THE MANTOUX TEST

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The Mantoux test is used as a screening tool for tuberculosis infection or disease and as an aid to diagnosis.

The standard test for use in Ireland is an intradermal injection of Mantoux 2TU/0.1ml Tuberculin PPD.

The local skin reaction to Tuberculin Purified Protein Derivative (PPD) injected into the skin is used to assess the individual's sensitivity to tuberculin protein.

The Mantoux test does not measure immunity to tuberculosis

NATIONAL GUIDELINES ADVISE MANTOUX TESTING PRIOR TO BCG VACCINATION IN THE FOLLOWING CIRCUMSTANCES (1):

1. Children aged 3 months to aged under 6 years in at-risk environments.

   - *Children in **at-risk environments** include those who are contacts of a pulmonary TB case, who are from an area of high endemnicity or whose parents are from an area of high endemnicity or who have household contacts who may belong to an at-risk group for TB.*
   - ***High incidence countries** refer to countries with an incidence rate of greater than 40 per 100,000*

2. Persons aged 6 years and older.

NATIONAL GUIDELINES ADVISE MANTOUX TESTING PRIOR TO BCG VACCINATION IN THE FOLLOWING CIRCUMSTANCES (2):

3. Infants and children under six years of age with a history of residence or prolonged stay (more than three months) in a country of high endemnicity.

4. Those who have had close contact with a person with known TB.

5. There is a history of TB in a household contact in the last five years.

ADMINISTERING THE MANTOUX TEST:
Materials(1):

- Tuberculin PPD RT 23 SSI, 2 T.U./0.1 ml, solution for injection:
  1 dose = 0.1 ml contains 0.04 microgram Tuberculin PPD.
  - Store at 2°C - 8°C, protected from light

- 1ml graduated syringe fitted with a short bevel 26G (0.45x10mm) needle

ADMINISTERING THE MANTOUX TEST: Materials(2):

- Needle to draw up tuberculin
- Sharps box
- Patient Record
- Although anaphylactic reactions to mantoux testing are extremely rare, facilities for their management should always be available.

ADMINISTERING THE MANTOUX TEST: Discussion with Patient:

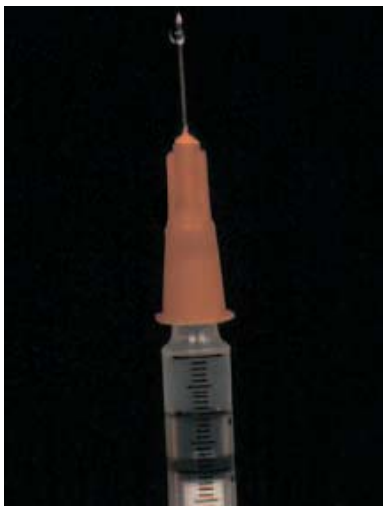
- Explain why the Mantoux test is advised and what is involved in the procedure
- Make arrangements for the patient to return to have the test interpreted. The injection site should be reviewed 48 to 72 hours after the administration.
- Testing with Tuberculin PPD RT 23 SSI may be carried out during pregnancy and lactation
- Tuberculin should not be administered to patients known to be hypersensitive to any component of the medicinal product or to patients who previously have experienced a severe skin reaction to Tuberculin products

ADMINISTERING THE MANTOUX TEST: Checking tuberculin

- Check expiry date and that the vial contains SSI tuberculin 2TU in 0.1ml
  - Care should be taken to store PPD Mantoux tests and BCG vaccine in separate areas of the fridge to ensure that the correct product is administered

- Check that the tuberculin has been stored appropriately
  - Store at 2°C - 8°C, protected from light

ADMINISTERING THE MANTOUX TEST: Prepare The Syringe



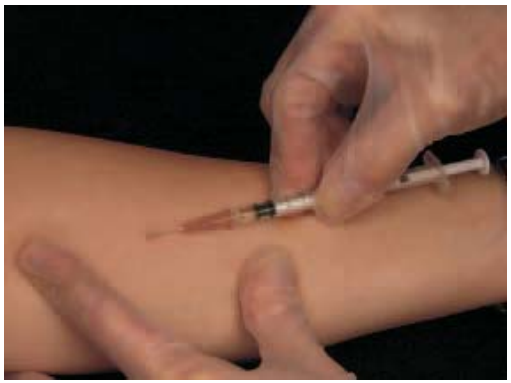
- Securely fasten an appropriately sized needle to a 1ml graduated syringe and draw up just over 0.1ml of tuberculin
- Safely dispose of the needle used to draw up the tuberculin and securely fasten a 26G short bevel needle
- Expel air and excess tuberculin to leave exactly 0.1ml of tuberculin

ADMINISTERING THE MANTOUX TEST:

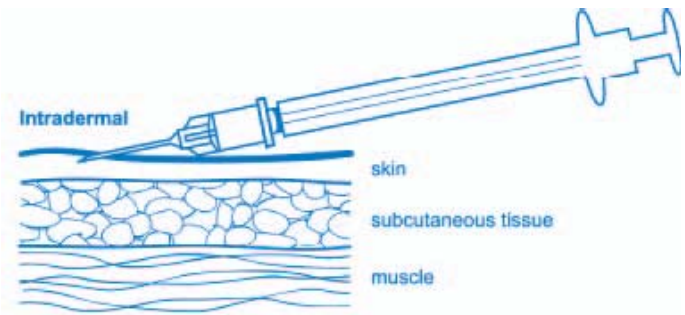
Injection Site

- The test is usually applied on the middle third of the flexor surface of the forearm, as a reaction may be weaker near the wrist or the elbow joint.
- It is usually applied on the left forearm.
- Ensure adequate lighting.
- Select an area of healthy skin which is free of muscle margins, heavy hair, veins, sores, or scars.
- Only visibly dirty skin needs to be washed with soap and water

ADMINISTERING THE MANTOUX TEST: Intradermal Injection(1):

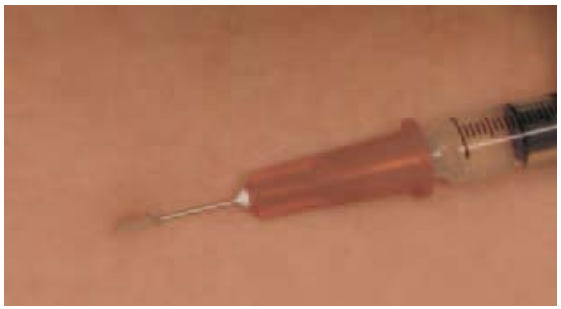


- Stretch the skin between the thumb and forefinger



- Insert the needle slowly, bevel upwards, at an angle of 5 to 15 degrees -almost parallel with the skin surface

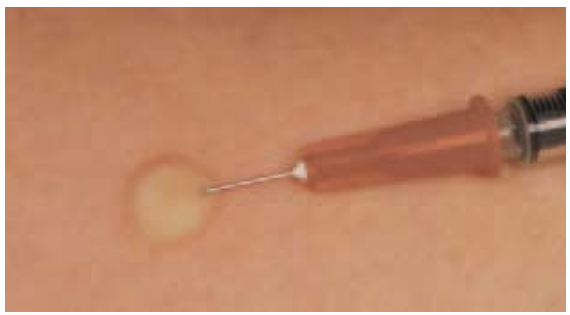
ADMINISTERING THE MANTOUX TEST: Intradermal Injection(2):



- Advance the needle 3-5mm so that the entire bevel is covered and visible just under the skin

- Release the stretched skin and holding the syringe in place on the forearm slowly inject the tuberculin solution

ADMINISTERING THE MANTOUX TEST: Intradermal Injection(3):



- If the needle is inserted correctly you should feel quite firm resistance as the tuberculin enters the skin to form a tense, pale wheal 6 to 10 mm in diameter.
- Remove the needle without pressing or massaging the injection site.
- If a papule does not appear the solution has been injected too deeply, and the test should be repeated on the other arm or if on the same arm at least 5cm from the first injection site.

POST INJECTION ARRANGEMENTS (1)

Advice

- Explain that mild itching, swelling, or irritation may occur and that these are normal reactions that do not require any treatment

- Tell the patient to keep the site clean, to avoid scratching it, and not to put creams, lotions, or adhesive dressings on it.

- Advise that it is alright to get water on the site.

POST INJECTION ARRANGEMENTS (2)

Records

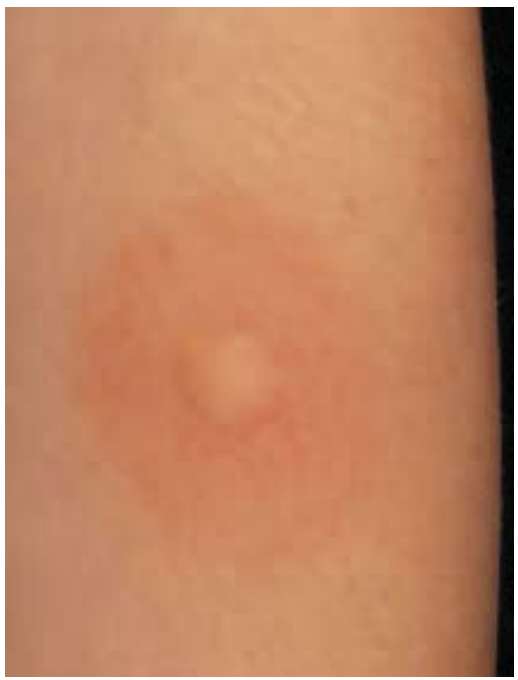
- Record all required information and confirm arrangements for the patient to return and have the test read.

Materials

- Any Tuberculin PPD remaining in the vial can be used within 24hours provided that storage guidelines have been observed throughout – (store at 2°C - 8°C, protected from light).

- Appropriate disposal of all materials used.

READING THE MANTOUX TEST (1)



- The reaction should be evaluated 48-72 hours after the injection

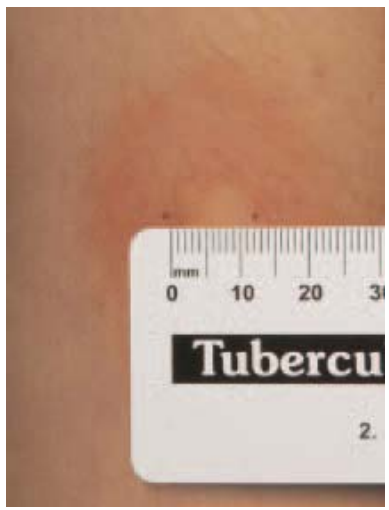
- Only the induration, which is a hard, dense, raised formation, is measured. The area of erythema is not included in the measurement.

READING THE MANTOUX TEST (2)

Using a light, gentle motion, run the fingertips over the surface of the forearm to locate the margins or edges of induration

- If there is difficulty in identifying the edges of induration it may help to flex the elbow up to 45degrees
- The longest diameter of induration, transverse to the long axis of the forearm, is measured in millimetres
- It may be helpful to mark lightly with a fine dot at the widest edges of induration across the forearm

READING THE MANTOUX TEST (3)



- Measure the diameter of the induration using a plastic flexible millimetre (mm) ruler.
- Record the exact measurement in millimetres (mm) of induration.
- If there is no induration, record as 0mm.
- If there is erythema only, record as 0mm.
- Do not record results as ‘positive’ or ‘negative’.

READING THE MANTOUX TEST (4)

- Widest transverse diameter = 12mm

READING THE MANTOUX TEST (5)

- A valid reading can usually be obtained up to 96 hours post injection.
- A delay in reading the Mantoux test if the result is positive - greater than or equal to 6mm does not affect the validity of the results.
- A strongly positive mantoux test resulting from inadvertent subcutaneous administration does not affect the validity of the reading.

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- BCG can be given up to three months following a negative tuberculin test

INTREPRETATION OF MANTOUX TEST (1):

Diameter of Induration	**Interpretation**	**Action**
Less than 6mm	Negative	Previously unvaccinated individuals may be given BCG provided there are no contraindications
6mm or greater but less than 15mm	Hypersensitive to tuberculin protein. May be due to previous TB infection, BCG or exposure to atypical mycobacteria	Should not be given BCG*
>=15mm	Strongly hypersensitive to tuberculin protein Suggestive of TB infection or disease	Should not be given BCG. Refer for further investigation and supervision which may include chemotherapy.

*INTREPRETATION OF MANTOUX TEST 2:

Diameter of induration 6mm or greater but less than 15mm

When Mantoux tests are being performed as part of an immunisation programme, no further action is required for people with a reaction in this range (6-<15mm).

In other contexts (e.g. new immigrant screening, contact tracing programmes) where the subject has not been previously vaccinated with BCG and taking account of the precise size of the reaction and the circumstances of the case further investigations and follow-up may be indicated.

NIAC Guidelines Tuberculosis Chapter 16; 7/12/2007

FALSE NEGATIVE REACTIONS (1)

The reaction to tuberculin protein may be reduced or suppressed by the following:

- Viral infections in general, including:
  - upper respiratory tract infections,
  - Infectious mononucleosis
  - Measles
  - varicella
  - Influenza
  - HIV

FALSE NEGATIVE REACTIONS (2)

The reaction to tuberculin protein may be reduced or suppressed by the following:

- Live viral vaccines
- Sarcoidosis
- Corticosteroid therapy
- Immunosuppression due to disease or treatment including HIV infection.
- Severe tuberculosis disease
- Poor nutrition

FALSE NEGATIVE REACTIONS(3)

- **Viral Infections:** Subjects who have a negative test but who may have had an upper respiratory tract or other viral infection at the time of testing or at the time of reading the test should be re-tested two or three weeks after clinical recovery before being given BCG. This second test should be done on the other arm; repeat testing at one site may alter the reactivity either by hypo-or more often hyper-sensitising the skin and a changed response may only reflect local changes in skin sensitivity.

NIAC Guidelines Tuberculosis Chapter 16; 7/12/2007

FALSE NEGATIVE REACTIONS(4)

- **Live Vaccines:** Live viral vaccines can suppress the tuberculin response and so testing should be not be undertaken within four weeks of having received a live viral vaccine such as MMR. Mantoux testing can be undertaken at the same time as inactivated vaccines are administered.

- **Steroids:** Topical (skin or inhaled) or locally injected steroids do not usually cause immunosuppression. The minimum amount and the duration of administration of systemic corticosteroids sufficient to cause immune suppression are not well defined.

SOURCES

- General Immunisation Procedures, Chapter 2; NIAC Guidelines, 2/11/2007
- Tuberculosis, Chapter 16; NIAC Guidelines, 7/12/2007
- Immunisation against infectious disease 2006. "The Green Book“; Department of Health, U.K.
- Core summary of product characteristics- Tuberculin PPD RT 23 SSI; 2002; Irish Medicines Board
- http://www.immunisation.nhs.uk/Library/Professional_Updates/Mantoux_Training_Resources
- http://www.cdc.gov/tb/pubs/slidesets/core/html/trans4_slides.htm
- WHO Report 2007, Global Tuberculosis Control, Surveillance, Planning, Financing

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