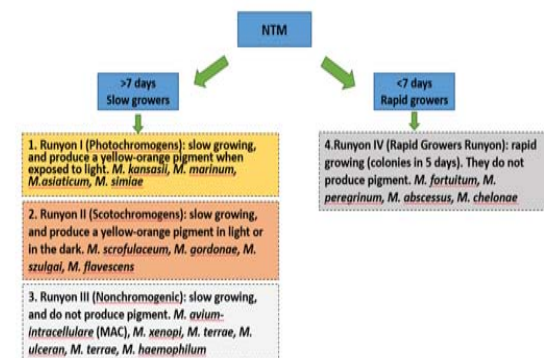


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**Department of Medicine, Faculty of Medicine, Khon Kaen**  
**University**

- a grouping of all Mycobacterium species other than the obligate pathogens *M. tuberculosis* complex and *M. leprae*
- typically environmental organisms residing in soil and natural as well as treated water



David Schlossberg. Tuberculosis and Nontuberculous Mycobacterial infections Sixth edition

- The distribution of NTM species varies from region to region
- Recovery of NTM from respiratory specimens are increasing over a 10-year period.
- NTM-related death numbers are rising.
- Outcome: complete response, partial response, relapse

# Epidemiology

| Drugs | <i>M. intracellulare</i> | <i>M. abscessus</i> | <i>M. fortuitum</i> | <i>M. goodii</i> | <i>M. kansasii</i> | <i>M. avium</i> | <i>M. parascrofulaceum</i> | Total      |
|-------|--------------------------|---------------------|---------------------|------------------|--------------------|-----------------|----------------------------|------------|
| INH   | 37 (97.37)               | 28 (100)            | 7 (87.5)            | 6 (75)           | 3 (42.86)          | 5 (100)         | 1 (100)                    | 87 (91.58) |
| RIF   | 34 (89.47)               | 28 (100)            | 7 (87.5)            | 2 (25)           | 0                  | 5 (100)         | 1 (100)                    | 77 (81.05) |
| EMB   | 4 (10.53)                | 26 (92.86)          | 7 (87.5)            | 1 (12.5)         | 0                  | 2 (40)          | 0                          | 40 (42.11) |
| SM    | 38 (100)                 | 28 (100)            | 7 (87.5)            | 4 (50)           | 6 (85.71)          | 5 (100)         | 1 (100)                    | 89 (93.68) |
| CPM   | 31 (81.58)               | 26 (92.86)          | 4 (50)              | 1 (12.5)         | 2 (28.57)          | 3 (60)          | 1 (100)                    | 68 (71.58) |
| AK    | 31 (81.58)               | 25 (89.29)          | 4 (50)              | 1 (12.5)         | 1 (14.29)          | 4 (80)          | 0                          | 66 (69.43) |
| PTO   | 25 (65.79)               | 27 (96.43)          | 6 (75)              | 4 (50)           | 0                  | 4 (80)          | 1 (100)                    | 67 (70.53) |
| PAS   | 38 (100)                 | 28 (100)            | 7 (87.5)            | 8 (100)          | 7 (100)            | 4 (80)          | 1 (100)                    | 93 (97.89) |
| OFLX  | 38 (100)                 | 28 (100)            | 3 (37.5)            | 3 (37.5)         | 1 (14.29)          | 5 (100)         | 1 (100)                    | 79 (83.16) |
| LVFX  | 36 (94.74)               | 28 (100)            | 3 (37.5)            | 2 (25)           | 0                  | 5 (100)         | 1 (100)                    | 75 (78.95) |
| Total | 38 (40)                  | 28 (29.47)          | 8 (8.42)            | 8 (8.42)         | 7 (7.37)           | 5 (5.26)        | 1 (1.05)                   | 95 (100)   |

Emerging Infectious Diseases www.cdc.gov/eid Vol. 20, No. 7, July 2014

## Clinical diseases

### ❑ Pulmonary Disease

Common pathogens: MAC, *M. kansasii*, *M. abscessus complex*, *M. xenopi*

### ❑ Lymphadenitis

Common pathogens: MAC, *M. malmoense*, *M. scrofulaceum*

### ❑ Disseminated Disease

Common pathogens: MAC, *M. chelonae complex*, *M. haemophilum*, *M. kansasii*

### ❑ Skin, Soft Tissue, and Bone Disease

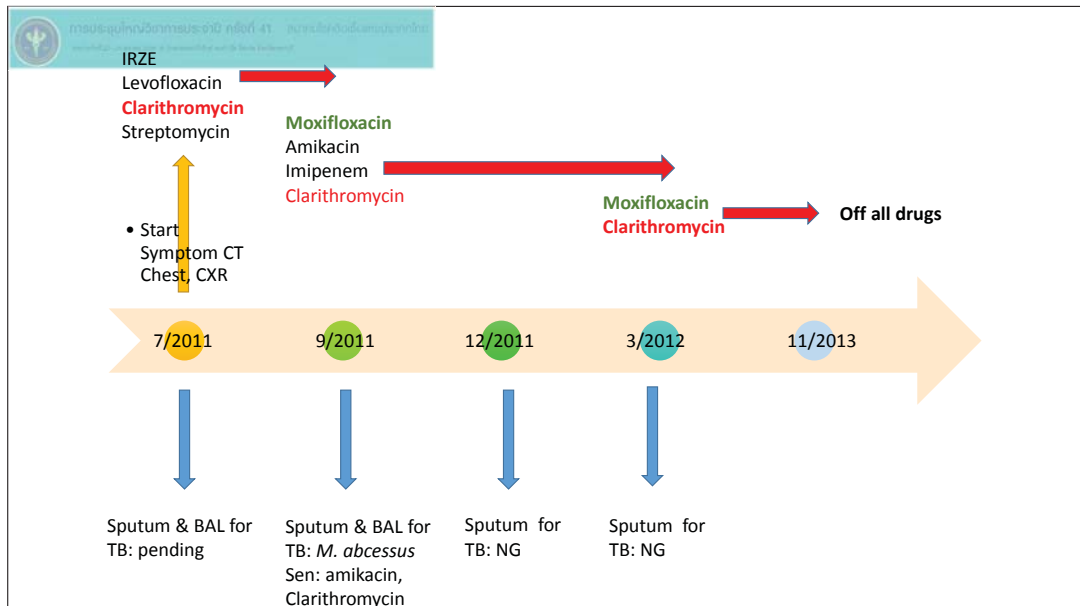
Common pathogens: RGM, *M. marinum*, *M. ulcerans*

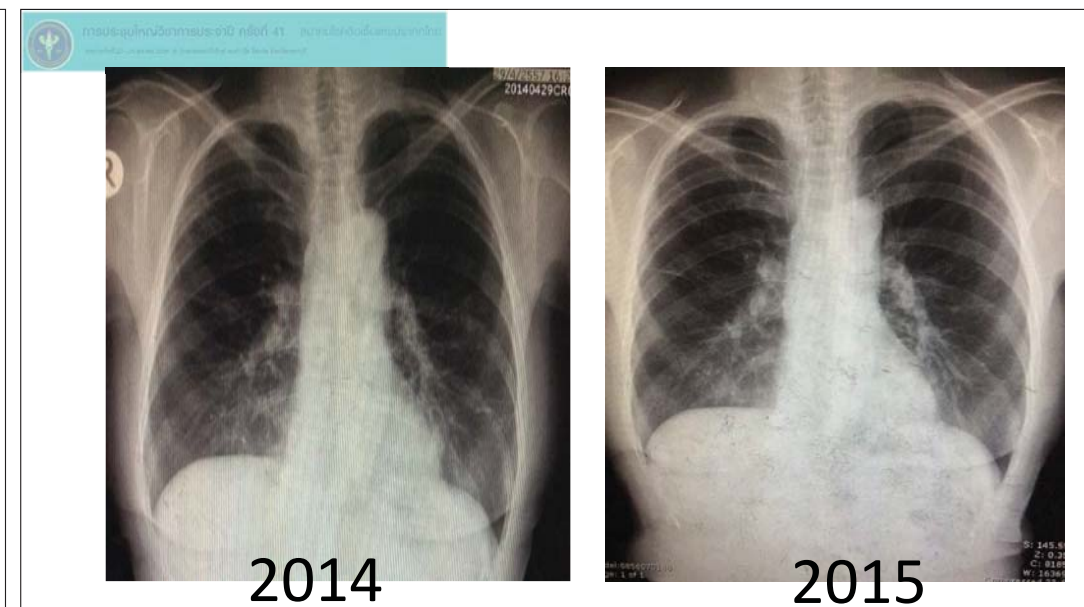
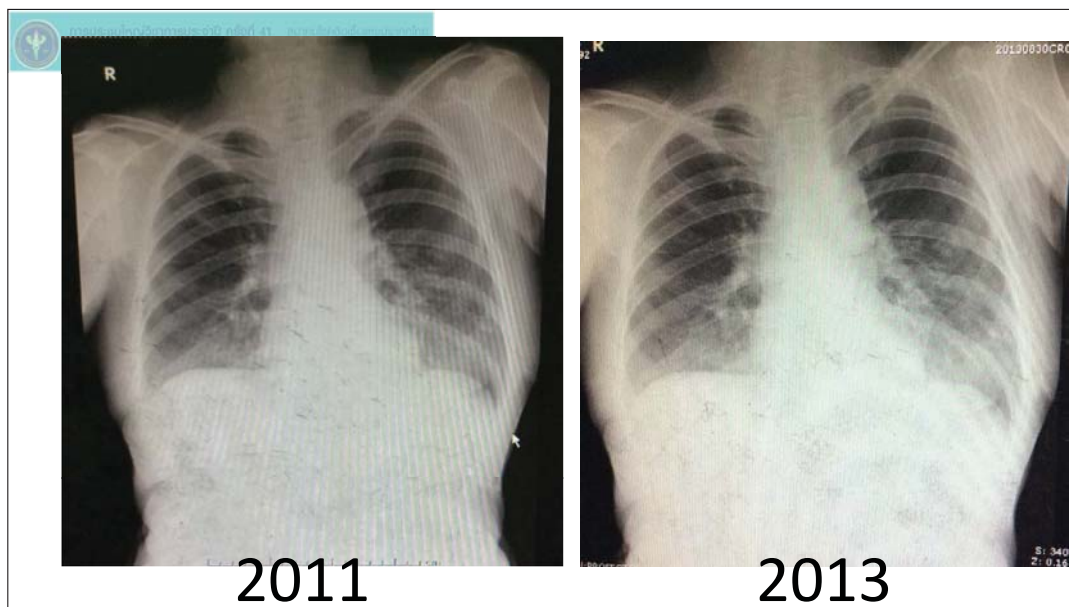
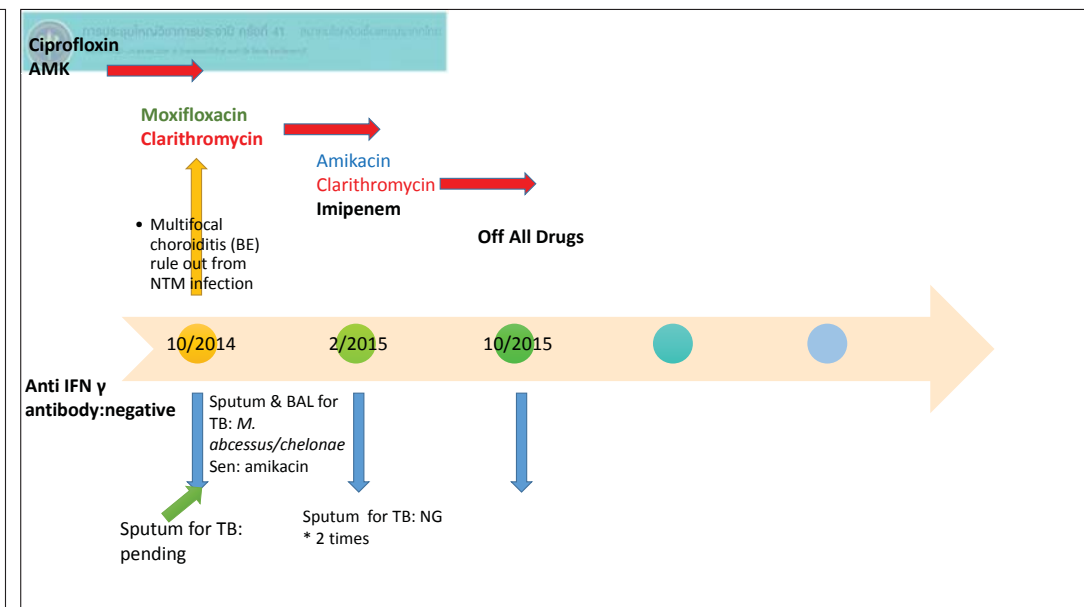
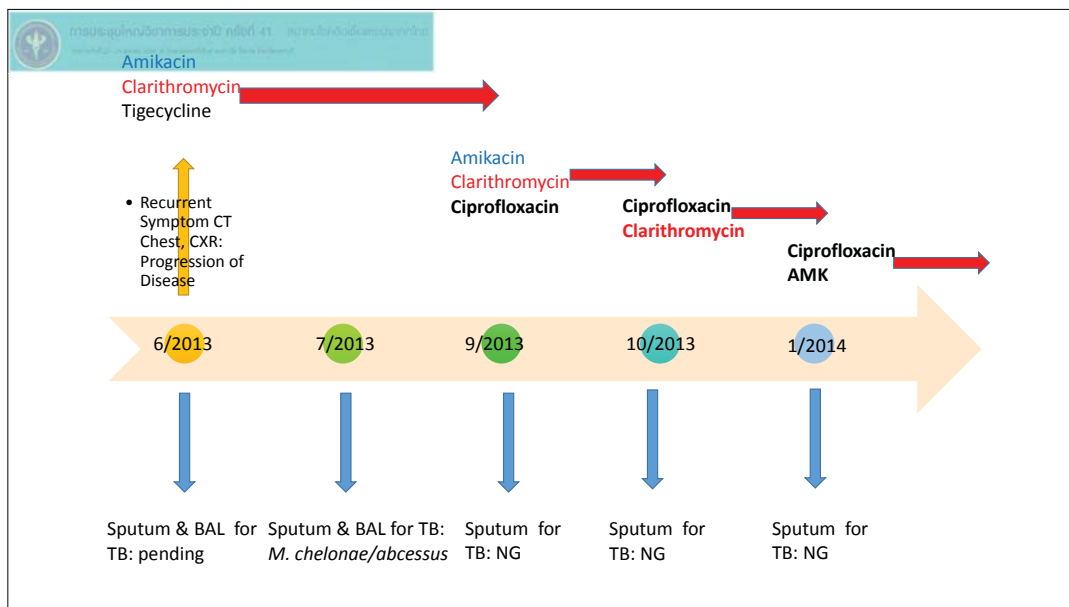
Chih-Cheng Lai & Po-Ren Hsueh Diseases caused by nontuberculous mycobacteria in Asia. Future Microbiol. (2014) 9(1), 93–106

Am J Respir Crit Care Med Vol 175. pp 367–416, 2007

## Case I: NTM lung infection

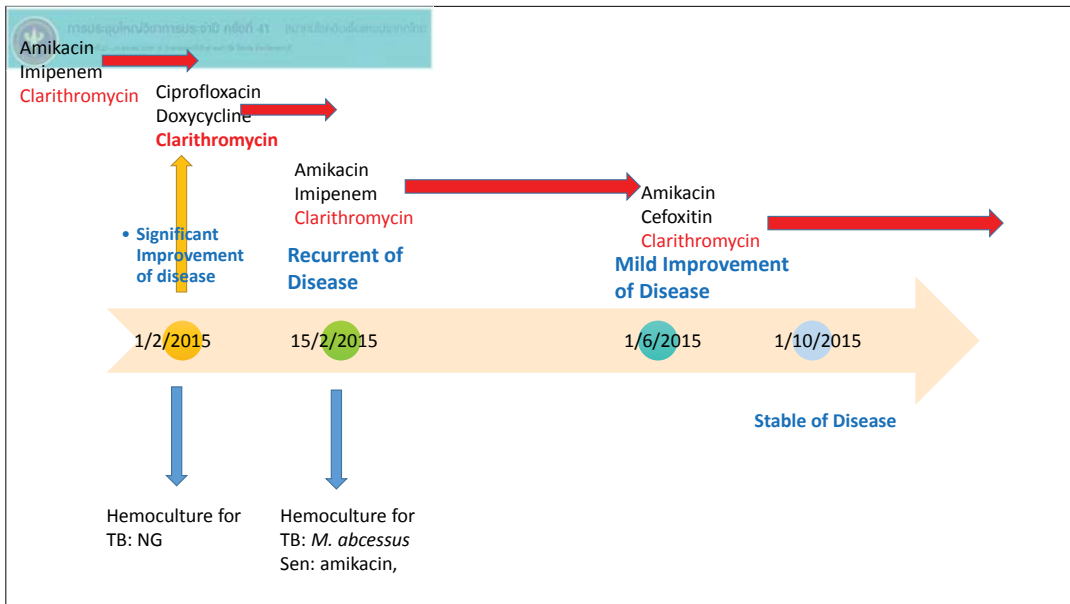
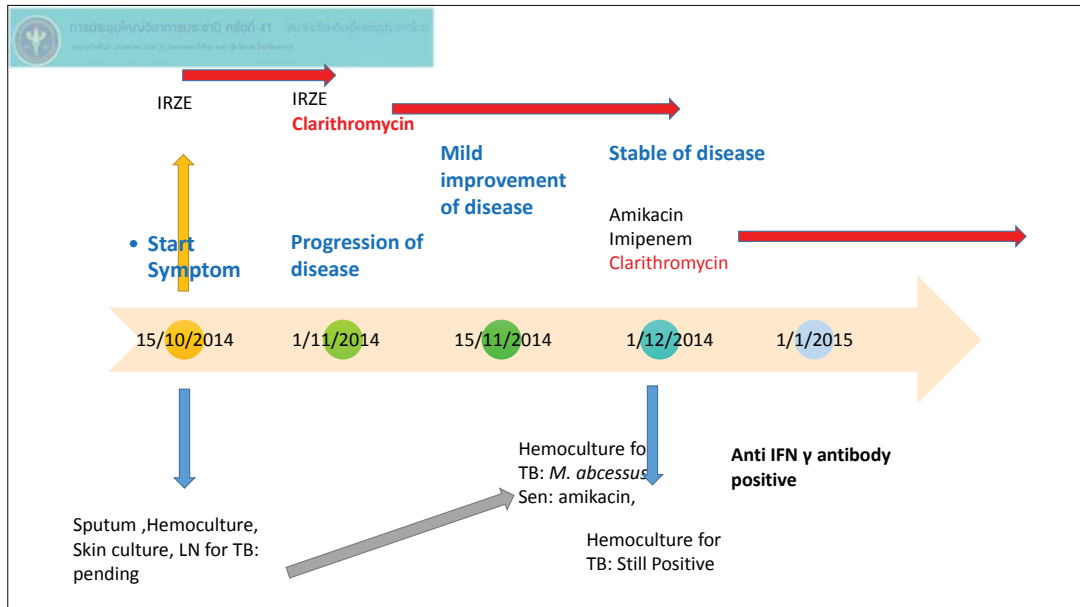
- A 62 year-old-woman presented with fever, cough, hemoptysis and dyspnea for 1 month.
- Then, she had been admitted to work up and received treatment since July 2011.
- Her diagnosis at first time was pulmonary tuberculosis.





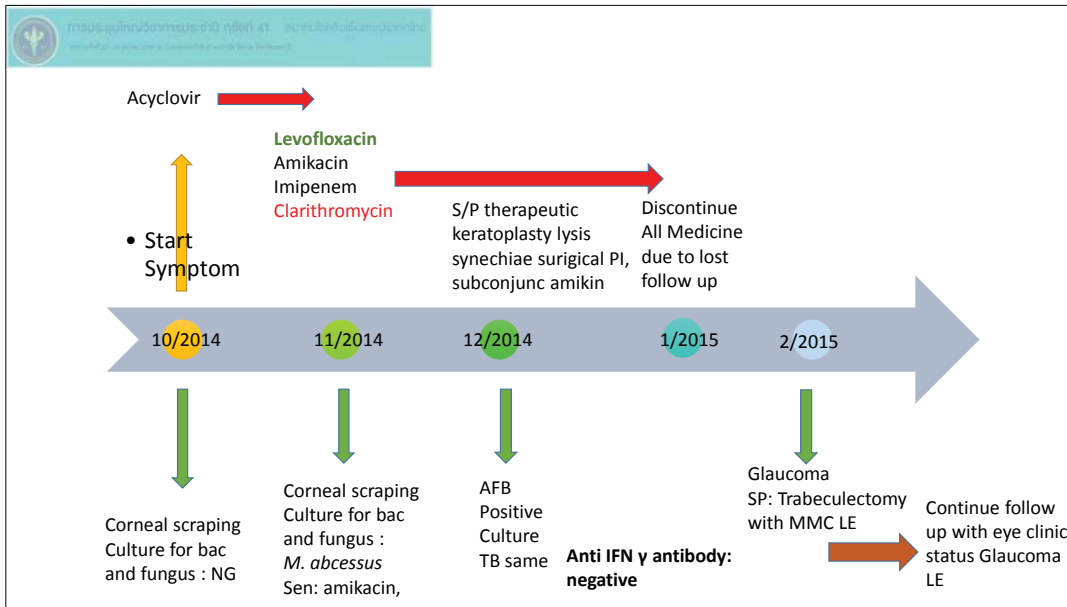
## CASE II : NTM lymphadenitis:

- A 56 year-old-man presented with prolonged fever, multiple cervical lymphadenopathy, and erythematous papules at neck for 2 weeks.
- Then, he had been admitted to work up and received treatment since August 2014.
- His diagnosis at first time was disseminated tuberculosis.



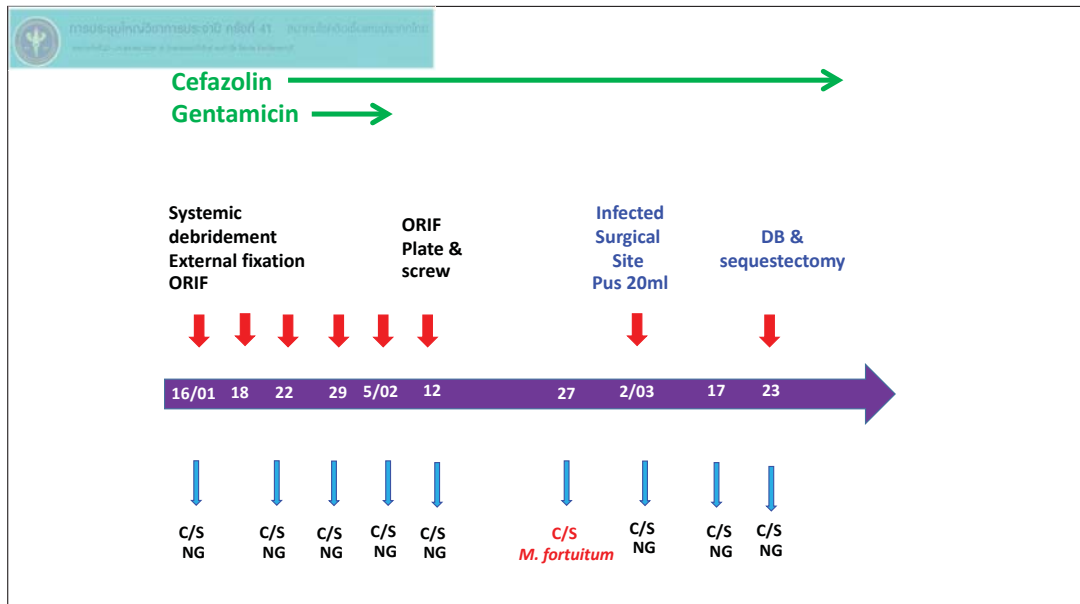
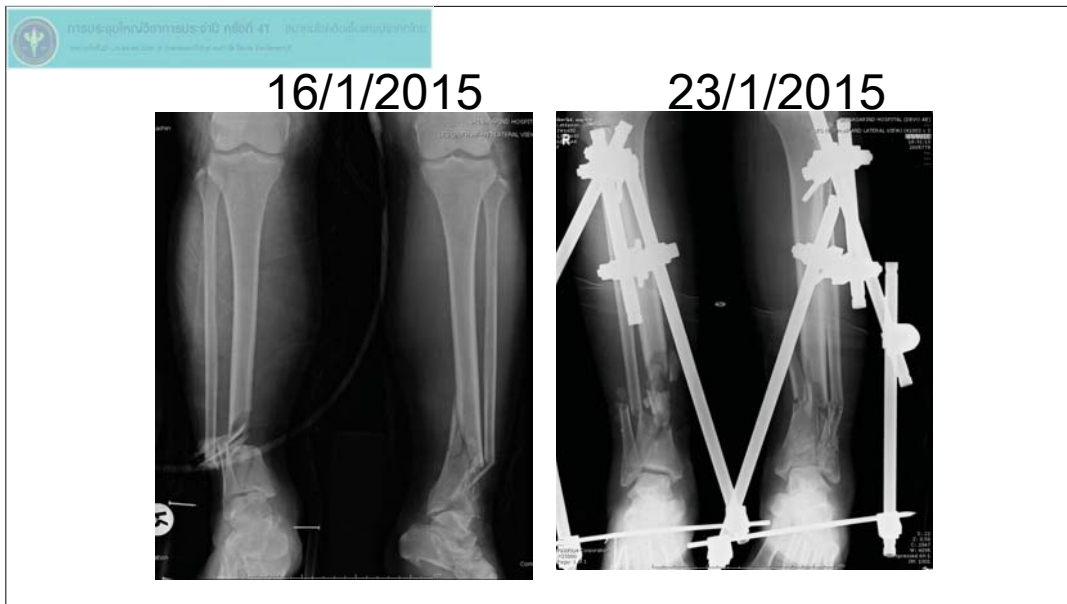
## Case III :NTM ocular infections

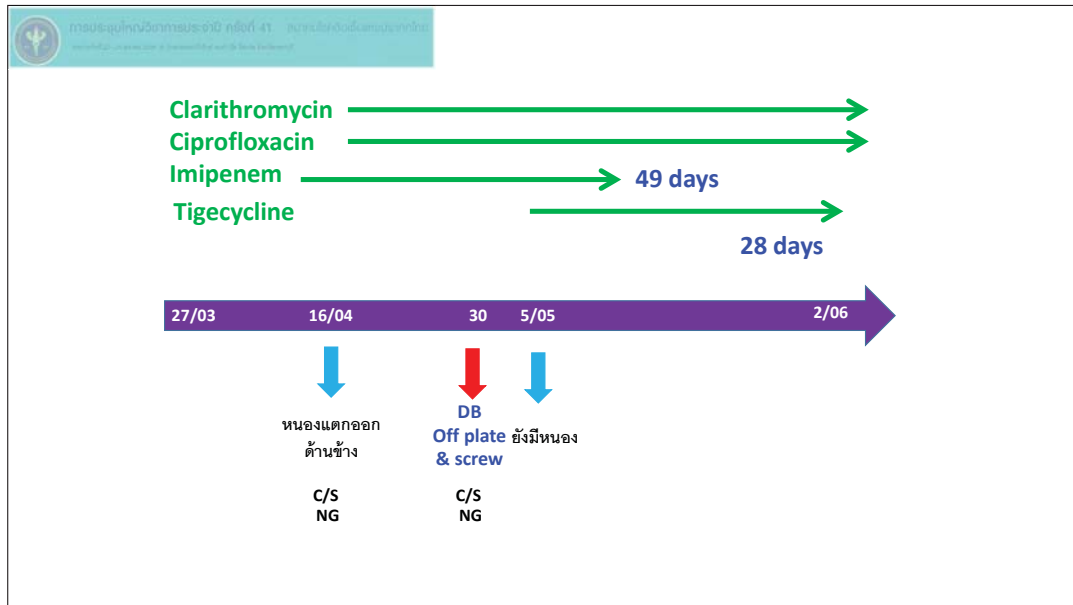
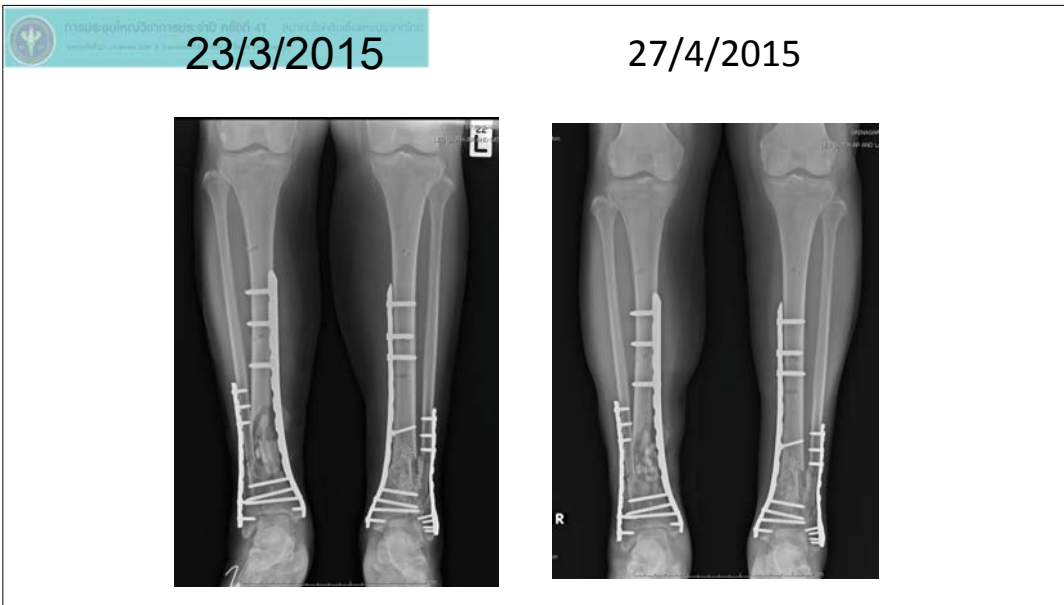
- A 52 year-old-man presented with low grade fever and left eye pain and redness for 2 days.
- Then, he was admitted and his diagnosis was corneal ulcer at left eye.



## IW6480

- A 68 y-o female case
- 16 Jan 2015: Admitted with motor vehicle accident
  - blunt chest injury with multiple ribs fracture
  - Tear liver
  - Open fracture both bones
  - Open fracture proximal phalanx





การดูแลผู้ป่วยโรคกระดูกอักเสบ 31: การดูแลผู้ป่วยโรคกระดูกอักเสบ

Test Name Result

CULTURE & SENSITIVITY : PUS & WOUND SWAB

SPECIMEN: Leg ขาขวา

\* Aerobic Culture \*

1. Mycobacterium fortuitum

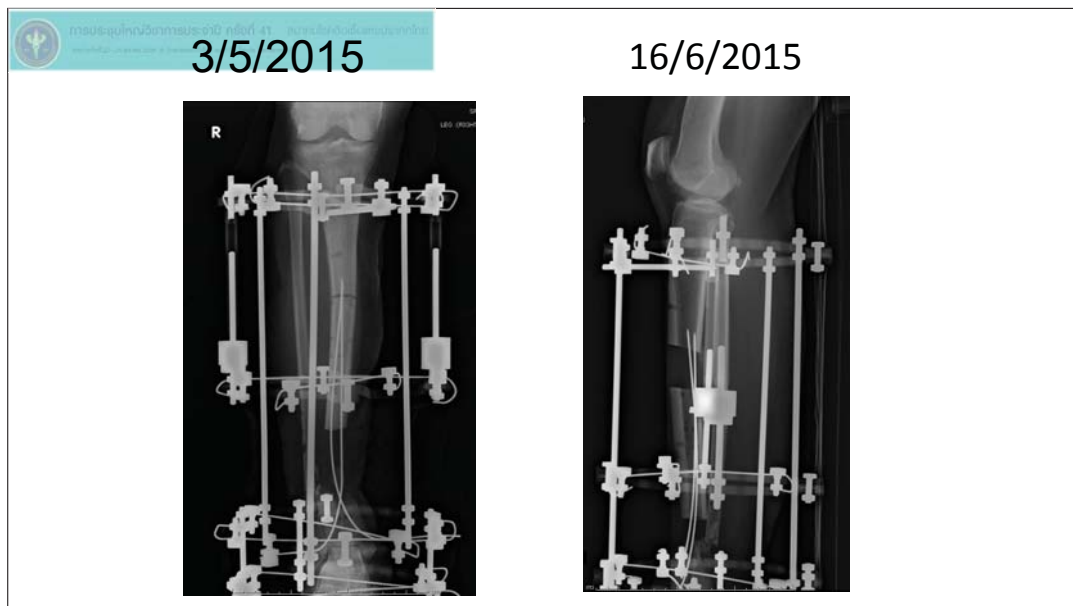
1-2-3 1-2-3 1-2-3

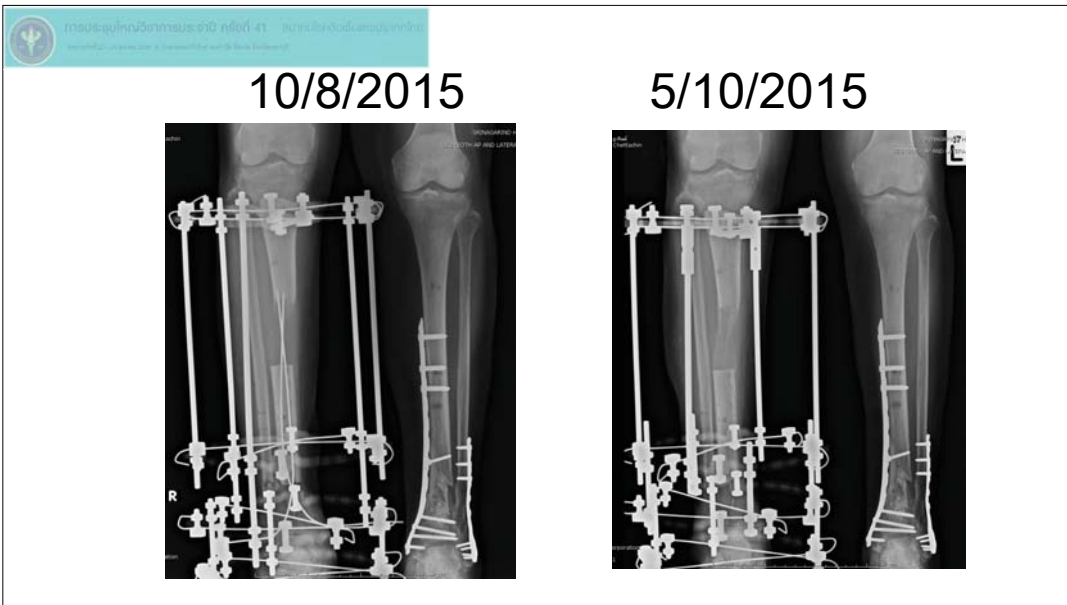
AMIKACIN..... S CEFTRIAXONE..... R  
TRIMETHO/SULFA. R MINOCYCLINE..... R  
CEFOXITIN..... I TOBRAMYCIN..... R  
CLARITHROMYCIN. I  
DOXYCYCLINE..... R  
IMIPENEM..... R  
TIGECYCLINE..... S  
LINEZOLID..... I  
CEFEPIME..... R  
AMOXICIL/CLAV.. R

MIC/MBC ORGANISM : Mycobacterium fortuitum (Numerous)

| AGENTS                      | METHOD     | MIC (ug/mL) | MBC (ug/mL) | BREAKPOINTS (ug/mL) | DATE      |
|-----------------------------|------------|-------------|-------------|---------------------|-----------|
|                             |            |             | S I R       | PERFORMED           |           |
| Amikacin                    | Broth Dil. | <= 1.0      | <= 16       | >= 64               | 01-May-15 |
| Amoxicillin/Clavulanic acid | Broth Dil. | 64          | <= 8        | >= 32               | 01-May-15 |
| Ciprofloxacin               | Broth Dil. | <= 0.125    | <= 1        | >= 4                | 01-May-15 |
| Clarithromycin              | Broth Dil. | 4           | <= 2        | >= 8                | 01-May-15 |
| Ceftriaxone                 | Broth Dil. | > 64        | <= 1        | >= 4                | 01-May-15 |
| Doxycycline                 | Broth Dil. | > 16        | <= 1        | >= 16               | 01-May-15 |
| Cefepime                    | Broth Dil. | > 32        | <= 2        | >= 16               | 01-May-15 |
| Cefoxitin                   | Broth Dil. | 32          | <= 16       | >= 128              | 01-May-15 |
| Imipenem                    | Broth Dil. | 16          | <= 4        | >= 16               | 01-May-15 |
| Linezolid                   | Broth Dil. | 16          | <= 8        | >= 32               | 01-May-15 |
| Minocycline                 | Broth Dil. | > 8         | <= 4        | >= 16               | 01-May-15 |

LAB NO.: 3-0391





การดูแลผู้ป่วยโรคกระดูกสันหลัง: กรณีที่ 41 - การดูแลผู้ป่วยโรคกระดูกสันหลัง

## GE6058

- A female patient
- 2005: Dx thyroid nodule
- Nov 2007: lymphadenopathy
- 2008: Thyroidectomy with lymph node biopsy  
Patho: adenomatoid goiter and reactive hyperplasia  
Lymph node enlarged with ulcerated
- Sep 2010: Dx **Salmonella** pneumonia with Blood culture +ve
- Oct 2010: LN Bx: granulomatous lymphadenitis, AFB +ve

การดูแลผู้ป่วยโรคกระดูกสันหลัง: กรณีที่ 41 - การดูแลผู้ป่วยโรคกระดูกสันหลัง

## GE6058



## GE6058

- Started Tx: **clarithromycin+ofloxacin+ETB**  
Developed allergic shock from ETB  
On only clarithro + Ofloxacin
- Culture LN for mycobacteria: NG
- IFN- $\gamma$  Ab +ve
- Persistent ulcerated lymphadenopathy
- Aug 2011: LN biopsy: culture +ve **MAC**  
add **Amikacin**
- Creatinine rising 1.0 to 1.5 without improvement



Admitted Aug-Oct 2011 with **massive pericardial effusion** while on treatment with **Clarithromycin+ofloxacin+INH**

1/9/2011



28/9/2011



## GE6058

- Pericardial window was performed  
Pathology: fibrinous thickening no inflammation
- Patient refuse to take anti-TB



Nov 2011: Developed **right pleural effusion** with constrictive pericarditis





13/3/2012



GE6058

- April 2012: Pericardial fluid Culture positive **MAC**
  - Patient developed rash after add **Rifampicin**



Sep-Oct 2012: admitted with  
**osteomyelitis Lt humerus**



- Sep-Oct 2012: admitted with **osteomyelitis Lt humerus and lymph node enlarged**
  - Try treat with **imipenem** 34 days (presumptive co-infected with RGM)
  - Add **linezolid** for 1 year
  - Continued **clarithromycin + ofloxacin**

**Brown-Elliott BA. Clin Microbiol Rev 2012; 25:545-582**



## Antimicrobials used for treatment of commonly encountered species of nontuberculous mycobacteria

| NTM                     | Antimicrobials   |
|-------------------------|--|
| <i>M. avium</i> complex | Clarithromycin-azithromycin, rifampin-rifabutin, ethambutol, moxifloxacin (50%), ciprofloxacin (25%) ; amikacin, streptomycin, linezolid (50%)                 |
| <i>M. kansasii</i>      | Clarithromycin-azithromycin, rifampin-rifabutin, trimethoprim-sulfamethoxazole, ethambutol, isoniazid, moxifloxacin, ciprofloxacin, linezolid (oral); amikacin |

Brown-Elliott BA. Clin Microbiol Rev 2012; 25:545-582



## Difficulty in NTM infection

### Underlying host factor

- Underlying Bronchiectasis
- Cystic Fibrosis
- Genetic Mutations: CXCR4 dysfunction
- Tumor Necrosis Factor: anti-TNF- $\alpha$  therapy
- HIV/AIDS
- Gamma Interferon and Interleukin-12 Receptor Defects
- IFN- $\gamma$  Ab