

The background features a grid of squares in various shades of orange and white. A large, solid orange rectangle is positioned in the center, containing the text. To the left of this rectangle, there is a vertical column of overlapping squares in different shades of orange, creating a stepped effect.

Tuberculosis

Identification:

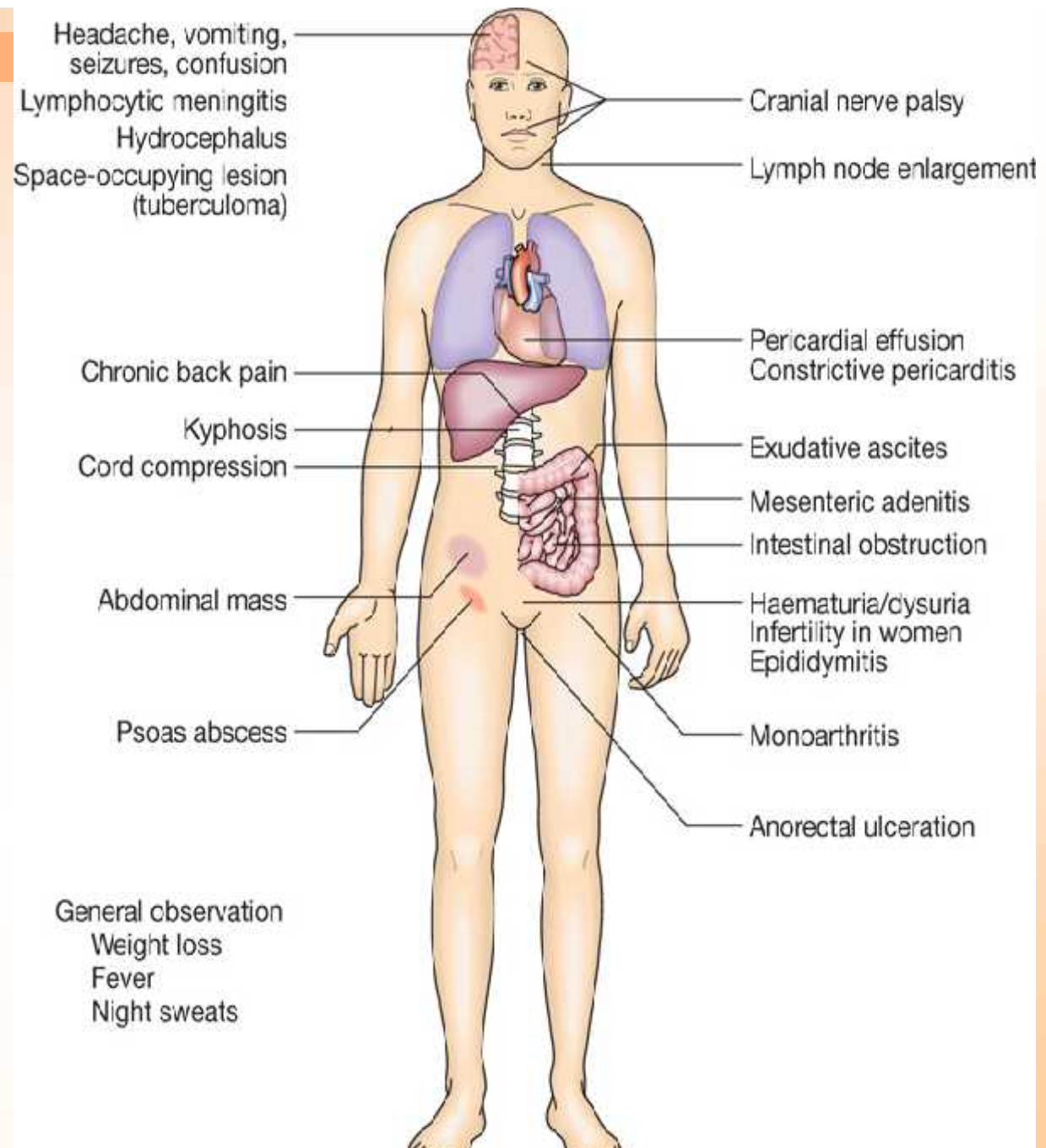
- TB is a major cause of disability and death in most of the world, specially in developing countries.
- It is estimated that around one-third of the world's population has latent TB.
- In 2006, there were an estimated 9.2 million new cases, 14.4 million prevalent cases and 1.5 million deaths attributable to TB.
- 90% of the initial infection heal leaving no residual changes.
- About 10% of the initial infection will eventually develop active disease, half of them during the 1st 2 years following infection;

■ Identification:

- Risky individuals (initial infection progress rapidly to active TB): infants; where the disease is miliary and immunosuppressed as HIV +ve individuals.
- TB disease may affect any organ or tissue.
- If untreated, about 65% of sputum smear +ve pul.TB die within 5 years.
- Symptoms: fatigue, fever, night sweating and weight loss + localized symptoms as cough, hemoptysis.

TB may affect any organ or tissue; in order of frequency:

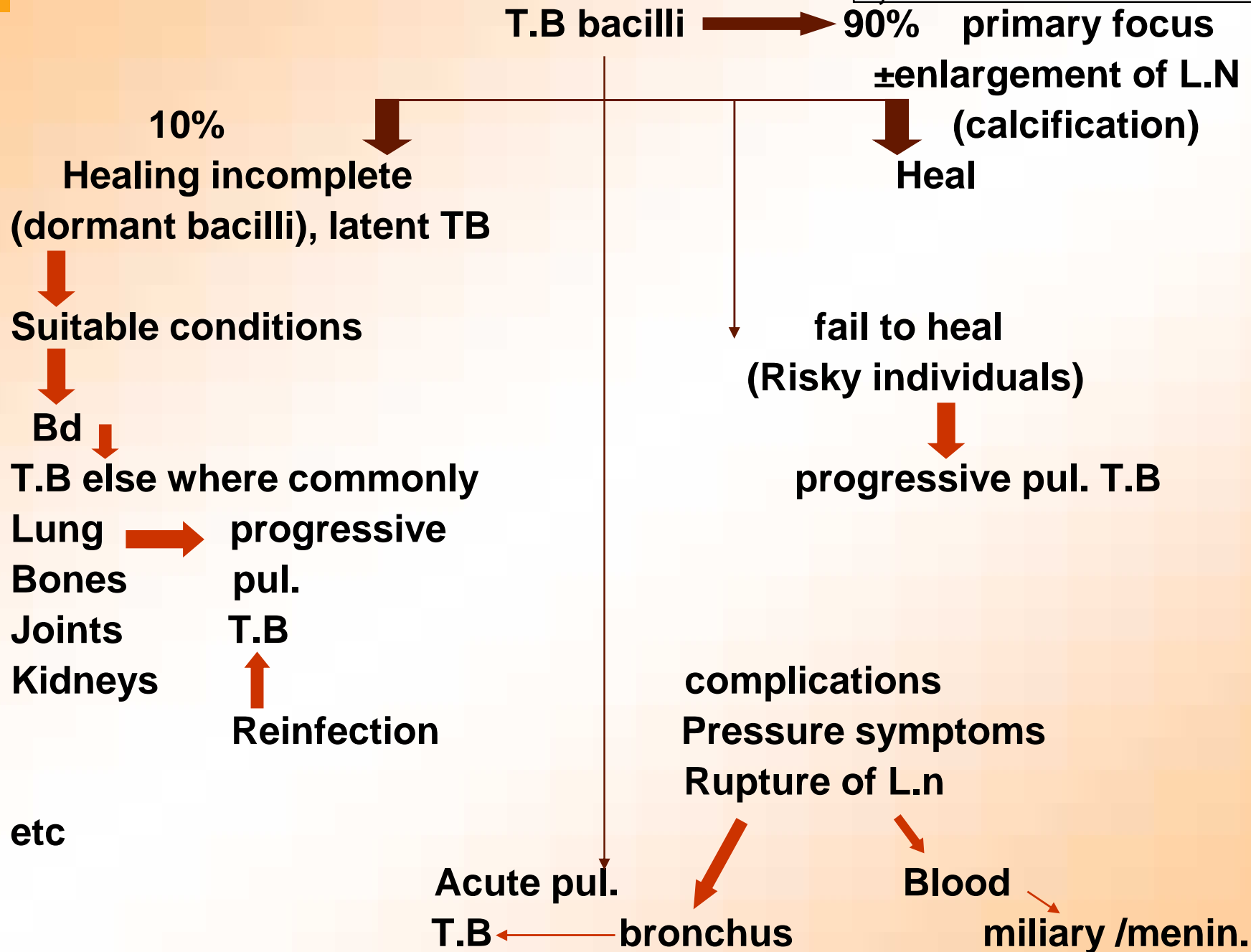
- 1- Lymph nodes
- 2- Pleura
- 3- Genito-urinary tract
- 4- Bones and joints
- 5- Meninges
- 6- Gastro-intestinal tract
- 7- Peritoneum
- 8- Pericardium



Systemic presentations of extrapulmonary TB.

Pathogenicity

Lung (other tonsil, ileo-cecal, skin...)




History

Improving in social conditions and nutrition decrease risk of TB infections and deaths.

TB Death Rate / 100,000 population / USA

1800-1880	400
1900	245
1920	119
1932	64
1965	4.1
1968	3.1



Dx:

1. Clinical [unexplained fever + night sweating + cough] for > 3 weeks suspected TB.
2. CXR pul. infiltration and cavitations ... most commonly in the upper segments of the lobes.
3. Sputum smear (AFB)
4. Sputum culture
5. Tuberculin test
6. Others as biopsy

Consolidation/collapse

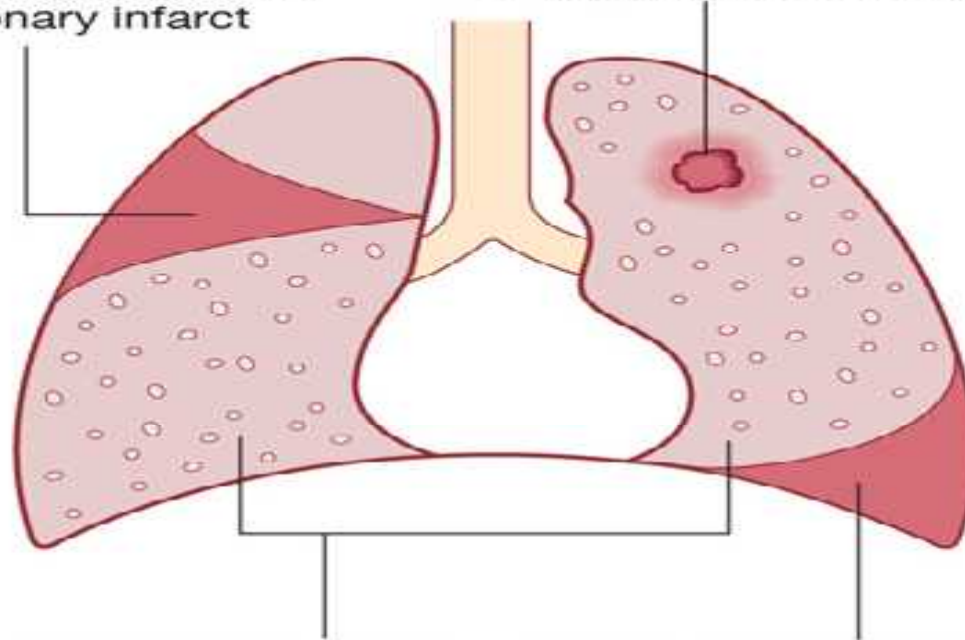
Differential diagnosis

- Pneumonia
- Bronchial carcinoma
- Pulmonary infarct

Cavitation

Differential diagnosis

- Pneumonia/lung abscess
- Lung cancer
- Pulmonary infarct
- Wegener's granulomatosis
- Progressive massive fibrosis



'Miliary' diffuse shadowing

Differential diagnosis

- Sarcoidosis
- Malignancy
- Pneumoconiosis
- Infection (e.g. histoplasmosis infection)

Pleural effusion/empyema

Differential diagnosis

- Bacterial pneumonia
- Pulmonary thromboembolism (pulmonary infarct)
- Carcinoma
- Connective tissue disorder

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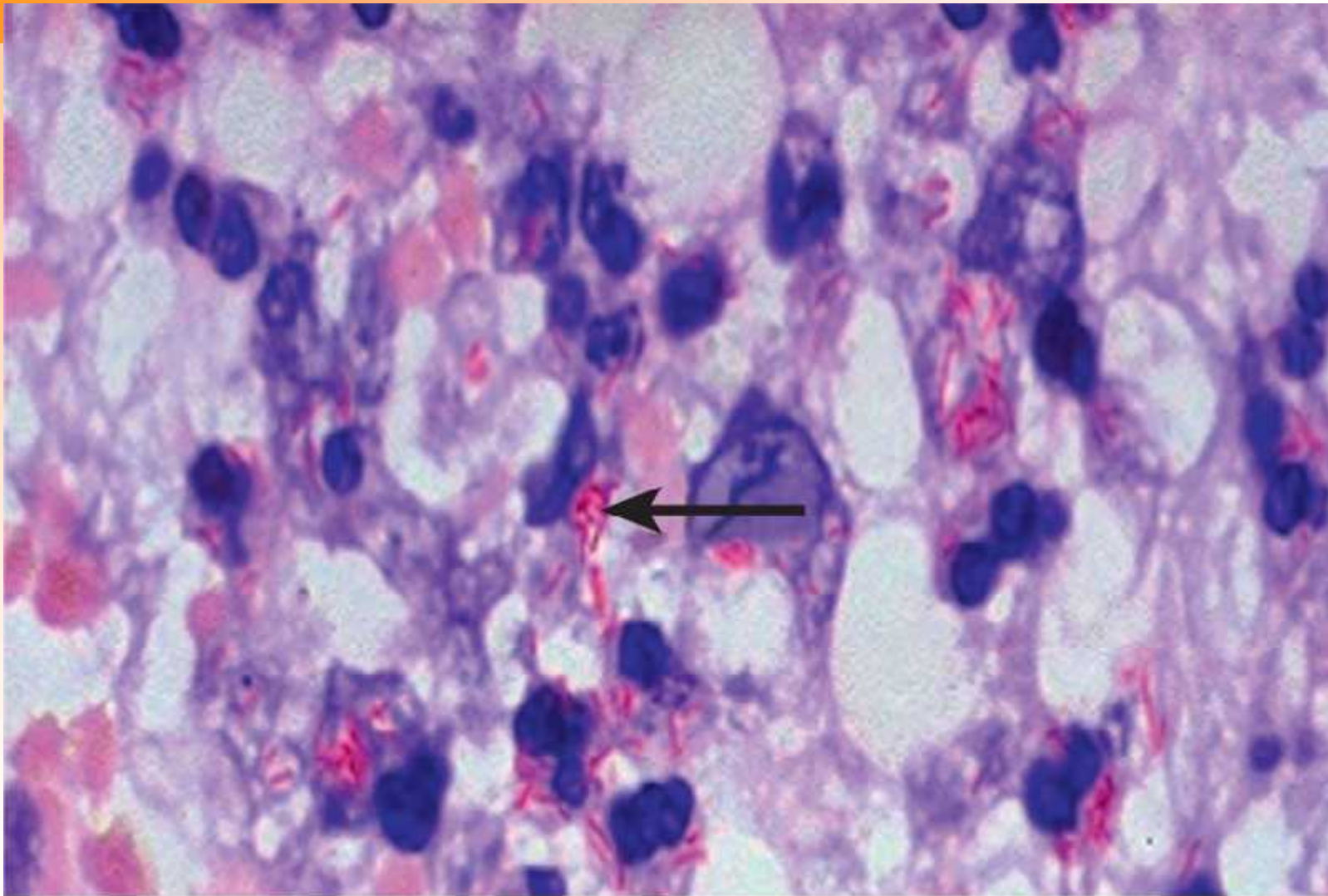
Chest X-ray: major manifestations and differential diagnosis of pulmonary TB.

Sputum smear for AFB:

To detect the bacilli in sputum smear need 10 000 bacilli / mL.

Only 50 – 80% of patients with active pulmonary TB will have a +ve smear test.

**At least 2 smears but preferably 3, including an early morning sample .*



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Positive Ziehl-Neelsen stain. Mycobacteria retain the red carbol fuchsin stain despite washing with acid and alcohol.

Tuberculin skin test (T.T)

Type : old tuberculine –not in use

Purified Protein Derivative standard (PPDs)

Dose : 5 T.U

Methods :

1. Standard method-quantitative intradermal test (Mantoux test).
2. Multiple puncture test (Heaf test).

Note: the reactivity of T.T is not affected by treatment.

Technique :

1. **Heaf test –(for surveys)**

3-7 days +ve 4+ indurated papules at punctures

Atypical grade 1 : 4-6 papules

+/- grade 2 : confluent papules ring

Infected by } grade3 : central induration

Tubercle B. } grade 4 : indurated +necrosis (> 10 mm)

2. **Mantoux test**

Read 2-4 days (indurate skin diameter: 5 10 15mm)

Injection on flexor of forearm I.D.

+ ve test when raised area of inflammatory edema not less than 10 mm surrounded by Erythematic ring.

Skin testing in TB

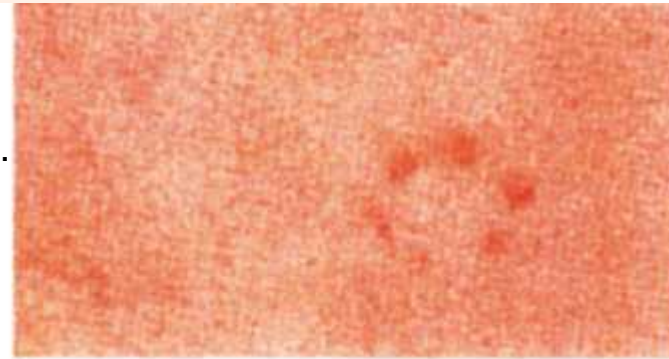
A

Negative.



B

Grade 1.



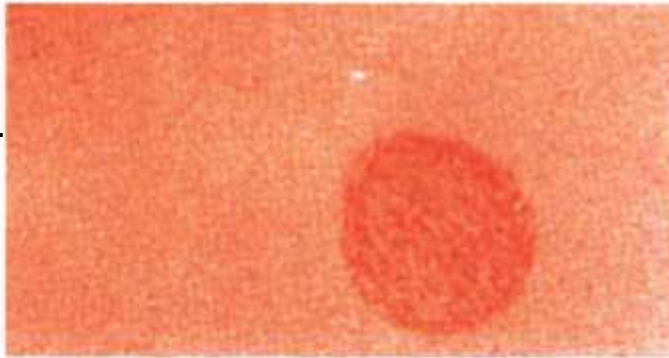
C

Grade 2.



D

Grade 3.



E

Grade 4.



+ ve tuberculin test

1. Active TB
2. Old healed TB (primary focus)
3. BCG vaccine
4. Atypical M. infection

- ve tuberculin test

1. 10 – 20% of active TB (false - ve)
2. TB meningitis and miliary TB
3. Newborn and elderly
4. Recent infection as measles with acute exanthemata
5. HIV and immune suppressive drugs

These limitations may be overcome by employing interferon-gamma release assays (IGRAs)

**In developing countries T.T has limited use in the
Dx of TB**

2. Infectious agent:

Mycobacterium tuberculosis

in human

M. bovis in cattle

M. Avium in birds

Tubercle bacilli

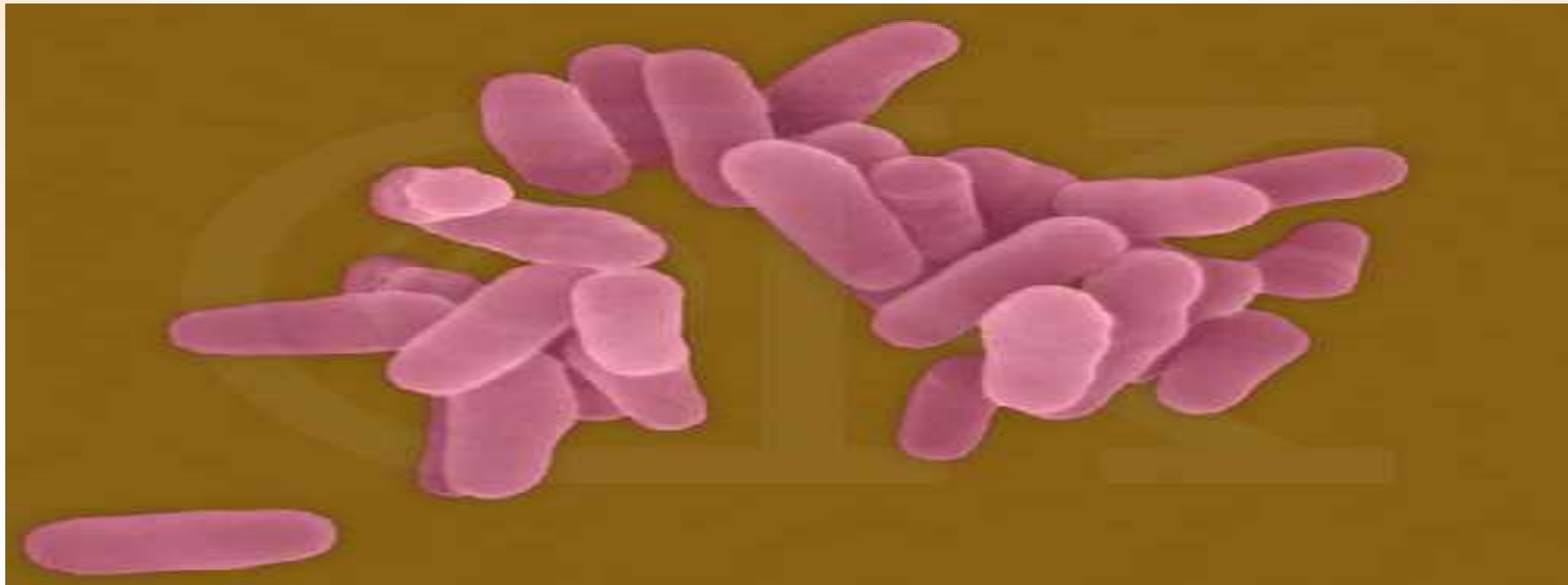
M. africanum. and *M. canettii*, responsible for a small number of cases in Africa.

Other mycobacteria occasionally produce disease clinically indistinguishable from tuberculosis.

Human infection with *M. bovis* is still a problem in areas where the disease in cattle has not been controlled and milk and milk products consumed raw.

Structure of the TB Bacillus

- *M. tuberculosis* is a thin aerobic organism.
- Multiply slowly and acid-fast.
- Thin rods that can occur in clusters and alone.
- Sensitive to sun, ultraviolet light,



3. Occurrence: worldwide

Commonest communicable disease in the world,

In 2006 global data:

Prevalence 14.4 million of infectious TB

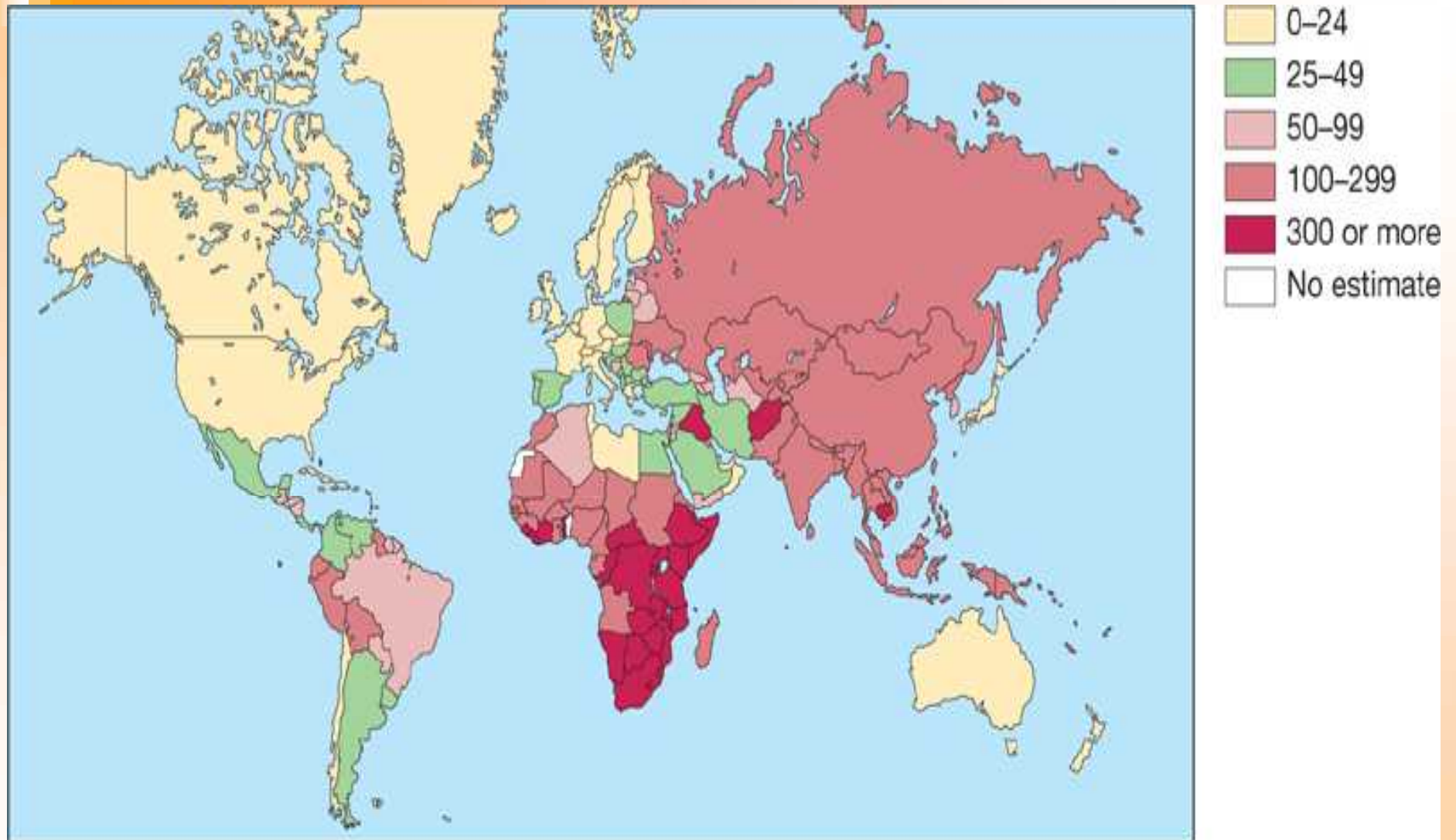
Incidence 9.2 Million / year

Death 1.5 million / year

95% of TB cases and 98% of TB deaths in the developing countries.

☹ Infected children or adult (latent T.B) life time risk of T.B is 10 %

☹ Latent T.B + HIV life time risk of T.B is 50 %



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World-wide incidence of TB. Estimated new cases (all form)/100000population(WHO)

3- Occurrence cont.,.

- The highest rates per capita are in Africa, especially the eastern and southern sub-regions (***up to 1 000 per 100 000 population***), but the highest numbers are reported in Asia (nearly 60% of all cases).
- In Nineveh – 2010: no. of new cases was 463
92% of them above 15 years of age.

TB disease caused by *M. bovis* accounts for approximately 1% of all reported TB cases.

4. Reservoir:

primarily humans, in some areas diseased cattle.

5. Mode of transmission:

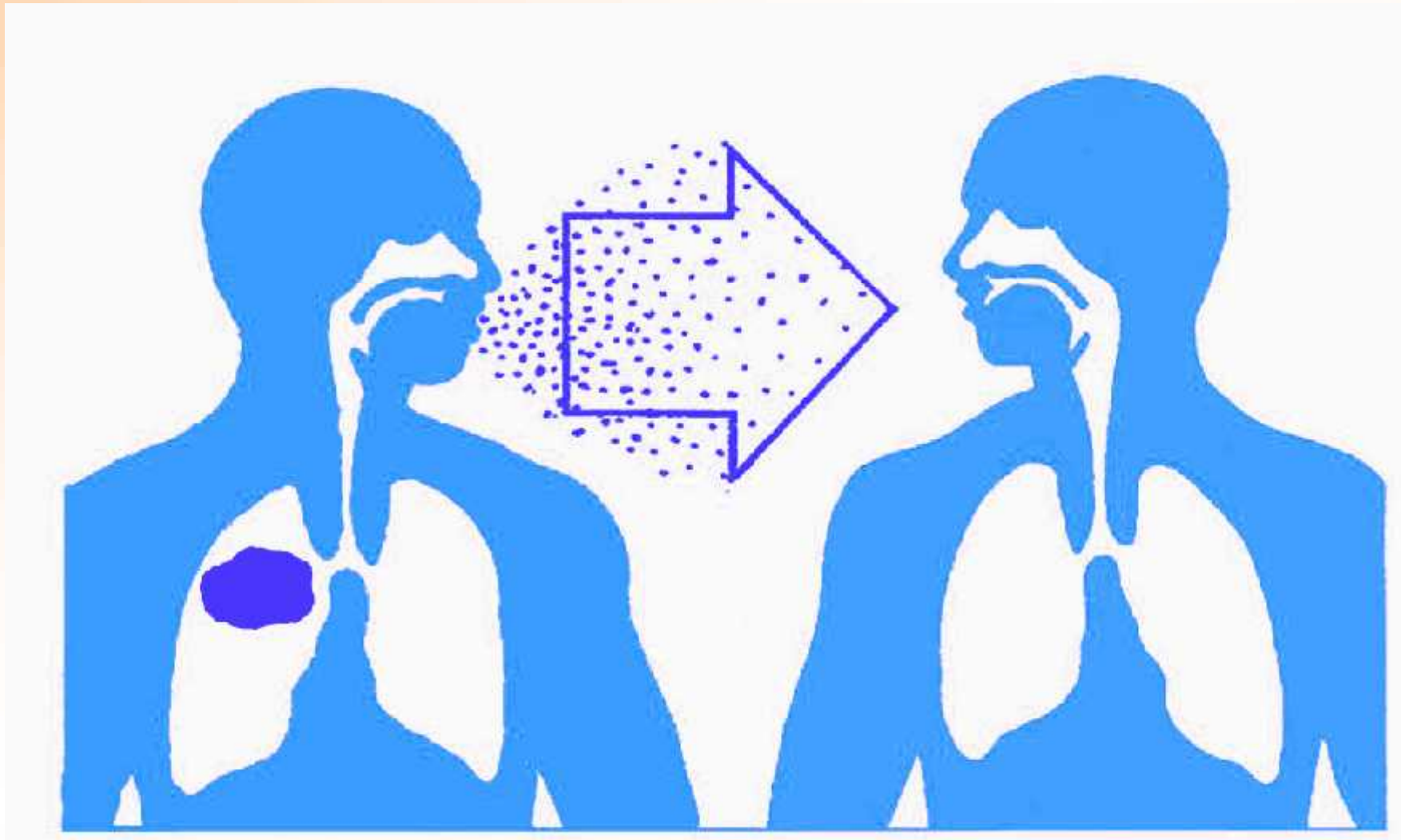
1. **Air-borne transmission by droplet nuclei 1 – 5 microns in diameter** (person with pul. Or laryngeal TB) coughing, singing or sneezing inhaled via contacts pul. Alveolae alveolar macrophages initiating a new infection. It required prolonged close contact.

laryngeal TB is highly contagious but rare.

2. **Bovine TB (infected cattle)** either ingestion of raw milk or dairy products (unboiled or unpasteurized), or air-borne infection to farmers
3. contact infection: direct contact of braded skin and mucosa are extremely rare.

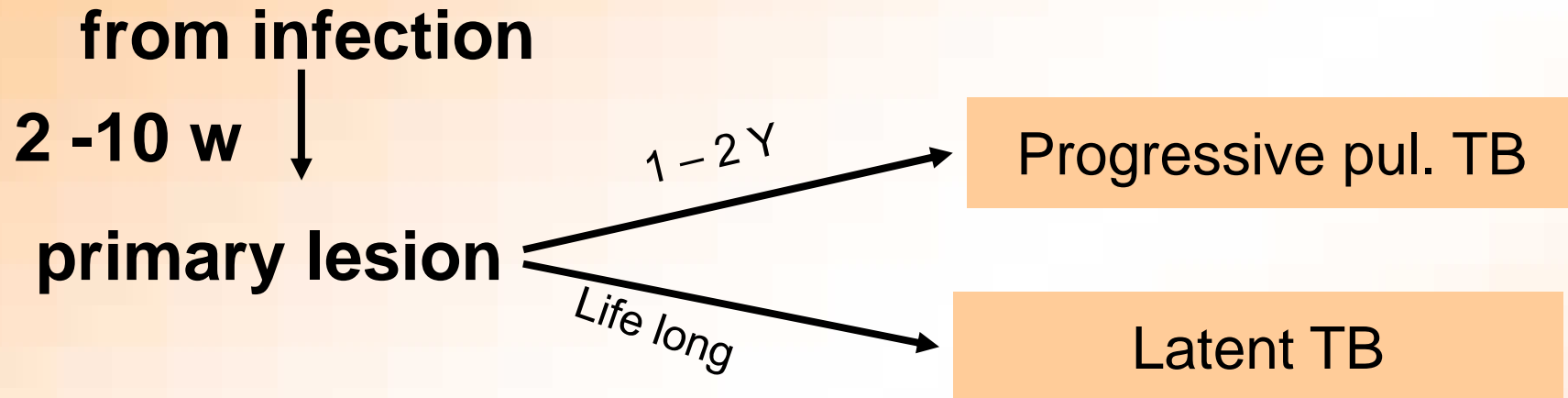
Note: extrapul. TB not contagious except where there is draining sinus.

How Are TB Germs Spread?





6. Incubation period:



7. Period of communicability:

As long as the bacilli present in the sputum (+ve smear for AFB). Effective Rx eliminates communicability within 2 – 4 weeks.

Children with primary TB are not infectious.

8. Susceptibility:

Factors affecting the development of active T.B

1. **Immunity** as TB + HIV, underweight or undernourished.
2. **Dose**
3. **Age:** highest in children under 3 years, lowest in later childhood, high again in young adults males and the very old.
4. **Socio-economic status** over crowding, malnutrition, bad ventilation. Morbidity and mortality rates are higher *among poor and minority populations,*
5. Usually higher in urban areas.
6. Smoking.
7. **Heredity** no rule
8. **Individual conditions** [Silicosis, type I D.M, gastrectomy, malabsorption, vitamin A or D deficiency, high-dose steroids, certain cancers]

9. Methods of control

A- Preventive measures:

1. Health education of suggestive symptoms to people: **unexplained cough > 3 weeks**. also H.E on curability of TB.
2. Improving socio – economic conditions.
3. **Maximum number of case detection and Rx**
 - i. Sputum smear is the mainstay of Rx, it's the most cost-effective method of case finding and is 1st priority in developing countries.

Why not sputum culture?

Why not mass miniature CXR?

9. Methods of control

A- Preventive measures:

3. Maximum number of case detection and Rx

ii. Risky groups, do whatever investigations:

- 1.** Contacts of an active case.
- 2.** Medical workers.
- 3.** Military forces and school teachers
- 4.** Young adults on university admission.

iii. Successful treatment:

Problems of Rx defaulters

Solutions of defaulters :

- Rx under supervision (DOTS)
- involving local community.
- mobile + peripheral Rx centers.
- checking drug consumption.
- Rx resistant cases.

4. Chemoprophylaxis (for close contacts especially < 5 years)

- a. Isoniazid tab. for 6 – 12 months was effective in preventing progress of latent TB into active TB. (be aware from side effect as hepatitis, allergy, skin rash).**
- b. HIV +ve persons with +ve T.T should received INH for latent TB (exclude active TB).**
- c. During pregnancy; postpone treatment until after delivery.**
- d. Not routinely indicated in developing countries to avoid drug resistance.**
- e. Mass chemoprophylaxis is unrealistic.**

5. Pasteurization /sterilization of milk/M.bovis

6. B.C.G (Bacillus Calmette Guérin)

B.C.G (Bacillus Calmette Guérin)

Live attenuated vaccine

Indications: given to all new born babies in developing countries including Iraq within 1st week of life.

Also given to all T.T -ve contacts.

Dose : 0.1 ml adult / 0.05 ml children / ID/ Deltoid.

Red papule vesicle 4 - 8w. deep permanent scar.

Protection : ?? up to 80%. In Iraq 60 – 70 %.

Protect against severe form: T.B meningitis /miliary T.B

Immunity : 12 -20 years.

Complications : suppurative Lymphadenitis 0.1 - 4.3 % among < 2 years, local abscess.

Not routinely indicated in developed countries [used for high risk groups].

B- Control of patients, contacts and environment:

- 1) **Reporting:** class II.
- 2) **Isolation:** Hospitalization only for severe illness, otherwise its ambulatory Rx. Stick respiratory precaution until sputum – ve and no cough.
- 3) **Disinfection** of purulent discharges.
- 4) **Quarantine:** not applicable.
- 5) **Management of contacts:**
 - 1) Surveillance for contacts (T.T in developed countries).
 - 2) Chemoprophylaxis can be given after ruling out of TB disease especially for under 5 aged contacts.
- 6) **Investigation of contacts and source of infection:** sputum smear for household contacts who have respiratory symptoms.
- 7) **Specific treatment:**



Face respirator

Rx

1. Objectives of individual Rx

- Anti :T.B drugs should be used in combination (3 drugs)

Continue (2drugs)

e.g INH (isoniazid)+Rifampicin + streptomycin

2. It is an ambulant chemotherapy

3. Follow –up of the patient

- During Rx-very important by monthly sputum smear
- After Rx ±

Note: if smear +ve at month 5 Rx failure.


4. Tracing contacts

- By T.T especially for children, if +ve do CXR.

DOTS:


- **Directly Observed Therapy-Short course.**

2M  **INH + Rifampicine + Pyrazanimide & Ethambutol**
(Daily)

4M  **INH + Rifampicine**
(twice weekly)

Advantages

1. **Effective (95% cure rate)**
2. **Cost –effective (20 \$ for 6 M treatment)**
3. **Easy to apply and used.**
4. **Can be applied by paramedics**
5. **Doesn't require hospitalization or isolation.**
6. **Supply good records for follow up.**
7. **Shorter duration.**
8. **DOTs help prevent drug resistance**

- 
- Pregnancy: all safe except streptomycin.
 - Lactation: all safe + baby [BCG & INH]
 - OCP: rifampicin decrease effectiveness of Pills so increase possibility of pregnancy so use higher dose of estrogen or use other method of contraception.

Stop TB initiative

TB was declared by WHO in 1993 as global emergency

Main Aims

- 1. to use DOTS**
- 2. political commitment**
- 3. Guarantee adequate financing & human resource**
- 4. Improve management capacity**
- 5. Ensure un interrupted supplies of high – quality anti TB**

Action

A ministerial conference 20 highest TB burden countries in Amsterdam 2000 to stop T.B

WHO TB control policy package:

1. Government commitment
2. Case detection by positive case finding
3. DOTS
4. Establishment & maintenance of Monitoring system for program supervision & evaluation.

