CHILDHOOD TUBERCULOSIS

What is Tuberculosis??

It is a *chronic infectious disease*

caused by bacteria,

Mycobacterium Tuberculosis.

Where does Tb affect??

Tuberculosis primarily affects lungs

↓

Pulmonary Tuberculosis

Other sites-

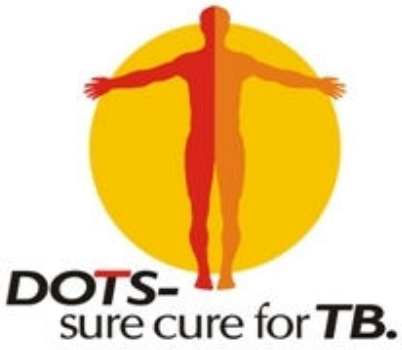
- intestine
- meninges
- bones and joints
- skin and other tissues of body

OF THIS, PULMONARY TUBERCULOSIS IS THE MOST IMPORTANT ONE THAT AFFECTS MAN.

- Causative organism for tuberculosis was discovered more than 100 years ago
- Highly effective drugs and vaccines are available

⇩

This means, tuberculosis is a preventable and curable disease.



Then, Why are we so concerned about this disease??

Despite all these facts, tb still remains one of the deadliest diseases in the world, killing nearl 2 million people every year.

WHY??

More than **90% of all tuberculosis cases occur in developing countries**, where limited resources are available for optimal treatment and standard of living is lower.

Therefore, control of tuberculosis
can be achieved with
application of available technical knowledge and health resources(vaccines and drugs),
coupled with
changes in non specific determinants of disease

- improvement in standard of living
- quality of life of people

DOTS-
sure cure for TB.

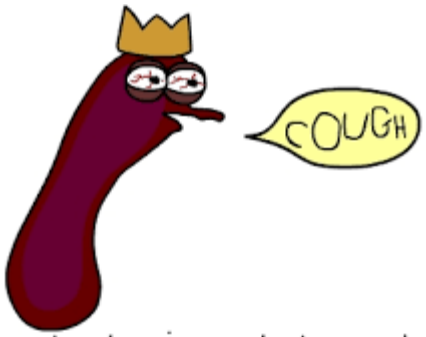
EPIDEMIOLOGY

- The actual burden of pediatric tuberculosis is not known due to diagnostic difficulties. **It is assumed that 10% of tuberculosis burden is in children.**
- **In developing countries, 2-5% of children are at risk of tuberculosis infection.**

- A child infected with M.tuberculosis has 10% chance of developing tuberculosis disease during lifetime.

In India, over 1lakh children die from Tb every year.

Agent-



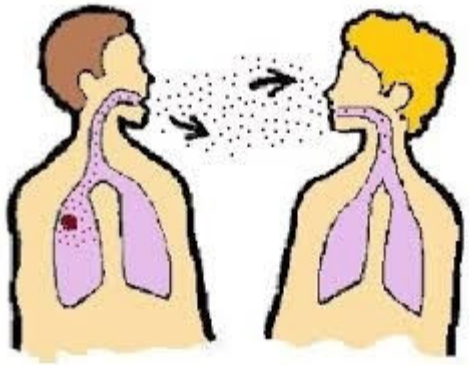
Mycobacterium tuberculosis

Reservoir of infection-

tuberculosis patient who discharge tb bacilli in sputum and nasopharyngeal secretions

Transmitted by-

inhalation of droplets of infected secretions.



Rarely, through skin, mucous membrane and transplacentally

HOST FACTORS

AGE-

Tb can develop in any age group.

An Infant is more likely to develop infection as compared to older child.

ENVIRONMENT-

The risk of acquiring infection is associated with extend of **contact with index case.**

MALNUTRITION-

Undernourished children *are more susceptible to develop tuberculosis due to depressed immunity.*

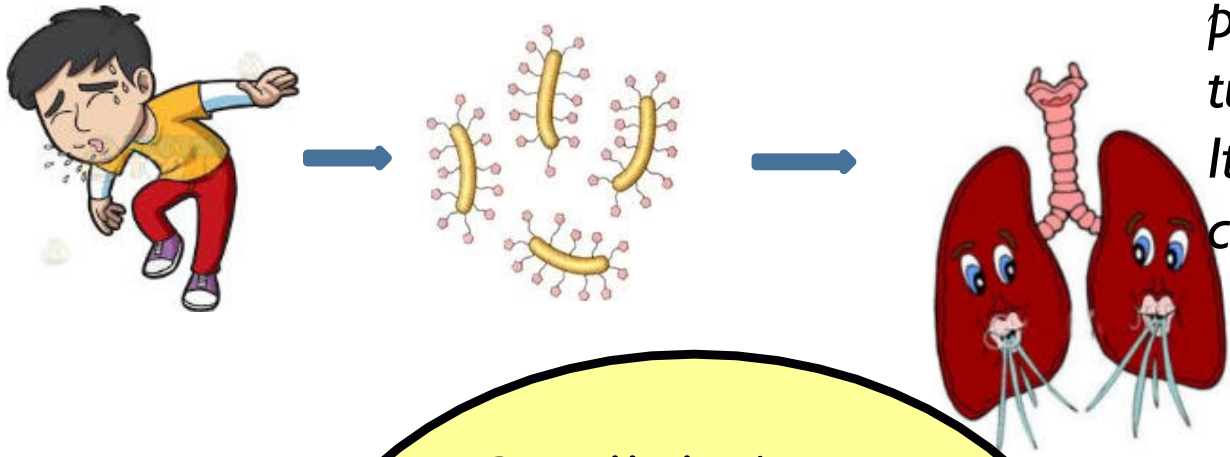
IMMUNODEFICIENCY-

Children with **primary or secondary immune** *deficiencies are more likely to develop tuberculosis.*

SEX-

Adolescent *girls are prone to develop active tuberculosis during puberty.*

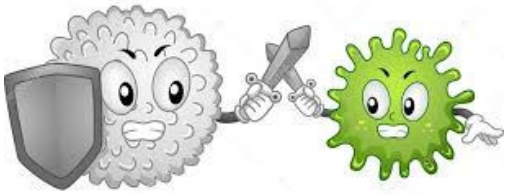
How Is It Caused??



This initial infection is primary pulmonary tuberculosis.
It usually occur in children.

Bacilli lodge in pulmonary alveoli, mostly in upper part of lower lobe and lower part of upper lobe

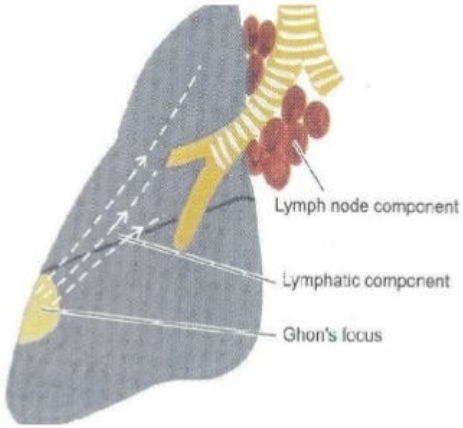
This is followed by Inflammation of the site of lesion, with hyperemia and congestion.



Initially PMNL infiltrate site of lesion, but their phagocytic ability is poor and is eliminated.

This primary focus of inflammation in lungs is

GHON'S FOCUS



GHON'S COMPLEX =

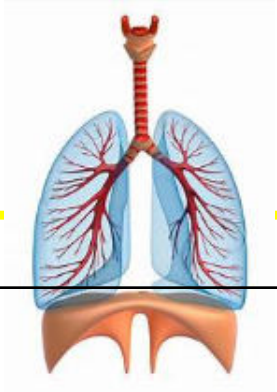
Enlarged regional lymph nodes + interconnecting lymphatic vessels

- *Further course of disease depends on immune response of host.*

Good immune response

Inflammatory exudate around primary focus is absorbed and caseous area inspissated.

fibrosis and calcification.

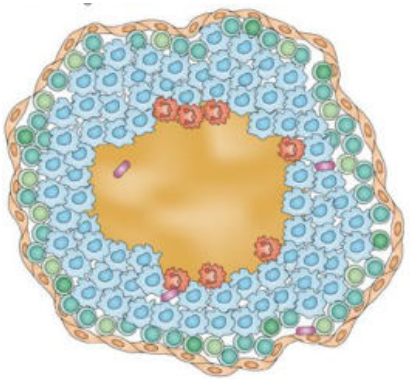


HEALING

Weak immune response

Bacilli continue to multiply, inflammatory process extends to contiguous areas

Primary complex enlarge steadily and develop large caseous center



PROGRESSIVE PRIMARY DISEASE

The caseous center liquefies, then empty into adjacent bronchus

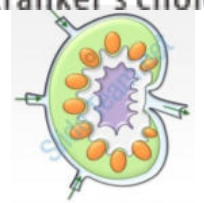
Bacilli continue to multiply and spread to other parts of lobe or entire lung

CAVITY FORMATION

This leads to

CONSOLIDATION OF AREA

BRONCHOPNEUMONIA



ENLARGED LYMPH NODES COMPRESSING AIRWAY LEADS TO

-Airway obstruction

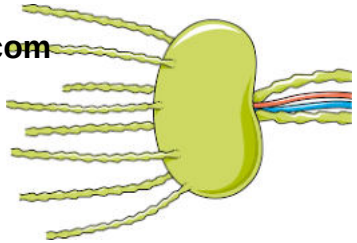
- **Dysphagia** *(subcarinal nodes impinge on esophagus)*
- **Bronchial obstruction**
- **Stridor and respiratory distress** *(due to enlarged Para tracheal lymph nodes)*

Outcomes of Bronchial obstruction are:

- *Atelectasis, if obstruction of bronchus is complete.*
- *Complete expansion and resolution of chest X-ray findings*
- *Bronchiectasis*
- *Disappearance of the segmental lesions*

- **A CASEATED LYMPH NODE MAY ERODE THROUGH THE WALL OF THE BRONCHUS RESULTING IN ENDOBRONCHIAL TUBERCULOSIS.**

Bacilli reach blood stream through lymphnodes



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Focii of infection in different organs

→ **HEMATOGENOUS DISSEMINATION**

Good host immune system → ↓

Disease doesnot occur

Lowered host immunity → ↓

Activation of metastatic focii in different organs

↓

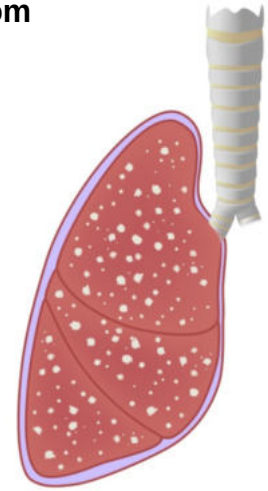
Development of disease

→

- *In young infants*
- *Malnourished children*
- *Children with immunodeficiency*

Massive entry of bacilli into blood stream leads to

Miliary Tuberculosis



Numerous tubercles develop in affected tissues

- Lungs
- Liver
- Spleen
- Kidney
- Meninges
- Brain
- Bones
- Joint
- Intestine
- Skin
- Choroid of eye

These coalase to form multiple lesions of size of millet seeds

- **TUBERCULOUS MENINGITIS** *occurs as a component of miliary tuberculosis when organism reaches CNS through blood stream*

How does the disease present??

- Patient presents with symptoms 4-8 weeks after exposure to TB bacilli.
- Clinical features are different for

Intrathoracic tuberculosis

- *Primary infection*
- *Progressive primary disease*
- *Endobronchial tuberculosis*
- *Miliary tuberculosis*
- *Pleural effusion*

Extrathoracic tuberculosis

- *Tuberculosis of abdomen*
- *Tuberculous meningitis*
- *TB of the superficial lymph nodes*

Clinical Features of Primary Infection

- *Primary infection* usually passes off unrecognized.

ASYMPTOMATIC INFECTION

infection associated tuberculin hypersensitivity and a positive tuberculin test but with no striking clinical or x ray manifestations.

Most symptoms in children with pulmonary primary complex (PPC) are

- mild fever
- anorexia,
- weight loss
- decreased activity.

COUGH IS AN INCONSISTENT SYMPTOM AND MAY BE ABSENT EVEN IN ADVANCED DISEASE.

Progressive primary disease (PPD)

- is the result of the progression of primary disease.
- Children with PPD present with
  - high-grade fever
  - cough
  - Expectoration of sputum and
  - hemoptysis

usually associated with advanced disease and development of cavity or ulceration of the bronchus.

- Abnormal chest signs --dullness,
  decreased air entry
  crepitations.

- Cavitating pulmonary tuberculosis is uncommon in children.

Endobronchial tuberculosis

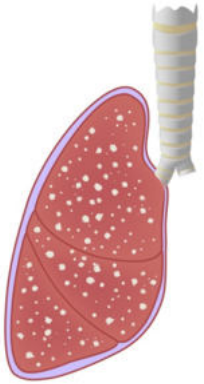
Children present with

- fever and
- troublesome cough (with or without expectoration).
- Dyspnea, wheezing and cyanosis may be present.

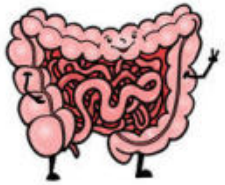
Occasionally, the child may be misdiagnosed as asthma.

IN A WHEEZING CHILD, NOT RESPONDING TO BRONCHODILATORS LESS THAN 2-YR-OLD, THE POSSIBILITY OF ENDOBRONCHIAL TUBERCULOSIS SHOULD ALWAYS BE CONSIDERED.

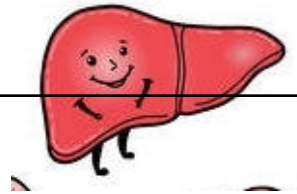
Miliary Tuberculosis



- *Miliary tuberculosis is characterized by hematogenous spread and progressive development of innumerable small foci throughout the body.*
- **The disease is most common in infants and young children.**



- *The onset of illness is often sudden.*
- *The clinical manifestations depend on the numbers of disseminated organisms and the involved organs.*



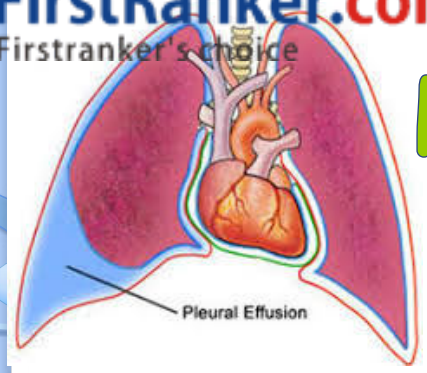
Child presents with:

- *High-grade fever, which is quite unlike other forms of tuberculosis.*

- *dyspnea and cyanosis.*

- *There are hardly any pulmonary findings but fine crepitations and rhonchi may be present.*
- *In severe illness, child has high fever, rigors and alteration of sensorium.*
- *In addition, these children may have lymphadenopathy and hepatosplenomegaly.*
- *The other presentation of miliary tuberculosis may be insidious with the child appearing unwell, febrile and losing weight.*
- *Choroid tubercles may be seen in about 50% patients. Meningitis may occur in 20-30% cases.*

PLEURAL EFFUSION IN TUBERCULOSIS



How is it caused???

- Due to rupture of a subpleural focus into the pleural cavity.

OR

- The pleura infected by hematogenous spread from the primary focus.

- It usually occurs because of hypersensitivity to tubercular proteins. If the sensitivity is high, there is significant pleural effusion along with fever and chest pain on affected side.

TUBERCULOUS EFFUSION IS UNCOMMON IN CHILDREN YOUNGER THAN 5YR OF AGE

Clinical presentation of Pleural Effusion

Onset → insidious or acute

Presents with → rise in temperature
cough
dyspnea
pleuritic pain on the affected side.

There is usually no expectoration.

CLINICAL FINDINGS

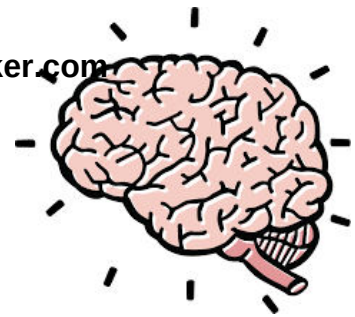
depend on the amount of fluid in the pleural cavity.

Early signs

- Pleural rub
- decreased chest wall movement,
- impairment of percussion note
- diminished air entry on the affected side.

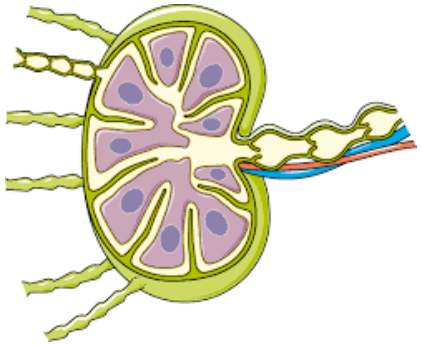
As the fluid collection increases, the signs of pleural effusion become more definite.

EXTRATHORACIC TUBERCULOSIS



- The most common forms of extrathoracic disease in children include tuberculosis of the superficial lymph nodes and the central nervous system.

- Other rare forms of extrathoracic disease in children ------- Osteoarticular
  Abdominal
  gastrointestinal,
  genitourinary,
  cutaneous and congenital disease.



TB of the superficial lymph nodes

- How is it caused??

  associated with drinking unpasteurized cow's milk

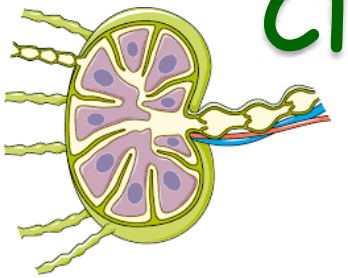
  or

  can be caused by extension of primary lesions of the upper lung fields or abdomen.

- Lymph nodes commonly involved-

  supraclavicular
  anterior cervical
  tonsillar
  submandibular nodes.

Clinical features of tb lymphadenitis



- low grade fever may be the only systemic symptom.
- A primary focus is visible in x-ray 30 to 70% of the time.
- Tuberculin skin test results are usually reactive.

Spontaneous resolution may occur, but untreated lymphadenitis frequently progresses to

- caseating necrosis
- capsular rupture
- spread to adjacent nodes and overlying skin
  - draining sinus tract

TUBERCULOUS MENINGITIS

- *It is the most serious complication of tuberculosis in children.*
- How is it caused??

lymphohematogenous spread of tb bacilli

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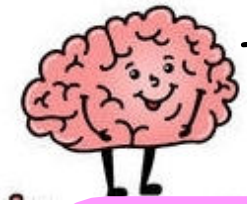
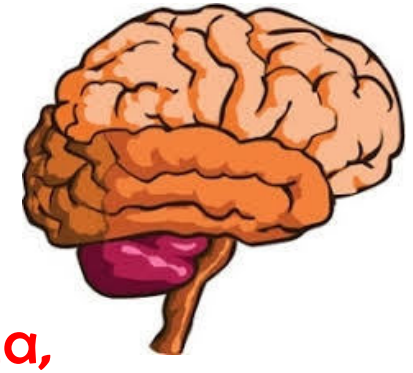


formation of a caseous lesion in the cerebral cortex

Infants and young children are likely to experience a rapid progression to hydrocephalus, seizures and raised intracranial pressure.

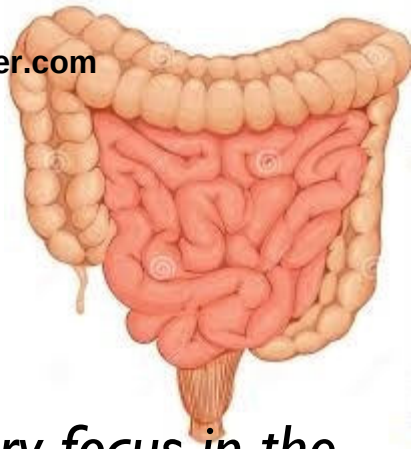
In older children, signs and symptoms progress over the course of several weeks, beginning with fever, headache, irritability and drowsiness.

Clinical features of Tuberculous Meningitis



- The disease advances with symptoms of lethargy, vomiting, nuchal rigidity, seizures, hypertonia and focal signs.
- The final stage of disease is marked by coma, hypertension, decerebrate and decorticate posturing and death.
- *Rapid confirmation of tuberculous meningitis can be difficult because of the wide variability in cerebrospinal characteristics, nonreactive tuberculin skin tests in 40% and normal chest radiographs in 50%.*

Tuberculosis of Abdomen



How is it caused??

- *due to hematogenous spread from the primary focus in the lungs.*

OR

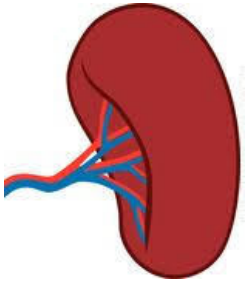
- *secondary to swallowing of the infected sputum by a patient with pulmonary lesions.*

OR

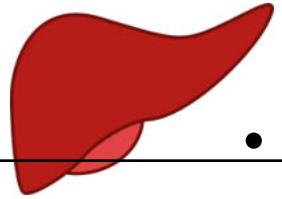
- *due to ingestion of the food contaminated by tubercle bacilli (ths is relatively less common in India as the milk is generally boiled before use.)*

Clinical features of Abdominal Tuberculosis

- Patients with abdominal tuberculosis may remain asymptomatic initially.
- **Symptomatic patients show evidence of tuberculous toxemia and may present with:**



  - *colicky abdominal pain*
  - *vomiting and constipation.*
  - *The abdomen feels characteristically doughy.*
  - *The abdominal wall is not rigid but appears tense, so that the abdominal viscera cannot be palpated satisfactorily.*
  - *The rolled up omentum and enlarged lymph nodes may appear as irregular nodular masses with ascites.*
  - *The liver and spleen are often enlarged.*



Thank You...