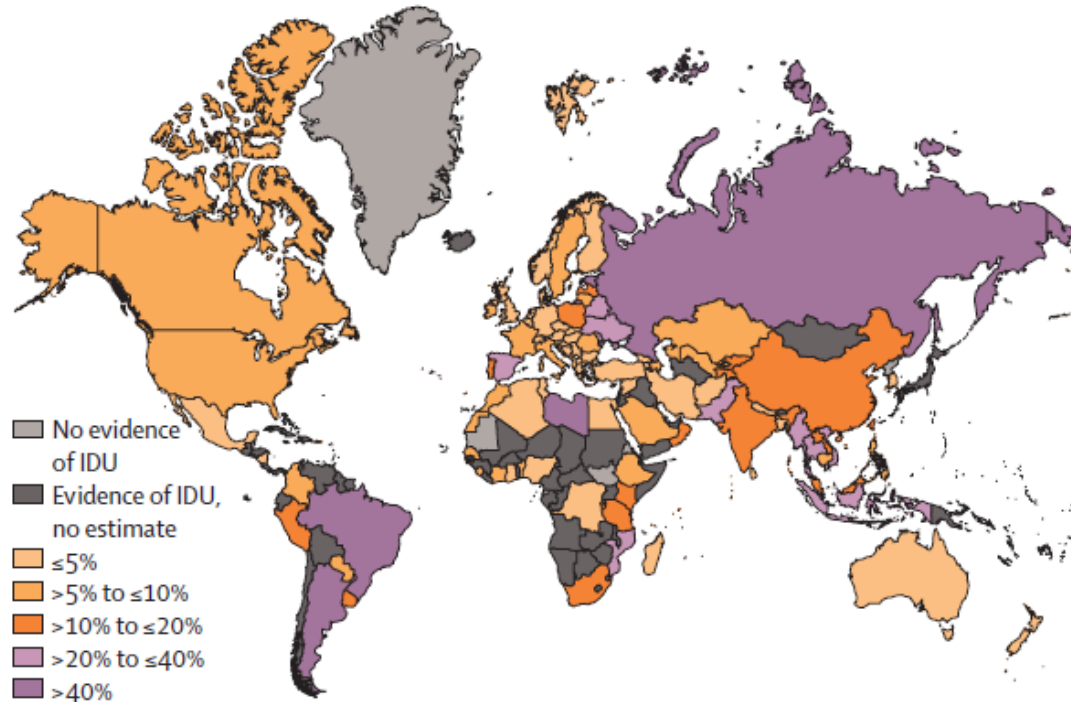
- Systematic review in the 22 countries of WHO Eastern Mediterranean region, between 2010-2022
- The prevalence of IDU is 20 per 10000 adults in this region.
- Among IDU, the prevalence of HIV is 19.22%, HCV is 44.82%, and HBV is 2.66%.



# HIV infection - epidemiology

- Systematic review, 2017-2022
- Globally, estimated 15.2% (95% CI 10.3-20.9) of people who injected drugs are living with HIV.

B Prevalence of HIV among people who inject drugs



L Degenhardt et al. Lancet Glob Health. 2023

	HIV positive	
	Prevalence among people who inject drugs, %	Estimated number of people who inject drugs
Eastern Europe	34.2% (26.0-42.5)	780 000 (588 500-971 500)
Western Europe	5.1% (3.6-7.0)	51 000 (32 500-73 500)
East and southeast Asia	14.5% (8.9-21.4)	554 000 (319 500-814 000)
South Asia	16.5% (11.9-21.8)	288 000 (203 000-380 500)
Central Asia	10.2% (7.1-14.5)	24 500 (17 500-32 500)
Caribbean*	13.2% (8.9-18.2)	12 500 (7 500-19 000)
Latin America	31.5% (14.3-49.1)	191 000 (115 500-278 500)
North America	5.9% (4.6-7.3)	194 000 (150 500-241 000)
Pacific Island states and territories*	..	..
Australasia	1.1% (0.8-1.6)	1 500 (1 000-2 000)
Sub-Saharan Africa	11.2% (5.4-19.0)	140 500 (61 000-244 000)
Middle East and north Africa	4.1% (2.5-6.8)	13 500 (4 500-27 500)
Global	15.2% (10.3-20.9)	2 253 500 (1 503 000-3 090 500)

# HIV infection – incidence of HIV in IDU in Taiwan

表二十八 一一一年男性 HIV 感染及 AIDS 發病確診病例之危險因素統計表（本國籍）

危險因素	HIV	百分比	AIDS	百分比
男男間不安全性行為	856	83.3%	454	73.3%
異性間不安全性行為	76	7.4%	75	12.1%
注射藥癮者	25	2.4%	62	10.0%
接受輸血感染	0	0.0%	1	0.2%
母子垂直感染	0	0.0%	0	0.0%
不詳	70	6.8%	27	4.4%
總計	1,027	100.0%	619	100.0%

表二十九 一一一年女性 HIV 感染及 AIDS 發病確診病例之危險因素統計表（本國籍）

危險因素	HIV	百分比	AIDS	百分比
異性間不安全性行為	37	88.1%	25	65.8%
注射藥癮者	1	2.4%	10	26.3%
接受輸血感染	0	0.0%	0	0.0%
母子垂直感染	0	0.0%	0	0.0%
不詳	4	9.5%	3	7.9%
總計	42	100.0%	38	100.0%

# HIV infection – transmission of HIV

- HIV transmission: blood transfusion, vertical exposures, sexual exposures, other parenteral exposures

 「會」透過以下方式傳染



未保護的性行為



血液交換



母子垂直

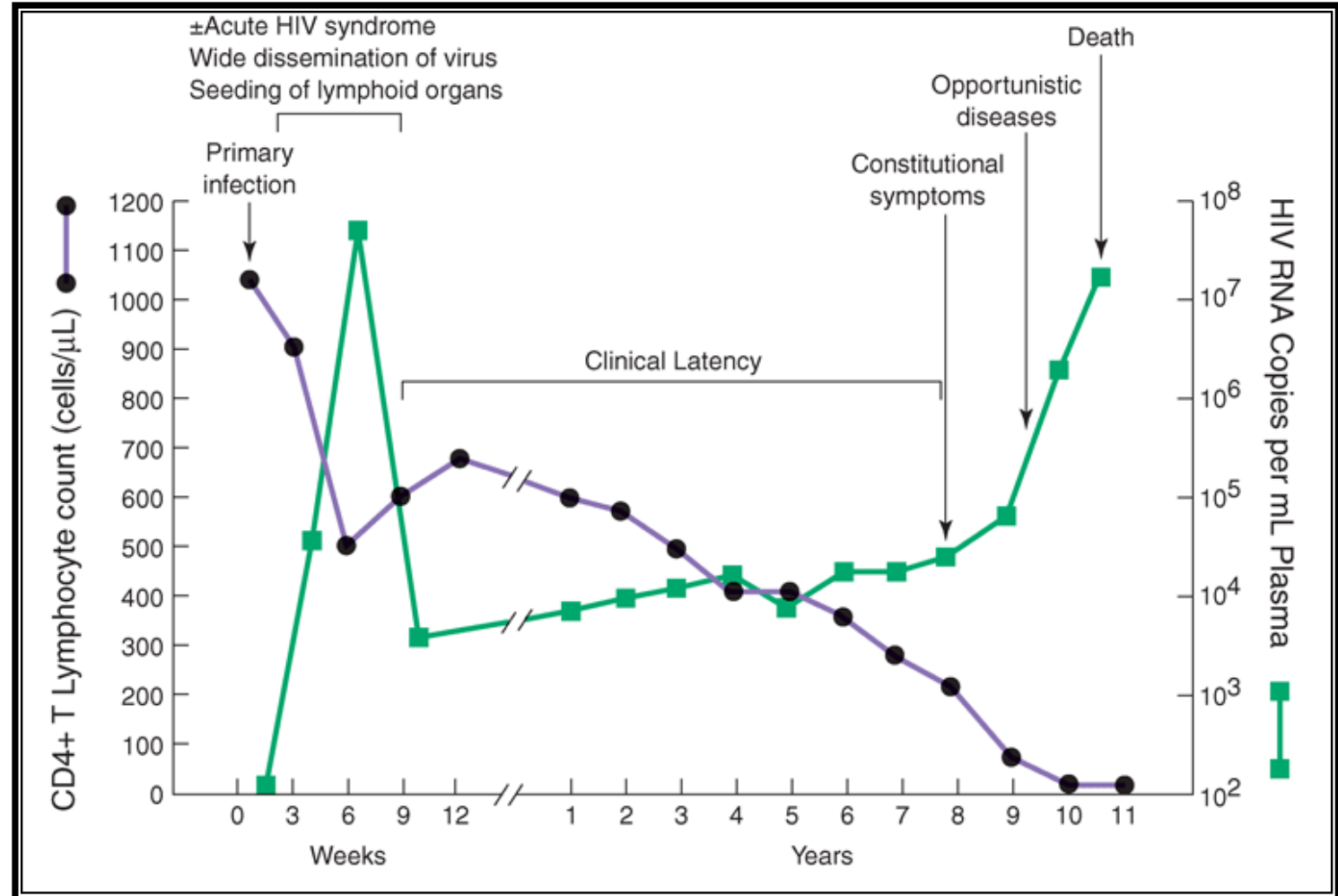
# HIV infection – transmission of HIV

Estimated per-act probability of acquiring HIV from an infected source, by exposure route.

Exposure route	Risk per 10 000 exposures to an infected source	95% Confidence interval	Reference(s)
Parenteral exposure			
Blood transfusion	9250	(8900–9610)	[5]
Needle-sharing injection drug use	63 <sup>b</sup>	(41–92)	[12]
Percutaneous needle stick	23	(0–46)	[5]
Sexual exposure <sup>a</sup> ↓ 99.2% with dual use of condoms and anti-retroviral Tx			
Receptive anal intercourse	138 <sup>c</sup>	(102–186)	[3,13–15]
Insertive anal intercourse	11 <sup>d</sup>	(4–28)	[13,14]
Receptive penile–vaginal intercourse	8 <sup>e</sup>	(6–11)	[7]
Insertive penile–vaginal intercourse	4 <sup>e</sup>	(1–14)	[7]
Receptive oral sex	Low <sup>f</sup>	(0–4)	[14,19]
Insertive oral sex	Low <sup>f</sup>	(0–4)	[19]
Vertical transmission with antiretroviral use, 67.4% relative reduction in risk of HIV transmission			
Mother-to-child transmission	2260 <sup>g</sup>	(1700–2900)	[8]

# HIV infection - pathogenesis

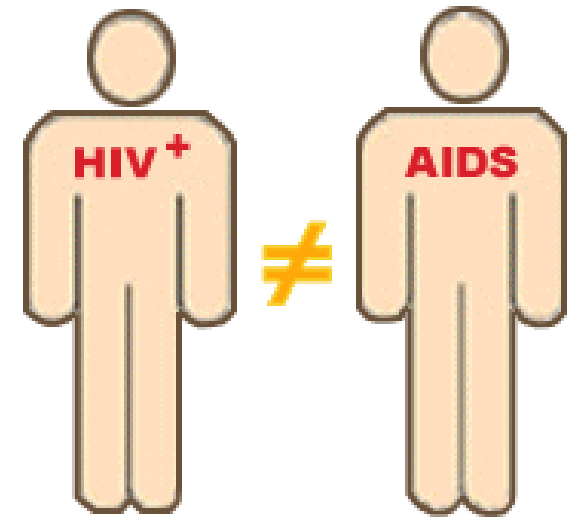
- HIV 病毒主要攻擊 CD4<sup>+</sup> T cell
- 大部分未接受治療的無症狀病人，CD4的數目在幾年內會緩慢的下降。
- 隨著病毒量增加，CD4的數目減少，得到伺機性感染、癌症、神經學的併發症以及死亡的危險性會明顯增加。





# HIV infection - pathogenesis

- HIV感染者，疾病進展到某個程度後，稱為AIDS (Acquired immunodeficiency syndrome)
- HIV infected people with  $CD4 < 200 /mm^3$  or opportunistic infections (OIs) noted

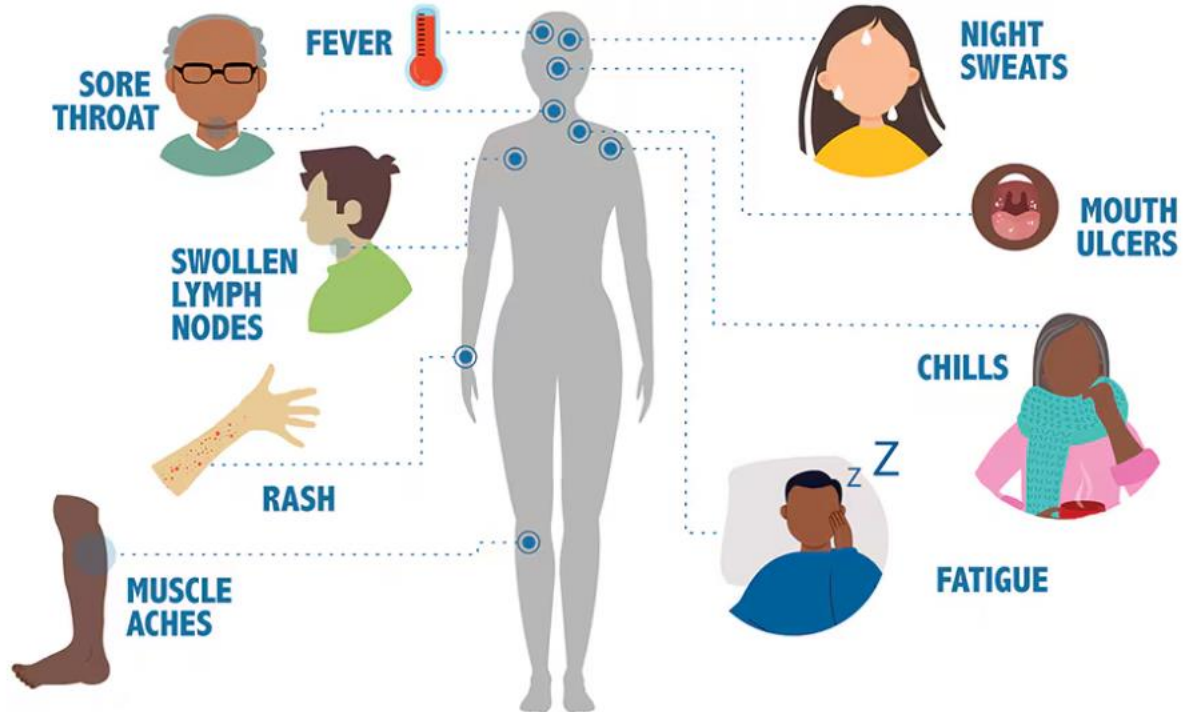


- OIs: Candidiasis, invasive cervical cancer, coccidioidomycosis, cryptococcosis, cryptosporidiosis, isosporiasis, CMV, HSV(except genital ulcer), histoplasmosis, Kaposi 's sarcoma, lymphoma, tuberculosis, MAC, PCP, recurrent pneumonia, HIV related encephalopathy, progressive multifocal leukoencephalopathy, Salmonella septicemia, toxoplasmosis, Wasting syndrome...

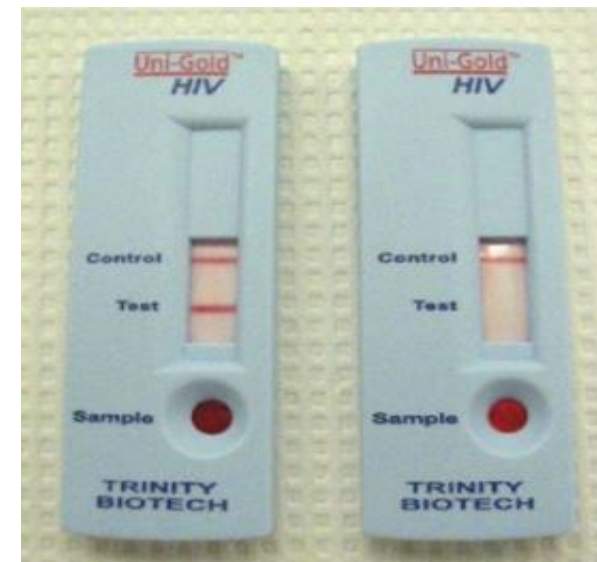
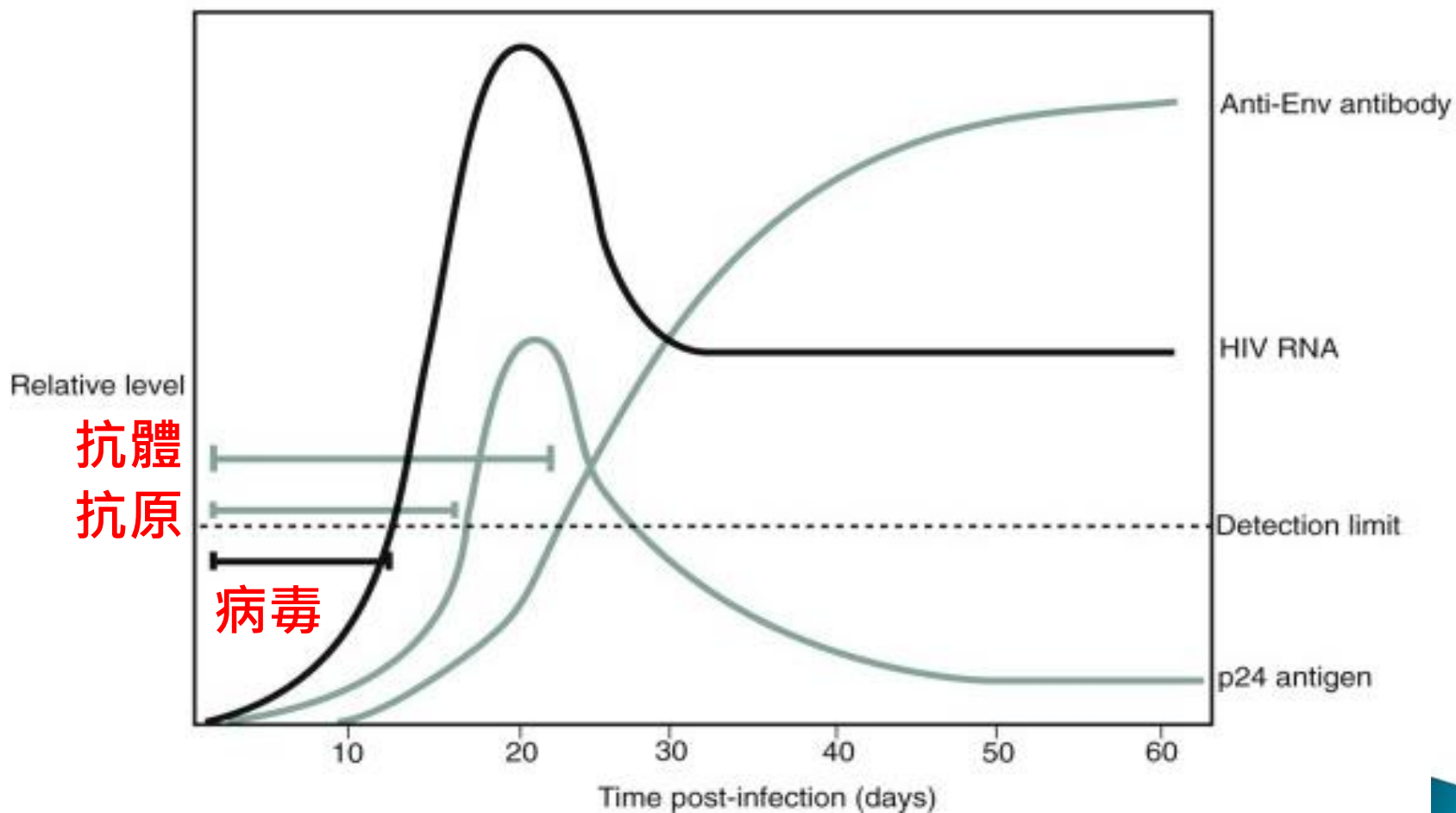


# HIV infection – clinical presentations

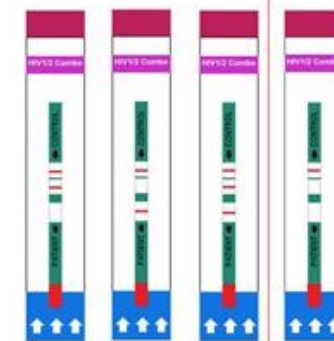
- Acute stage: flu-like symptoms within 2-4 weeks. Some people have no symptoms at all !!
- Chronic HIV infection: asymptomatic
- AIDS: Wasting syndrome, fever, opportunistic infections



# HIV infection - diagnosis



亞培第四代快篩試紙  
空窗期一個月

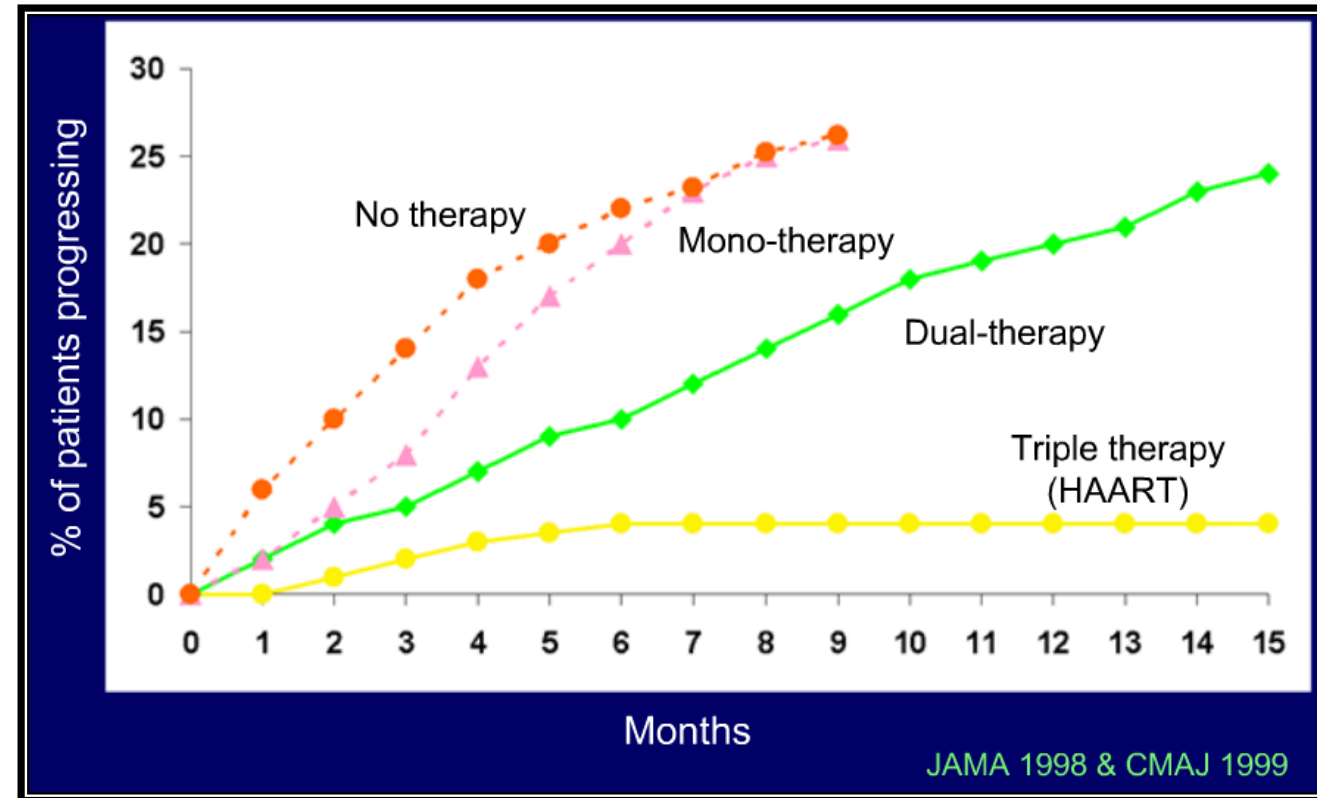
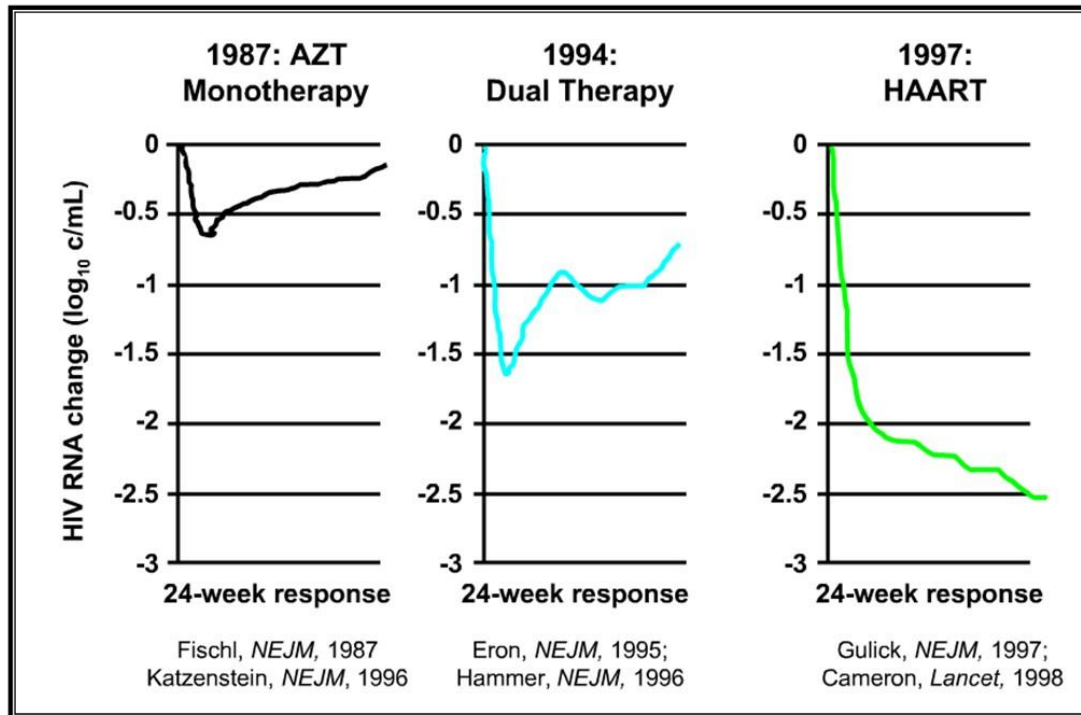


POSTIVE(+)

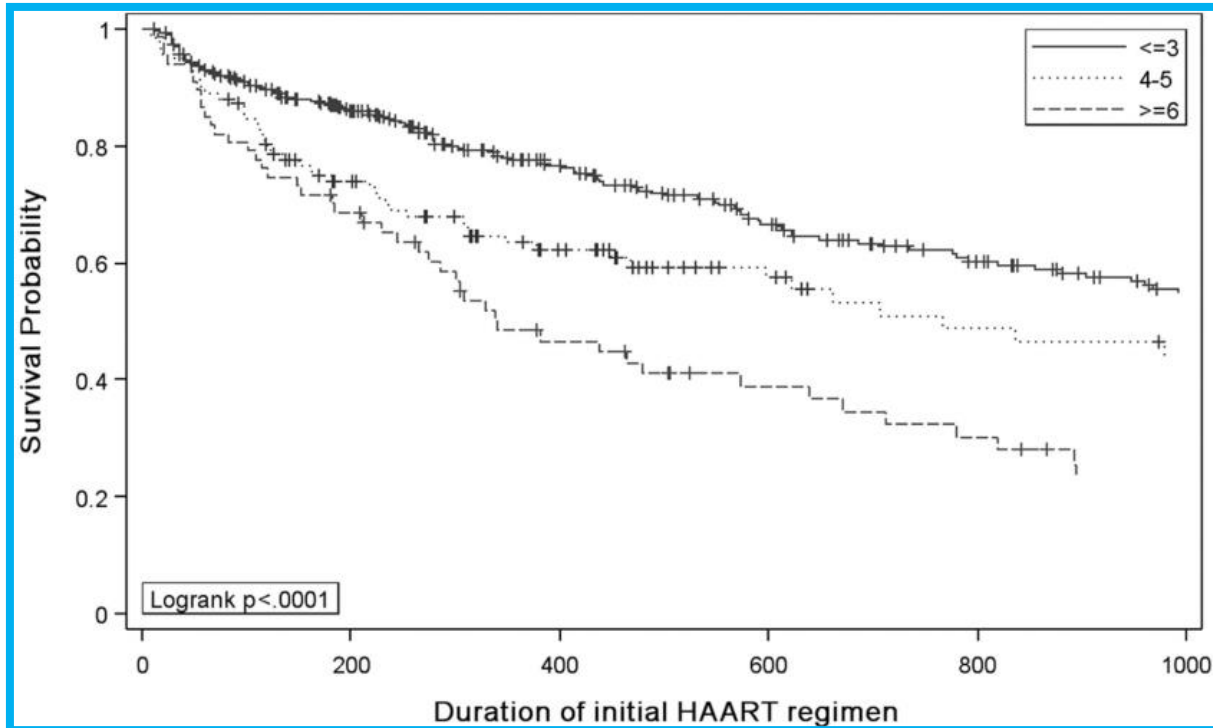
NEGITIVE(-)

# HIV infection - treatment

## 抗病毒藥物的治療-歷史觀點



# HIV infection - treatment



Willig JH et al. AIDS. 2008

### 過去療法

過去一天需要服藥3-4次，  
每次2-6顆藥物不等。

### 現今療法

如今只要1天1顆、每天1次，  
就能達到有效的治療控制。

**醫師指出** 近年也有長效針劑的抗病毒藥物，感染者僅需  
2個月到院施打一次，便利性與順從性皆提升。

資料來源：衛福部桃園醫院副院長 鄭舒倖醫師

Intramuscular Injection Components

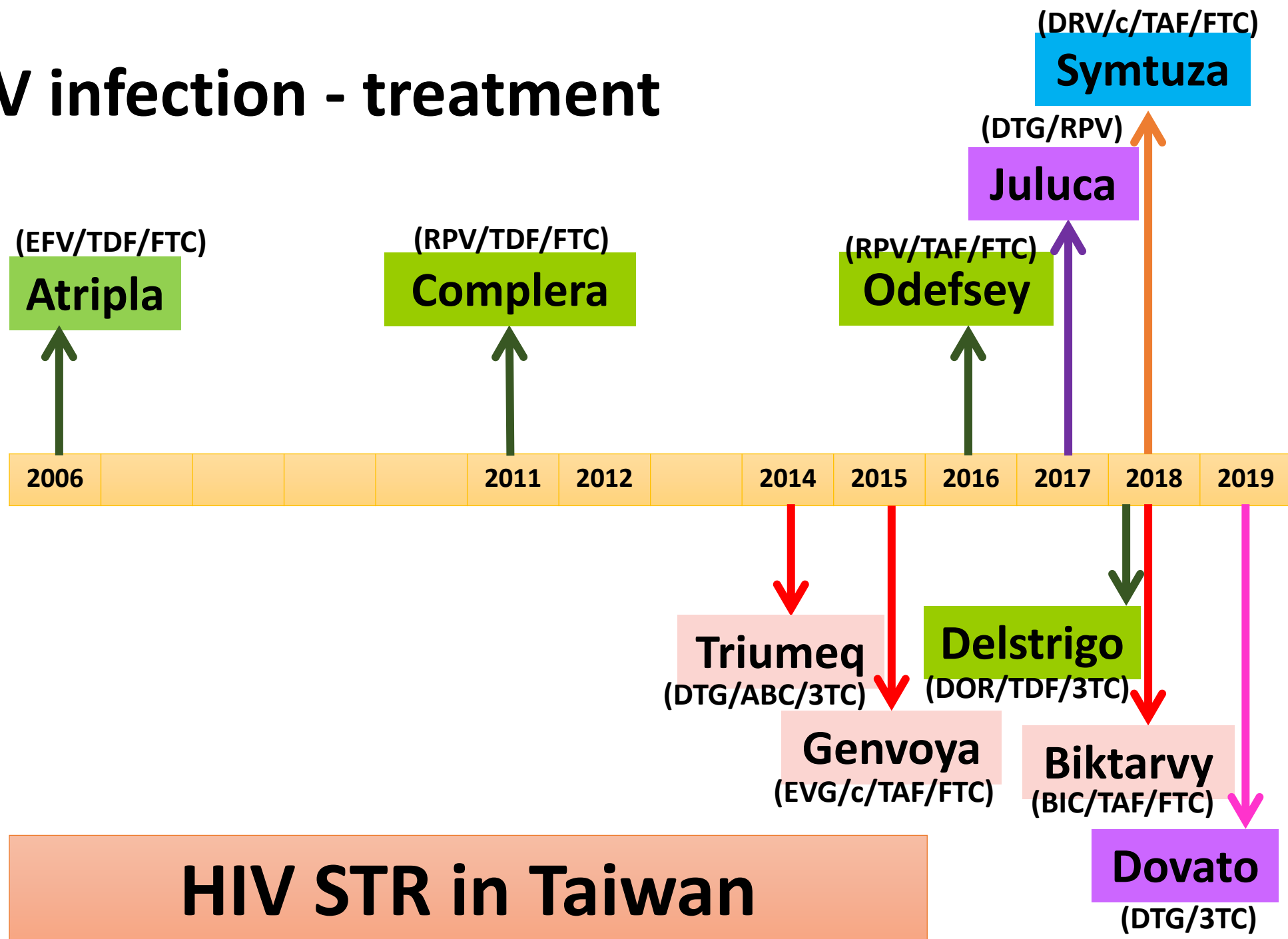
Cabotegravir  
200 mg/mL

↳ INSTI

Rilpivirine  
300 mg/mL

↳ NNRTI

# HIV infection - treatment



# HIV infection - treatment

外觀	123	GSI	255	510	572 Tr	9883	8121	SV J3T	SV 137
藥名	亞翠佩 Atripla TDF/FTC/EFV	康普萊 Complera TDF/FTC/RPV	安以斯 Odefsey TAF/FTC/RPV	捷服康 Genvoya TAF/FTC/EVG/C	三恩美 Triumeq ABC/3TC/DTG	吉他韋 Biktarvy TAF/FTC/BIC	信澤力 Symtuza TAF/FTC/DRV/C	滋若愷 Juluca DTG/RPV	Dovato DTG/3TC
病毒量限制	無限制	CD4 > 200 且 病毒量 < 10萬	病毒量 < 10萬	無限制	無限制	無限制	無限制	stable switch	無限制
同時治療 HBV	可使用	可使用	可使用	可使用	不建議	可使用	可使用	不建議	不建議
與 HCV DAA 併用	Maviret 不建議 Harvoni △腎功能 Epclusa 不建議	Maviret Harvoni △腎功能 Epclusa △腎功能	Maviret Harvoni Epclusa	Maviret Harvoni Epclusa	Maviret Harvoni Epclusa	Maviret Harvoni Epclusa 應無影響	Maviret Harvoni Epclusa 不建議	Maviret Harvoni Epclusa	Maviret Harvoni Epclusa
同時治療 TB	RIF: 無需調整劑量 RBT: RBT 450 mg qd	RIF: 不建議 RBT: 需加 RPV 1顆 <sup>A</sup>	RIF: 不建議 RBT: 不建議	RIF: 不建議 RBT: 調降 RBT 劑量 <sup>B</sup>	RIF: 需加 DTG 1顆 <sup>C</sup> RBT: 無需調整劑量	RIF: 不建議 RBT: 不建議 (資料不足)	RIF: 不建議 RBT: 調降 RBT 劑量 <sup>B</sup>	RIF: 不建議 RBT: 加 RPV 1顆 <sup>A</sup>	RIF: 需加 DTG 1顆 <sup>C</sup> RBT: 無需調整劑量
同時治療 LTBI	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input type="checkbox"/> 3HP <sup>D</sup>	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP	<input checked="" type="checkbox"/> 9H <input checked="" type="checkbox"/> 3HP
腎功能限制	CrCl <50: 不建議	CrCl <50: 不建議	CrCl <30: 不建議	CrCl <30: 不建議	CrCl <50: 不建議	CrCl <30: 不建議	CrCl <30: 不建議	CrCl <30: 不建議	CrCl <50: 不建議
肝功能限制	Child B/C: 不建議	Child C: 無資料	Child C: 無資料	Child C: 無資料	Child A: 不建議 Child B/C: 禁忌	Child C: 無資料	Child C: 不建議	Child C: 無資料	Child C: 無資料
與食物併服	空腹/睡前	隨餐 (>390 kCal)	隨餐 (>390 kCal)	隨餐服用	無限制	無限制	隨餐服用	隨餐 (>390 kCal)	無限制
飲食建議	宜空腹服用	高脂有助吸收 避免制酸劑、H2RA	高脂有助吸收 避免制酸劑、H2RA	高脂有助吸收 避免二價金屬成份	避免二價金屬成份	空腹時, 需避免 併服二價金屬成份	食物種類無影響	高脂有助吸收 避免制酸劑、H2RA	空腹時, 需避免 併服二價金屬成份
剝半/磨碎管灌	不建議 <sup>EACS</sup>	不建議 <sup>EACS</sup>	不建議 <sup>EACS</sup>	無限制	無限制	不建議 <sup>EACS</sup>	無限制	不建議 <sup>EACS</sup>	應無特殊限制
副作用疑慮	腎功能、骨密度、CNS	腎功能、骨密度	相對風險較低	相對風險較低	心血管、CNS	相對風險較低	肝炎、腸胃不適、皮疹	CNS (較輕微)	CNS (較輕微)
交互作用	多	中	中	多	少	少	多	中	少
抗藥性抵抗能力	低	低	低	低	高	高	高	-	高

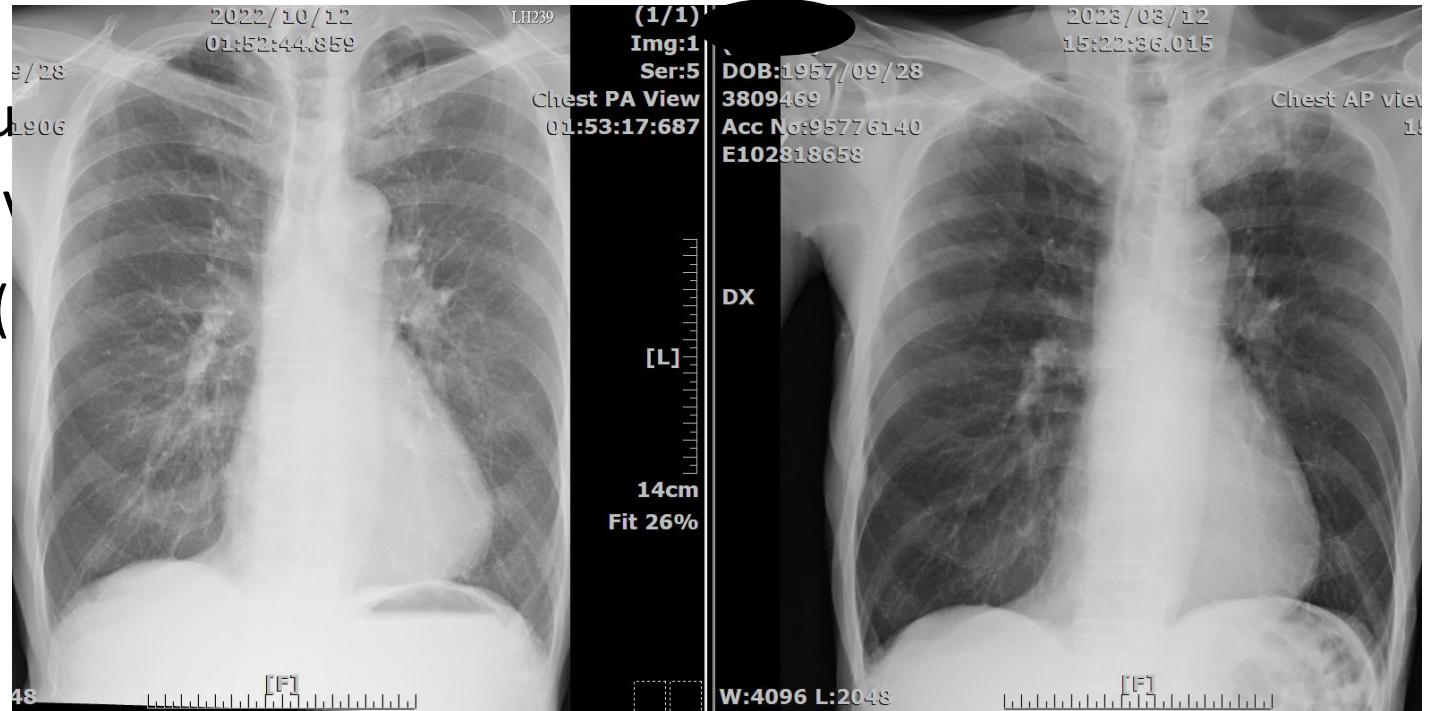
# 大綱

- Skin and soft tissue infection (軟組織感染)
- Bone and joint infection
- Infective endocarditis (IE, 感染性心內膜炎)
- HIV infection
- **MTB infection**

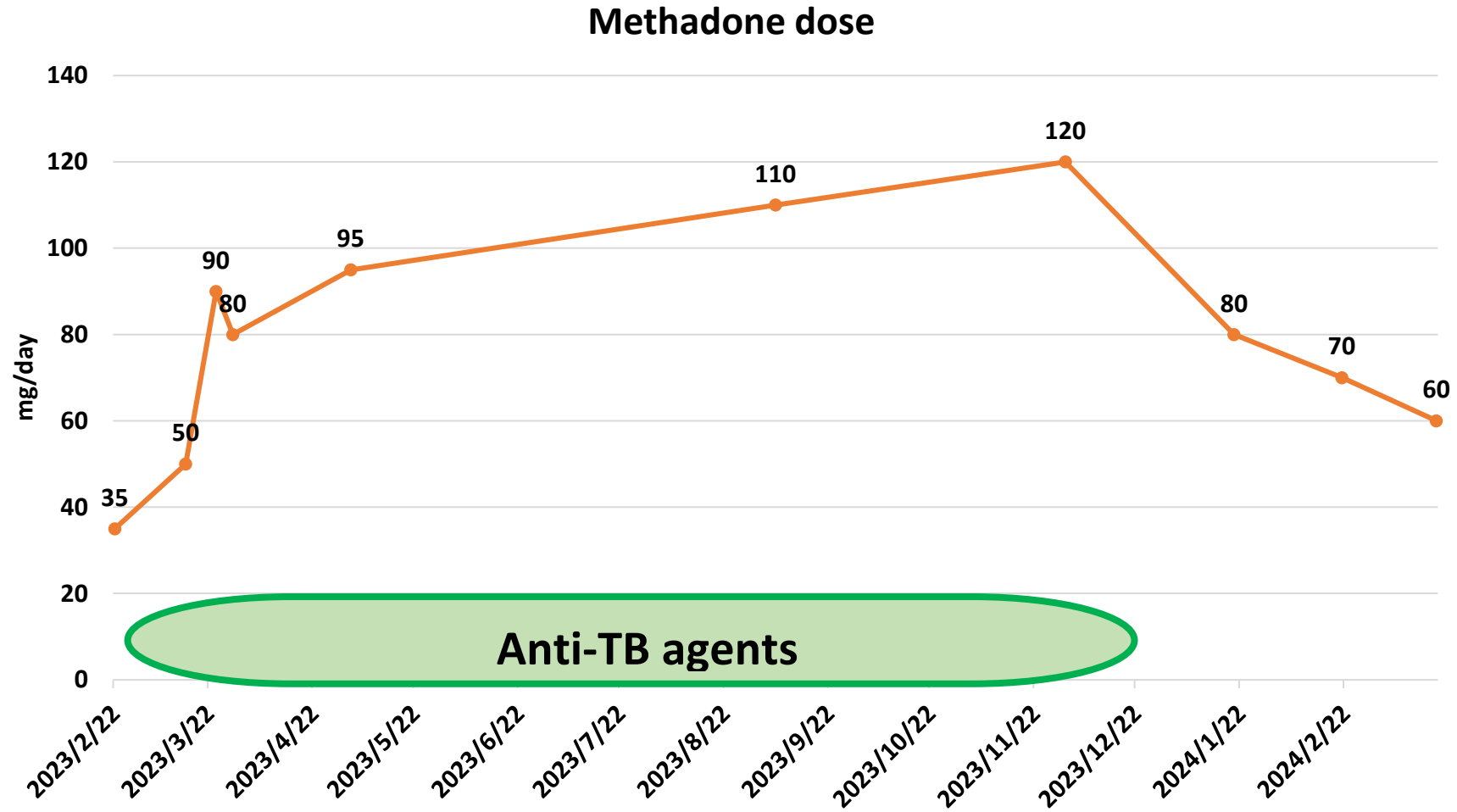


# MTB infection - Case sharing

- 65 y/o man
- 20230317 Refer from CS OPD under the suspicion of pul. TB, LUL
- PHx: IDU with heroin for about 10 years, under methadone replacement therapy since 202212; neck cutting injury with tracheal laceration under regular CS OPD f/u
- Sputum TB/C: AFS(1+), PCR(+), culture (+)
- HCVAb(-), HBsAg(-), HBsAb(+), HIV(-)
- Start ant-TB agent with Akurit-4 (20230527-1222,



# MTB infection infection - Case sharing



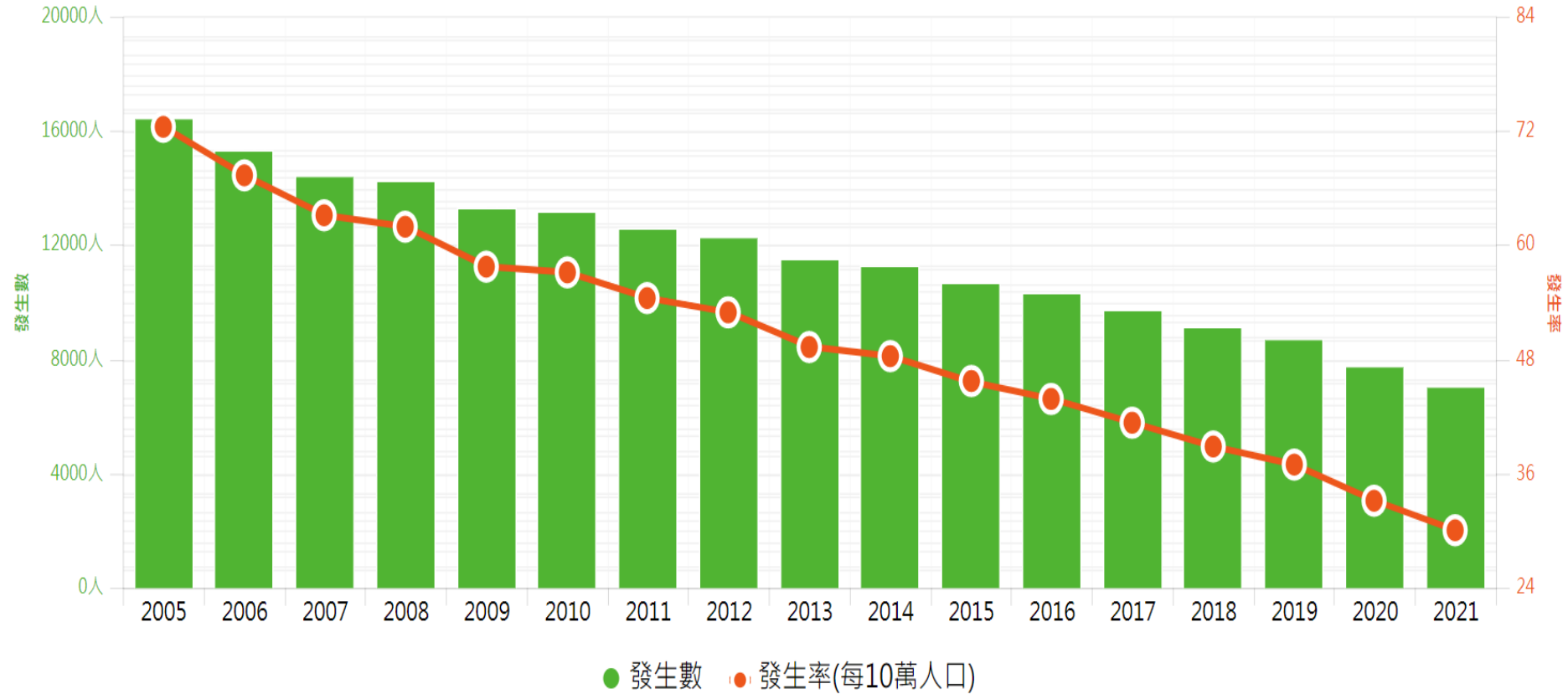
# MTB infection - epidemiology

- Systematic review, 1999-2020
- The prevalence of active TB were high among drug users, close contacts, the poor and people living with HIV, and prison inmates.

	General populations			
	Yield (95% CI)	NNS (95% CI)	Yield/prevalence ratio (95% CI)	Yield (95% CI)
<b>Overall</b>	432 (382–482)	231 (207–262)	1.4 (0.8–1.9)	1401 (1328–1475)
<b>Burden</b>				
Non-HBCs	248 (60–436)	403 (229–1667)	1.3 (0.2–2.5)	987 (891–1082)
HBCs	504 (438–571)	198 (175–228)	1.4 (0.8–2.0)	1734 (1625–1843)
Non-TB/HIV HBCs	246 (178–315)	407 (317–562)	0.9 (0.6–1.3)	1043 (955–1130)
TB/HIV HBCs	604 (514–695)	166 (144–195)	1.6 (0.8–2.3)	2202 (2041–2363)
<b>Incidence</b>				
Low	4 (0–8)	25 000 (12 500–)#		572 (446–698)
Moderate	158 (44–272)	633 (368–2273)	1.0 (0.2–1.8)	1194 (1035–1353)
Medium	500 (421–579)	200 (173–238)	1.4 (0.6–2.2)	1563 (1453–1672)
High	603 (457–749)	166 (134–219)	1.5 (0.7–2.3)	4159 (3525–4794)
<b>Region</b>				
North America and Europe	29 (26–31)	3448 (3226–3846)	0.2 (0.2–0.3)	481 (386–576)
Middle East	249 (0–508)	402 (197–)#	1.4 (0.8–2.1)	1718 (1456–1979)
Asia	358 (276–439)	279 (228–362)	1.3 (0.9–1.7)	995 (885–1106)
South and Central America	394 (356–436)	254 (229–281)		3098 (2599–3597)
Africa	690 (567–812)	145 (123–176)	1.5 (0.5–2.6)	3062 (2785–3339)
<b>Group</b>				
Refugees and immigrants				257 (186–328)
Poor and marginalised				1330 (1165–1495)
Contacts/HBCs				1690 (1511–1869)
Mixed groups				658 (511–804)
Drug users				1157 (809–1505)
Health workers				1201 (279–2122)
PLHIV				9092 (7229–10955)
Prison inmates				2371 (1983–2759)

# MTB infection– incidence of MTB in Taiwan

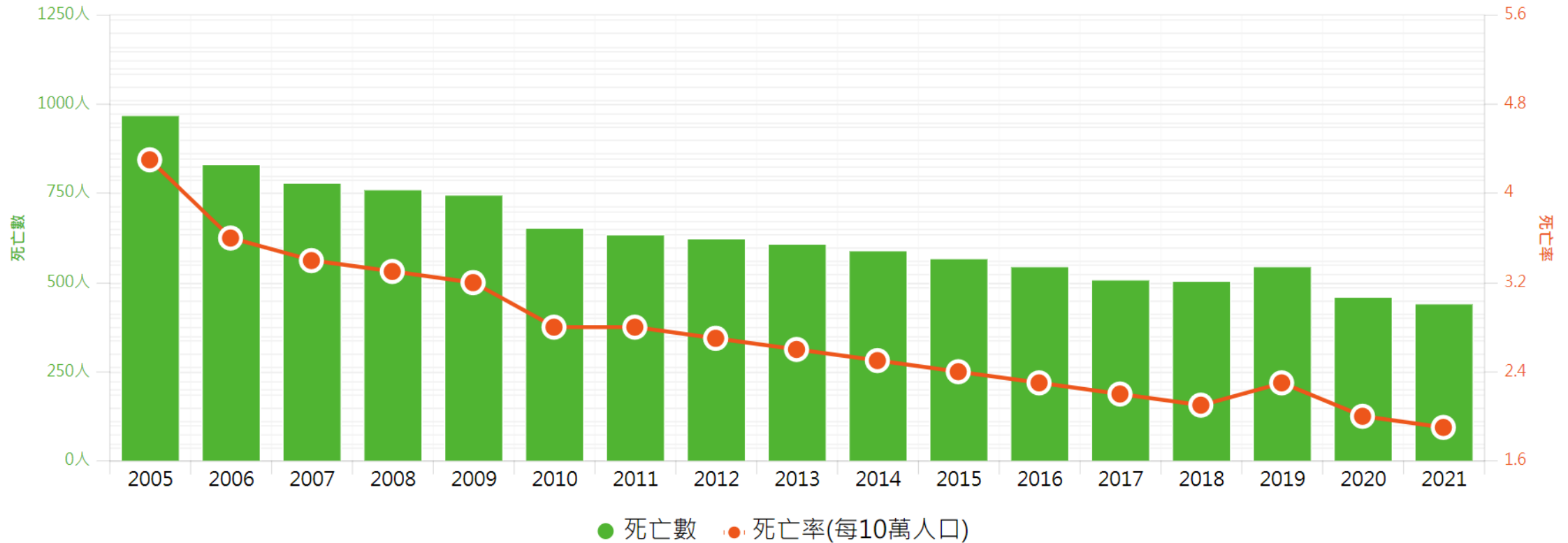
台灣歷年結核病發生監測統計圖



TB incidence (2005): 72.5/10萬人  
TB incidence (2022): 28.2/10萬人

# MTB infection – mortality of MTB in Taiwan

台灣歷年結核病死亡監測統計圖

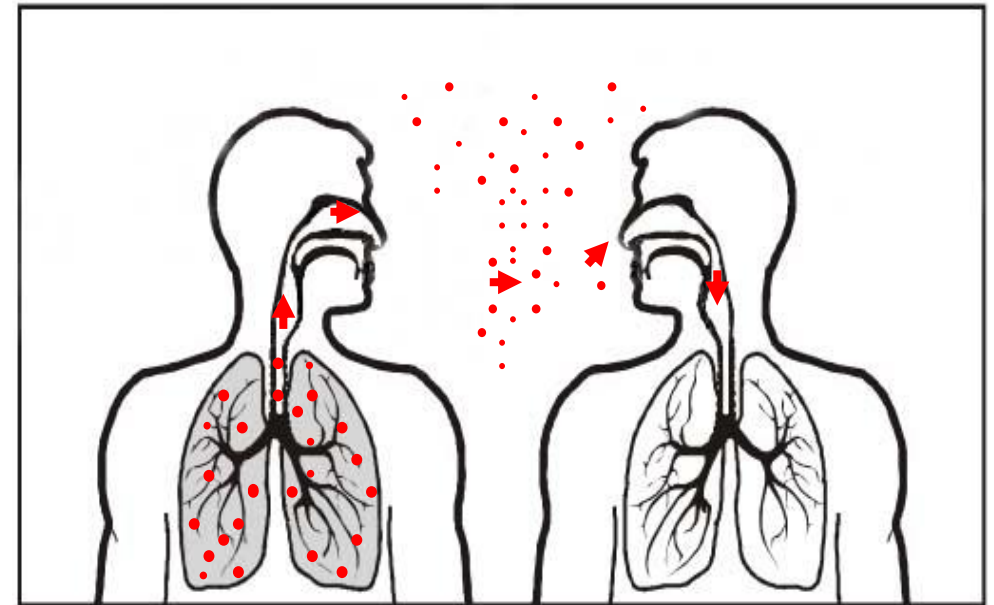


TB mortality (2005): 970

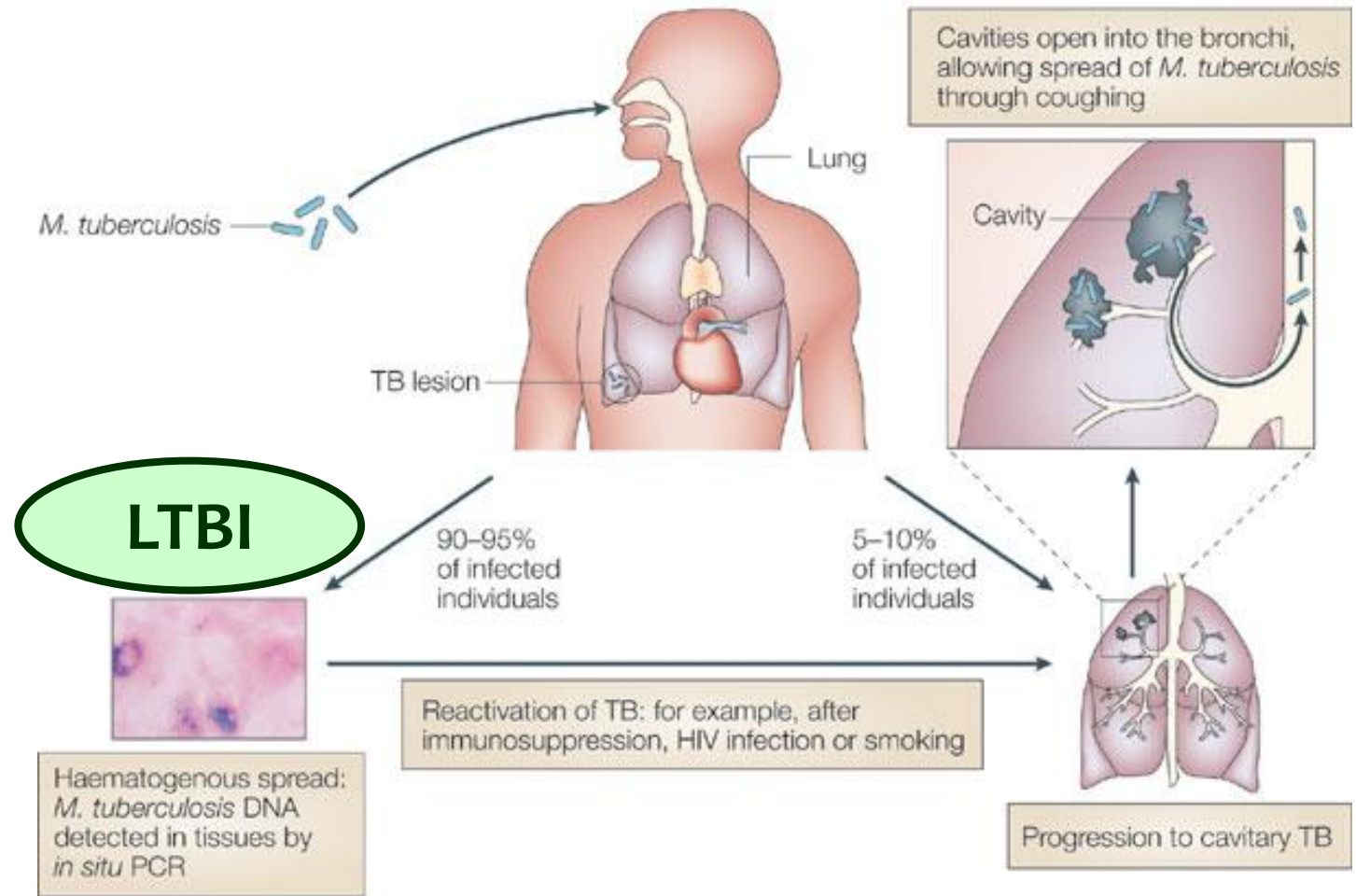
TB mortality (2022): 477

# MTB infection – pathogenesis

- **Airborne disease:** 傳染性肺結核病患在吐痰、咳嗽或打噴嚏時，漂浮在空氣中的細小飛沫含有無數的結核桿菌，飛沫直徑小於 $5\mu\text{l}$ 時便可經由呼吸道進入肺泡，造成感染。
- 結核桿菌除了侵犯肺部組織，也侵犯人體其他組織，特別是含氧量較豐富的器官如腎臟、腦膜及兒童的骨骼組織等。

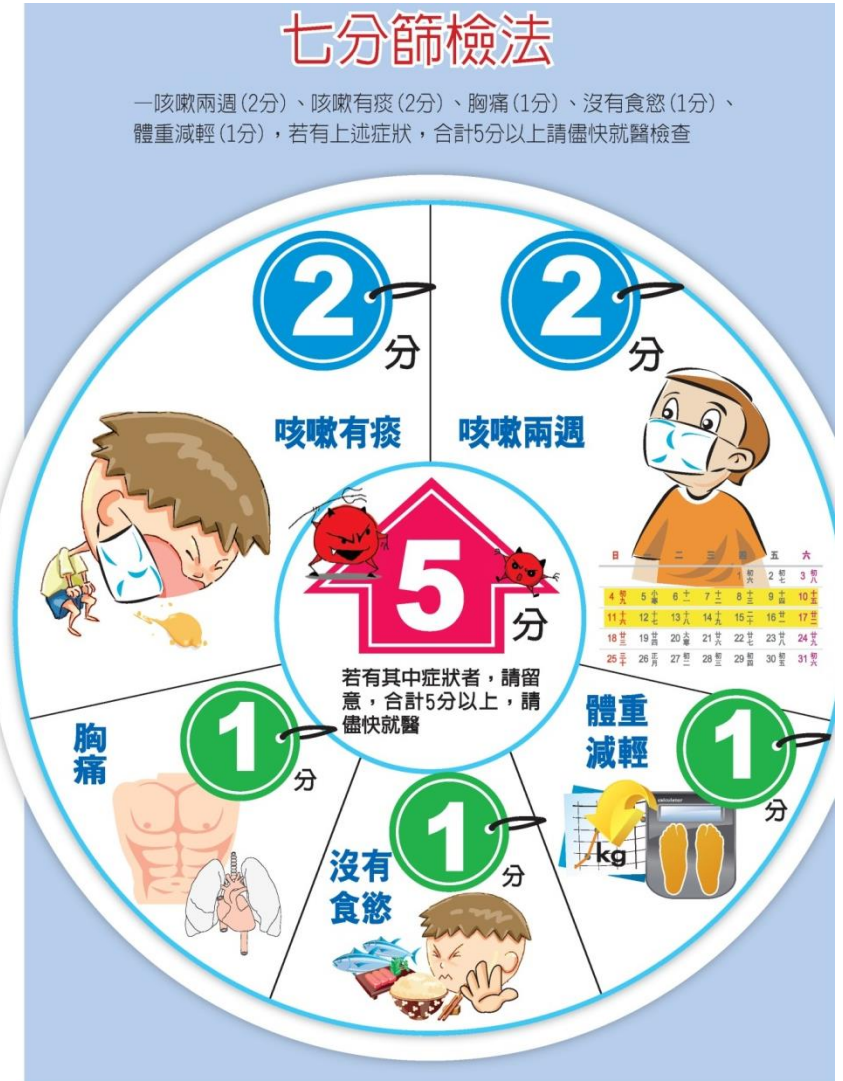


# MTB infection – pathogenesis



# MTB infection – clinical presentations

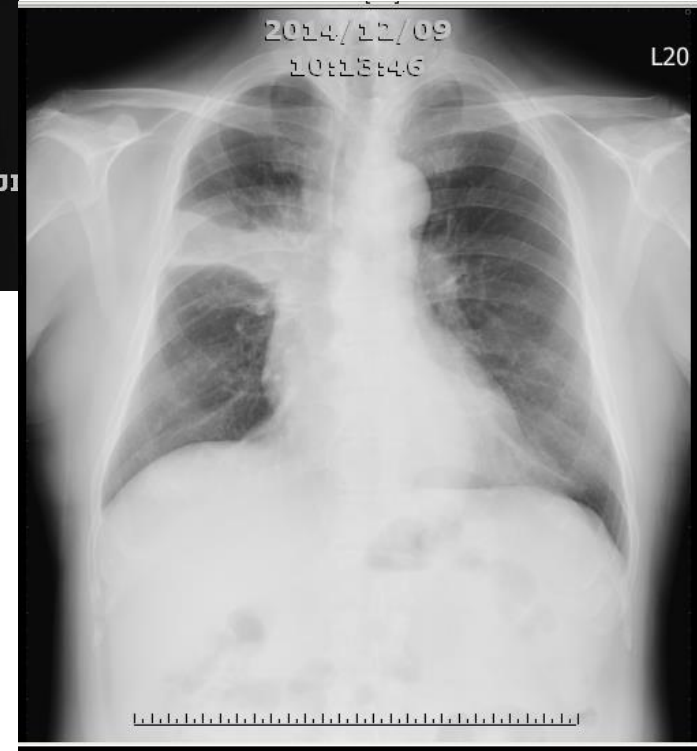
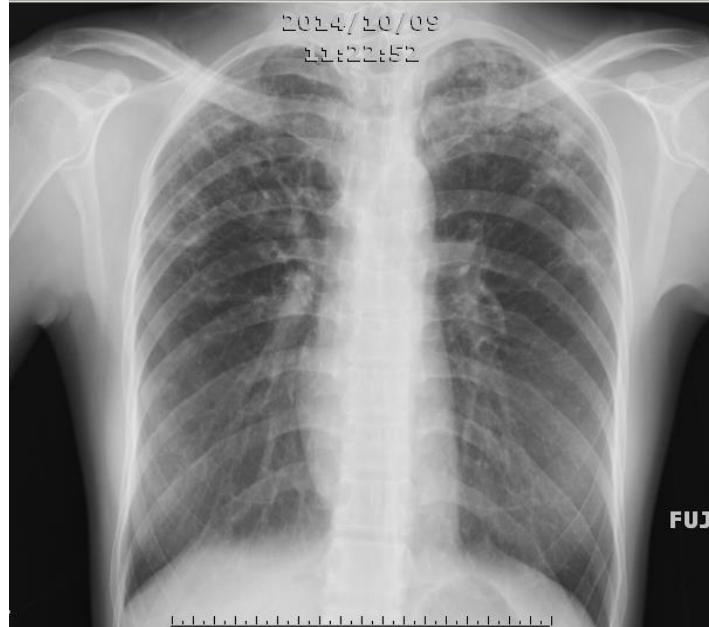
- Primary infection: asymptomatic
- Reactivation: nonspecific constitutional symptoms--anorexia, fatigue, weight loss, chills, fever, and night sweats, cough(一開始常不嚴重而容易被忽略!!). Hemoptysis and chest pain may be seen in some cases.





# MTB infection – diagnosis & Treatment

- Diagnosis:
  - ✓ History taking, physical examination
  - ✓ Image study (Chest CT, CXR)
  - ✓ Microbiology (smear, culture, PCR)
  - ✓ Pathology
- Treatment: anti-TB agent, HERZ
  - ✓ Isoniazide
  - ✓ Rifampin/rifabutin
  - ✓ Ethambutol
  - ✓ Pyrazinamide



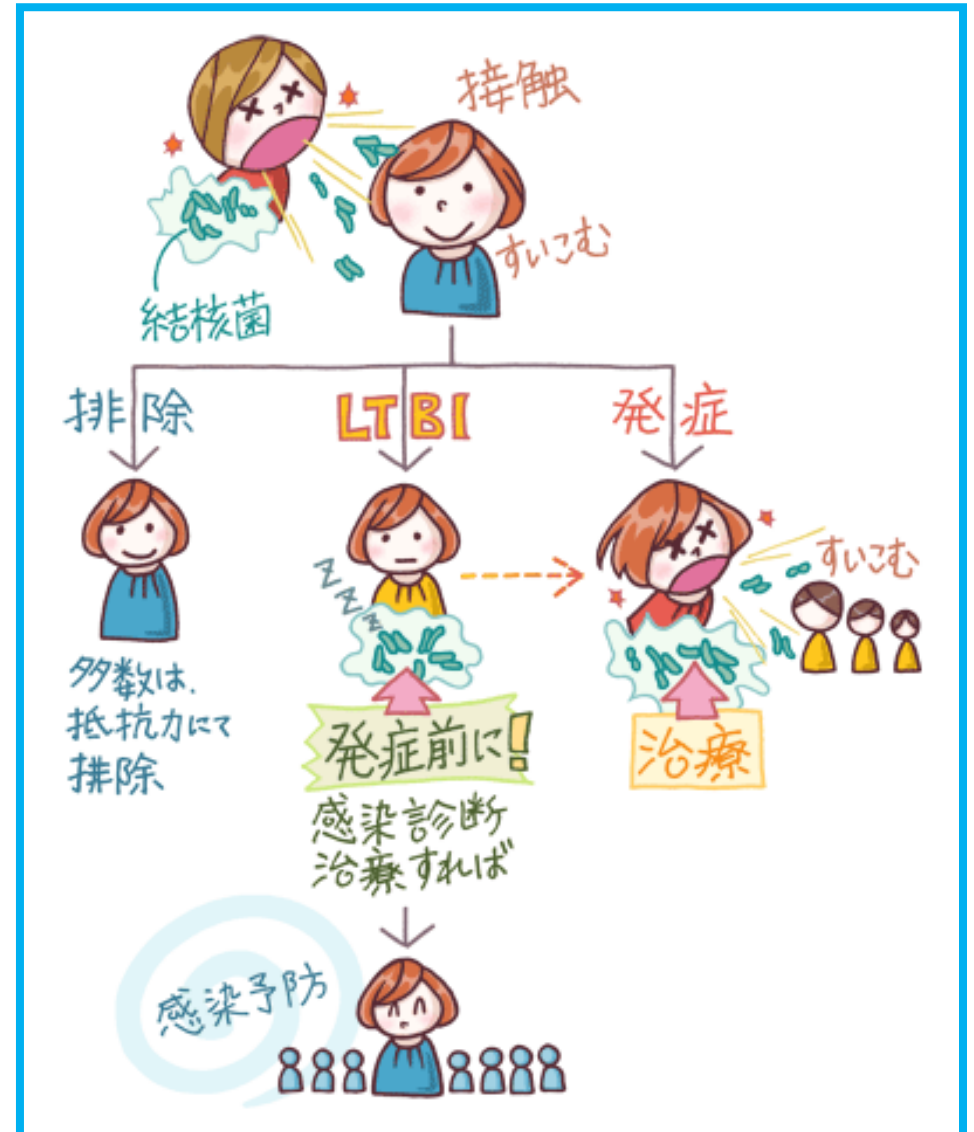
# Drug-drug interaction with methadone

- Rifampin can induce drug-metabolising enzymes, having the greatest effects on CYP3A4.
- Rifampin significant decrease methadone plasma concentration and need dose adjustments.
- Check drug interaction: Micromedex. UpToDate...etc

<b>Tuberculosis Medications</b>	<b>Methadone</b>
Rifampin	Opiate withdrawal may occur <sup>39</sup>
Rifabutin	No clinically significant interaction <sup>40</sup>

# MTB infection – Latent TB infection

- 接觸者有1/3的可能會被傳染而成為潛伏感染者，潛伏感染後終其一生有10%的發病機會，50%的發病多集中在曝露後前兩年內。



# MTB infection – Treatment of LTBI

LTBI 治療處方一覽表

處方	療程	頻率	劑次	都治	劑量
3HP*	3 個月	每週	12	必須	INH 每次最大劑量 900mg**** A.12 歲(含)以上 · INH 劑量為 15mg/kg B.2-11 歲的兒童 · INH 劑量為 25mg/kg
					RPT 每次最大劑量 900mg A. 10.0–14.0 kg 300 mg B. 14.1–25.0 kg 450 mg C. 25.1–32.0 kg 600 mg D. 32.1–49.9 kg 750 mg E. ≥50.0 kg 900 mg
3HR**	3 個月	每天	90	必須	INH 每日最大劑量 300mg 兒童劑量為 10mg/kg (7-15) 成人劑量為 5mg/kg
					RMP 每日最大劑量 600mg 兒童劑量為 15mg/kg (10-20) 成人劑量為 10mg/kg
4R	4 個月	每天	120	必須	每日最大劑量 600mg 兒童劑量為 15mg/kg (10-20) 成人劑量為 10mg/kg
9H	9 個月	每天	270	建議	每日最大劑量 300mg 兒童劑量為 10mg/kg (7-15) 成人劑量為 5mg/kg
1HP***	1 個月	每天	28	必須	適用對象：13 歲(含)以上 INH 每次 300mg**** RPT 每次最大劑量 600mg A. <35 kg 300 mg B. 35-45 kg 450 mg C. ≥45 kg 600 mg

Essential for impact: enabling interventions	Essential for impact: health interventions	Essential for broader health: health interventions
<ul style="list-style-type: none"> <li>• Removing punitive laws, policies and practices</li> <li>• Reducing stigma and discrimination</li> <li>• Community empowerment</li> <li>• Addressing violence</li> </ul>	<p><b>Prevention of HIV, viral hepatitis and STIs</b></p> <ul style="list-style-type: none"> <li>• Harm reduction (needle and syringe programmes, opioid agonist maintenance therapy and naloxone for overdose management)</li> <li>• Condoms and lubricant</li> <li>• PrEP for HIV</li> <li>• PEP for HIV and STIs</li> <li>• Prevention of vertical transmission of HIV, syphilis and HBV</li> <li>• HBV vaccination</li> <li>• Addressing chemsex</li> </ul> <p><b>Diagnosis</b></p> <ul style="list-style-type: none"> <li>• HIV testing services</li> <li>• STI testing</li> <li>• HBV and HCV testing</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• HIV treatment</li> <li>• Screening, diagnosis, treatment and prevention of HIV-associated tuberculosis (TB)</li> <li>• STI treatment</li> <li>• HBV and HCV treatment</li> </ul>	<ul style="list-style-type: none"> <li>• Conception and pregnancy care</li> <li>• Contraception</li> <li>• Anal health</li> <li>• Mental health</li> <li>• Prevention, assessment and treatment of cervical cancer</li> <li>• Safe abortion</li> <li>• Screening and treatment for hazardous and harmful alcohol and other substance use</li> <li>• Tuberculosis prevention, screening, diagnosis and treatment</li> </ul>

感謝聆聽，敬請指教~