

03

2016

March

Thursday

VACCINE

02	M	T	W	T	F	S	S
06	1	2	3	4	5	6	7
07	8	9	10	11	12	13	14
08	15	16	17	18	19	20	21
09	22	23	24	25	26	27	28
10	29						

Vaccines are 4 main types

① Live-attenuated vaccines

Live vaccines use a weakened (or attenuated) form of the germ that causes a disease.

- It provides strong and long-lasting immune response.

- Just 1 or 2 doses of most live vaccines can give you a lifetime protection against a germ and the disease it causes.

- It is stored in refrigerator.

Live vaccines are used to protect against

- Measles, mumps, rubella

- Rotavirus

- Smallpox

- chicken pox

- yellow fever.

Measles caused by a virus. Symptoms are fever, Rash, cough, Runny nose, mild pink eye, ear infection, diarrhoea, pneumonia (lung infection), inflammation of the brain.

- after your child receives the BCG vaccine, where the injection was given  
In 1-6 weeks, a small, red blister may appear

turn into a small, weeping sore.  
after 6-12 weeks, the blister may

usually - It is given just under the skin in the left upper arm.

### 3 types of vaccines

#### ①. Bacterial vaccines

- It contains killed or attenuated bacteria that orientates the immune system against that particular bacteria, and prevents bacterial infection later.  
eg. Tuberculin vaccine

#### 3 types

①. Live vaccines - TB

②. Dead " - enteric fever, whooping cough, cholera and plague

③. Toxoids - Diphtheria, tetanus

#### ②. Rickettsial vaccines

Rickettsiae are a diverse group of bacteria some of which can be transmitted to humans via the bites of fleas, lice, ticks or mites. It live in inside of the cells in another organism.

Refer 04

05

2016  
March  
Saturday

02

February 2016

03

wk	M	T	W	T	F	S	S	wk	M	T	W	T	F	S	S
06	1	2	3	4	5	6	7	10	1	2	3	4	5	6	7
07	8	9	10	11	12	13	14	11	7	8	9	10	11	12	13
08	15	16	17	18	19	20	21	12	14	15	16	17	18	19	20
09	22	23	24	25	26	27	28	13	21	22	23	24	25	26	27
10	29							14	28	29	30	31			

## II. Inactivated vaccines:

09.00

use the killed version of the germ that causes a disease.

10.00

11.00

12.00

Inactivated vaccines usually don't provide immunity that's as strong as live vaccines. So you may need several doses over time (boosted shots)

01.00

- it protect against

02.00

Hepatitis A, Flu, polio, Rabies.

03.00

## III. Toxoid vaccines

04.00

05.00

use a toxin (harmful product) made by the germ that causes a disease.

06.00

- Toxoid va eg. Diphtheria - <sup>bacteria</sup> and Tetanus

07.00

Diphtheria - weakness, sore throat, swollen glands in the neck, fever, serious cases - can damage heart, kidney, nerves

06 Sunday

Tetanus - headache, fever and sweating, stiff muscles, Bb, fast heart rate

14	4	5	6	7	8	9	10	19	2	3	4	5	6	7	8
15	11	12	13	14	15	16	17	20	9	10	11	12	13	14	15
16	18	19	20	21	22	23	24	21	16	17	18	19	20	21	22
17	25	26	27	28	29	30		22	23	24	25	26	27	28	29
18															

11  
2016  
March  
Monday

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07

Signs and symptoms:

swollen lymph glands, fever, headache, muscle aches, cough, rash

of vit. D - deficiency disease due to lack

organism of typhus rickettsiae - Definition - killed rickettsial strain or strains of epidemic typhus rickettsiae

typhus - 2-3 days incubation period

also known as typhus fever. by bacteria.

vi

page 04 Continuation

Viral vaccines :-

viral vaccine contains either inactivated or attenuated virus.

- It alone is not capable of disease causing effect.

- This vaccine not replicate inside the body. not cause any ill effect.

08

2016  
March  
Tuesday

02	M	T	W	T	F	S	S	10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
06	1	2	3	4	5	6	7	11	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31							
07	8	9	10	11	12	13	14	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31														
08	15	16	17	18	19	20	21	13	21	22	23	24	25	26	27	28	29	30	31																					
09	22	23	24	25	26	27	28	14	28	29	30	31																												
10	29																																							

eg: Influenza vaccine  
Measles vaccine  
Mumps vaccine  
polio va  
Yellow fever vaccine  
Small pox vaccine.

The following is the immunization  
schedule for children -

At birth - BCG Bacille Calmette guerin

2<sup>nd</sup> month - primary smallpox vaccination

3<sup>rd</sup> " - Triple antigen (diphtheria,  
whooping cough, Tetanus)  
1<sup>st</sup> dose.

4<sup>th</sup> " - Triple antigen 2<sup>nd</sup> dose  
and  
1<sup>st</sup> dose - oral polio vaccine

5  $\frac{1}{3}$  " - Triple antigen 3<sup>rd</sup> dose.

4<sup>th</sup> " - Oral polio vaccine 3<sup>rd</sup> dose.

# VACCINATION

- 12.00
- ① <sup>at</sup> 2 week of birth — BCG  
polio drops  
B hepatitis vaccine ①
- 01.00
- 02.00
- ② 6<sup>th</sup> week — Triple antigen I  
polio I  
B hepatitis II
- 04.00
- ③ 10<sup>th</sup> week — Triple antigen II  
polio II
- 06.00
- ④ 14<sup>th</sup> week — Triple antigen III  
polio III  
+  
B hepatitis III
- 07.00
- ⑤ 9<sup>th</sup> month — measles  
mumps  
measles vaccine
- ⑥ 15<sup>th</sup> month — measles (1st dose)  
(2nd dose) (2nd dose)  
measles

18<sup>th</sup> month — Triple antigen I  
polio.

2<sup>nd</sup> year — Typhoid vaccine

5 year — Triple antigen I  
polio.

10 year — Tetanus - Booster - TT  
( $\downarrow$  boost & boost)

16 " — Tetanus - Booster - TT.

### Advantages.

Tetanus injection has to be given when a person is involved in street accident or has deep puncture wounds.

### advantages

- ①. avoid <sup>dangers</sup> problems against harmful m. orgt.
- ②. give safe life, previously avoid the disease.
- ③. give immunity to a certain diseases.

April 2016						
Wk	M	T	W	T	F	S
12				1	2	3
15	4	5	6	7	8	9
16	11	12	13	14	15	16
17	18	19	20	21	22	23
18	25	26	27	28	29	30

May 2016						
Wk	M	T	W	T	F	S
18	30	31				
19	2	3	4	5	6	7
20	9	10	11	12	13	14
21	16	17	18	19	20	21
22	23	24	25	26	27	28

11  
2016  
March  
Friday

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11

## Vitamin B<sub>12</sub> (Cyanocobalamin)

— Smith and Parker in 1948  
— presents <sup>pernicious</sup> anaemia so pernicious anaemia  
— Factor

— V. B<sub>12</sub> contain heavy metal Cobalt and  
Four pyrrole rings.

vit B<sub>12</sub> - produced by  
propionibacterium freudenreichii  
P. shermanii  
Pseudomonas denitrificans  
Klebsiella pneumoniae.

— It produces industrially using bacteria.  
— it is a fine chemical, solid in granules.  
— prod by fermentation

— produced by no. of industries such as  
Merek A Co (USA), Gilasco Laboratories.

The culture media P. freudenreichii  
glucose and Cobalt chloride

anaerobic conditions on 4 days

5-deoxyadenosyl Cobalamin (B<sub>12</sub>)

5-deoxyadenosyl Cobinamide  
aerobic cond. 4 days

5,6-dimethyl benzimidazole



- B<sub>12</sub> is found under the cell

- Fe is released  
 ↓  
 solution is 10 minutes after heat treatment (180° to 120°C)

Rhodospirillum rubrum  
 yield 135 mg / lit vit 80-120°C  
 135 mg / lit vit

The microbial production of cyanocobalamin involves the following steps.

- ①. Formulation of medium
- ②. Sterilization of the medium
- ③. Making starter cultures
- ④. Anaerobic fermentation
- ⑤. Aerobic fermentation
- ⑥. Recovery of cyanocobalamin.

steeping protein  
 200g/l

13 Sunday

①. Formulation of medium:

is used as carbon source

Corn steep liquor  
 + beet molasses  
 + soyabean meal

high-energy feed ingredient made from the soluble parts of the corn kernel through a steeping process. A by-product of corn wet milling - a viscous concentrate of corn soluble which contains a.a.s, vita and minerals

is used as nitrogen source

+ Ammonium phosphate or NH<sub>4</sub>OH

+ Cobalt salt is added to the medium

+  
inorganic salts (provide macro and micro elements to the culture)

+  
pH 7

+  
microorganisms

(feed materials depend on the microorganism)

Beet molasses	-	<i>Bacillus megaterium</i>
Corn steep liquor	-	<i>Propionibacterium Freudenreichii</i>
glucose	-	<i>Streptomyces olivaceus</i>

## ②. Sterilization of medium.

The prepared medium is sterilized by autoclaving. The sterilized medium is then used for fermentation.

## ③. Making Starter Cultures:

The m.o. is selected and cultured in large flasks for use as inoculum.

For eg: *propionibacterium shermanii* is made to use as an inoculum.

now a days <sup>mutant strains</sup> *Pseudomonas denitrificans* is formed by using genetic engineering technology for production of vit B<sub>12</sub>. such strains produce 50,000 times more vit B<sub>12</sub> than the wild strains.

#### ④ Anaerobic Fermentation

The fermenter is batch culture fermenter. The sterilized medium is filled in stirred tank fermentor.

↓  
1% of inoculum is added into the fermenter.

↓  
Anaerobic condition is maintained to encourage the production of 5,6-dimethylbenzimidazole cobalamin — an it is 3 days. (DBC) by P. Sherman

#### ⑤ Aerobic Fermentation

When anaerobic fermentation is over, sterile air is pumped into the fermentor.

The culture stirred well for proper aeration.

↓  
aerobic fermentation is performed for 4 days.

↓  
DBC and pseudovitamin B<sub>12</sub> (adenosyl methyl cobalamin) are produced.

↓  
These are immediate precursors of cyanocobalamin.

wk	M	T	W	T	F	S	S
14				1	2	3	
15	4	5	6	7	8	9	10
16	11	12	13	14	15	16	17
17	18	19	20	21	22	23	24
18	25	26	27	28	29	30	

wk	M	T	W	T	F	S	S
18	30	31					
19	2	3	4	5	6	7	8
20	9	10	11	12	13	14	15
21	16	17	18	19	20	21	22
22	23	24	25	26	27	28	29

## ⑥. Recovery of Cyanocobalamin

Inside the microbial cell cyanocobalamin exists in the form of natural substances such as DBC & pseudovitamin B<sub>12</sub>.

The cultured broth contains  
10-23 mg vit B<sub>12</sub> / lit.

↓  
harvested

↓  
centrifuged at high speed to get a concentrated mass of cells.

↓  
The cell mass is treated with a cyanide solution to split the pseudo vit B<sub>2</sub> and DBC

↓  
As a result cyanocobalamin (vit B<sub>12</sub>) is released free in the solution

↓  
Cyanocobalamin in the liquid is separated by using an adsorption column chromatography with  
" RC-50 eluina "

↓  
The adsorbed cyanocobalamin is then eluted out of the column using a phenolic solvent.

The solvent fraction is evaporated by exposing it to atmospheric air.

as a result, crystals of cyanocobalamin is left in the vessel.

It is stored for future use.

uses . vit B<sub>12</sub>

It is a food preservative  
It is a co-factor  
It is a protective medicine.