Vaccination

Is the best know and most successful Application of immune principle to human health

The main effect of vacc in protection of individual against infection

The aim of vaccination are to produce Agic preparation from the pathogen which should be

- Safe when administer
- Induce right sort of immunity
- Are favorable by the population

2type of viral vaccine currently available

- Live attenuated vaccine
  - Use of mutant virus which should be
    - Agically identical with wild or virulent type
    - But lacking virulencey
  - This vaccine have the following advantages
    - Produce immunity similar to the immunity produce by natural infection
    - Which mean They multiply in the host cell so
      - Stimulat production of longer –lasting Ab
      - Induce production of Abs at entry of the virus
      - Induce good cell – mediated immunity
  - This vaccine have the following disadvantages
    - Page 2
- Killed inactivated vaccine
  - Page 3

Disadvantage of line attenuated vaccine

①Risk of reversion to greater virulence during multiplication within the host cell

↓ Lead to

Subclinical infection

②Using of culture substrate like eggs, primary cell culture to prepare vaccine

↓ Lead to

Unrecognized adventitious agent latently infection

③Storage and limited half life

↓ This problem May overcome To it by

Using stabilizer e.g. $Mgcl_2$

④It may produce persistent infection in the host (which appear very low), the actual risk → unknown

⑤Interference by naturally occurring wild type virus

↓ Which cause

Inhibit replication of vaccine virus

↓ So

Cause reduce its effectiveness

↓ e.g.

polio vaccine inhibited by various entero viruses infection

Killed inactivated vaccine

- Using destroying virus which are
  - Antigenic ally Remain intact
  - lack virulencey
  - → Stimulate humeral immunity rather then C M I
- Advantages of killed inactivated vaccine
  - ①There is no risk of reversion to virulence
  - ②This type of vaccine may be used when there in no available of acceptable attenuated virus
- Consist of
  - Purified of viral preparation whole virion
  - But its infectivity are inactivated by the way that cause minimal damage to the viral structural protein
    - → By using Mild formalin
    - → So This type of vaccine stimulate production of Abs against coats protein of the virus
- Disadvantages of killed inactivated vaccine
  - → Page 4

Disadvantages of killed inactivated vaccine

① Required extreme care during preparation or manufacturing of this vaccine to avoid present any residual live virulence virus in the vaccine stock

② Produce short brief duration of immunity

So

Should be boolstered

③ Administer by parentral route)injection(

❶ It stimulate production of circulating Abs)IgG,IgM) which are some time give limited protection

❷ This vaccine not stimulate of production of local immunity IgA at the natural portal site of multiplication of the wild type virus infection

❸ Not stimulate of C M I)cell medicated immunity(

❹ Some of then induce hypersensitivity to previous infection persons

Method of live vaccine attenuation

❶ Host rang mutant

Which May be obtained by

Isolation of the virus from human

Then

Culturing on tissue culture

Then

Subculturing on tissue culture
(about 60-70 subcuture(

Lead to

Decreasing of virulency of the virus (produce attenuation(→ So

Not produce disease when administered to human

e.g.

Yellow fever | measlt | mump | Rubella

❷ cold adapted mutant

Virus will multiply in

But not in lower Resp tract | Upper

e.g.

influenza viruses

❸ temperature sensitive mutant

Which may be obtain by

Isolation of the virus from human

Culturing of the virus under low temperature (e.g 32C˚)but not under high temperature (e.g. (37

Cause

Mutation which cause changes in aminoacide of essential protein which do its function normally at 32c but not at 37C˚

e.g.

respiratory viruses in upper Resp.(32C˚) but not in lower Resp. (37C(˚

so not cause pneumonia

❹ deletion mutants

❺ recombination

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Method of live vaccine attenuation

❹ deletion mutants
)genetic manipulation(

شيخ بعلات

e.g.

deletion of oncogen in which we delete part of the genome of the virus encode for oncogenicity by restricted enzyme

يجراخ ريغ

so

The virus will stimulate immunity

But not produce tumor

By using of this mutant or Recombinant live viral vaccine

No risk of reversion to virulence

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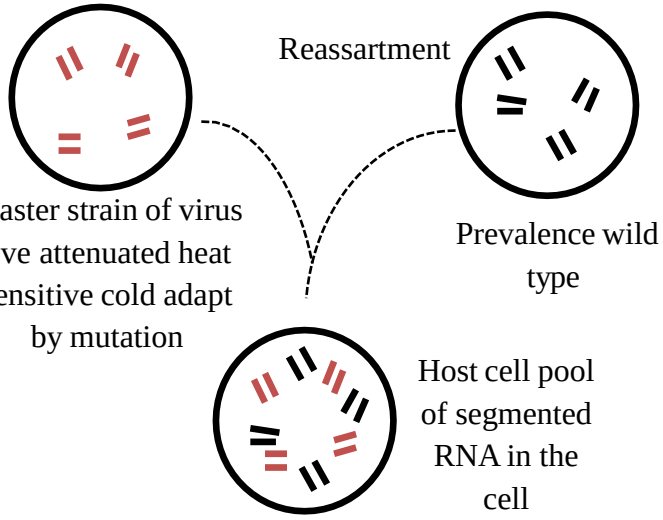
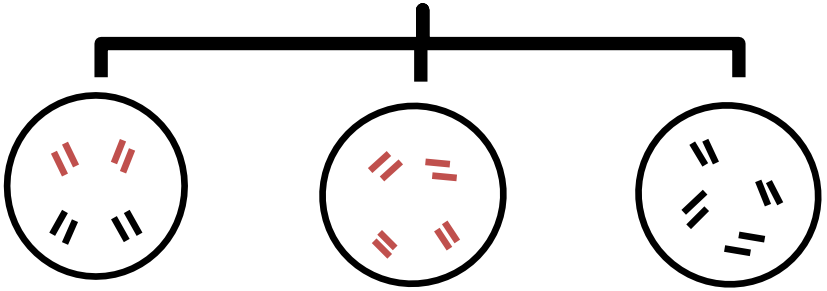
❺ recombination

Ressortment when the genome in segmented



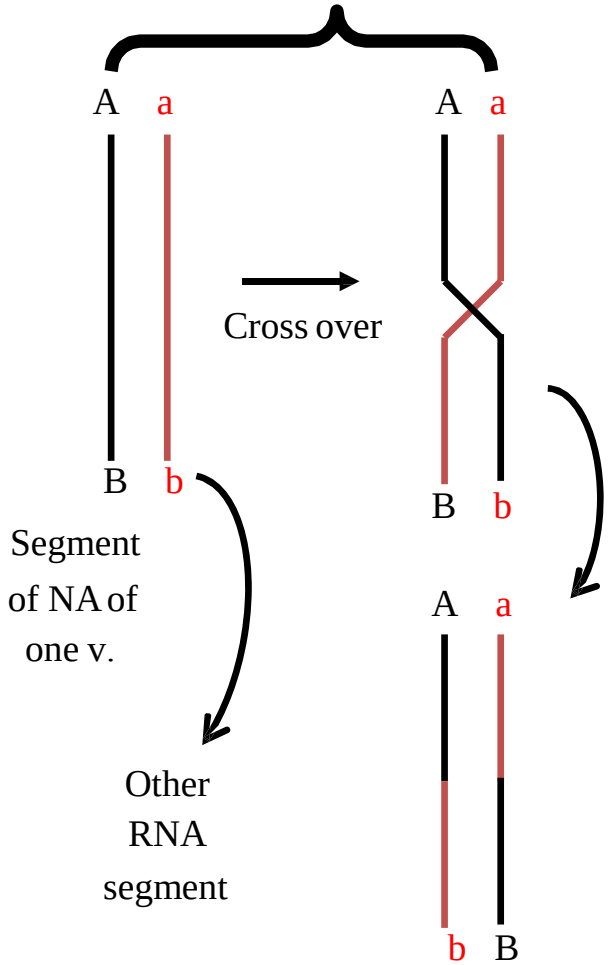


Hybrid strain viral which carry

Surface antigen of Wild type

other segmented of master strain

When the genome is non segmented



Killed inactivated vaccine

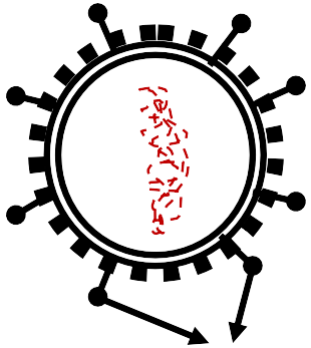
- Using of virulent virus
  - Destroy of
    - Its infectivity by destroying of Nucleic acid
    - But antigenicity and immunogenicity remain or intact
- There are 2 type of killed vaccine
  - ❶ Subunit vaccine also called sub viral vaccine or purified component vaccine (protein(
    - This prepared by the following steps
      - ① Killed or inactivated of virulent virus eitherby
        - Formaldehyde
        - B- pricopiolacton
        - Ethylenamines
      - ② Added of lipid solvent to disrupt the lipid like
        - Ether chlorophorm
        - Lipid detergent
      - ③ ultracentrif-igation in order to purification of viral protein by using either
        - Sucrose gradient
        - Gel filtration
        - Affinity chromatography
  - ❷ Whole virus vaccine

To separate of

Nuclear capsid (heavy(

Form

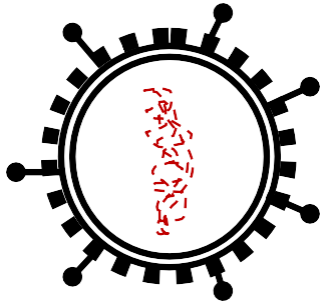
Surface glycoprotein



Surface glycoprotein

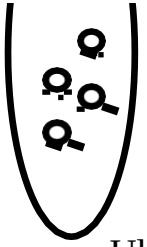
killed

or inactivated

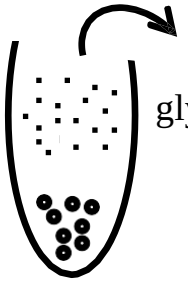


Lipid

Solvent



Ultracentrifugation

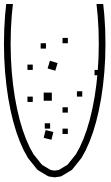


Surface glycoprotein

Nuclear capside

Liposome = synthetic phospholipids mixed with glycoprotein

Surface glycoprotei



Notice :- child is given whole virus vaccine

Lead to

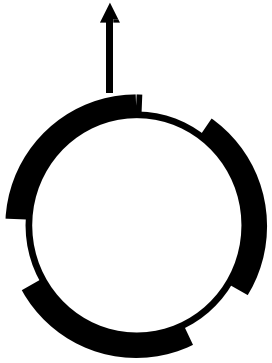
Fibril reaction

headache

Due to preset of lipid within the vaccine

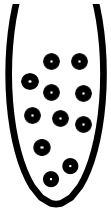
So

We use subunit vaccine in children



Virosome

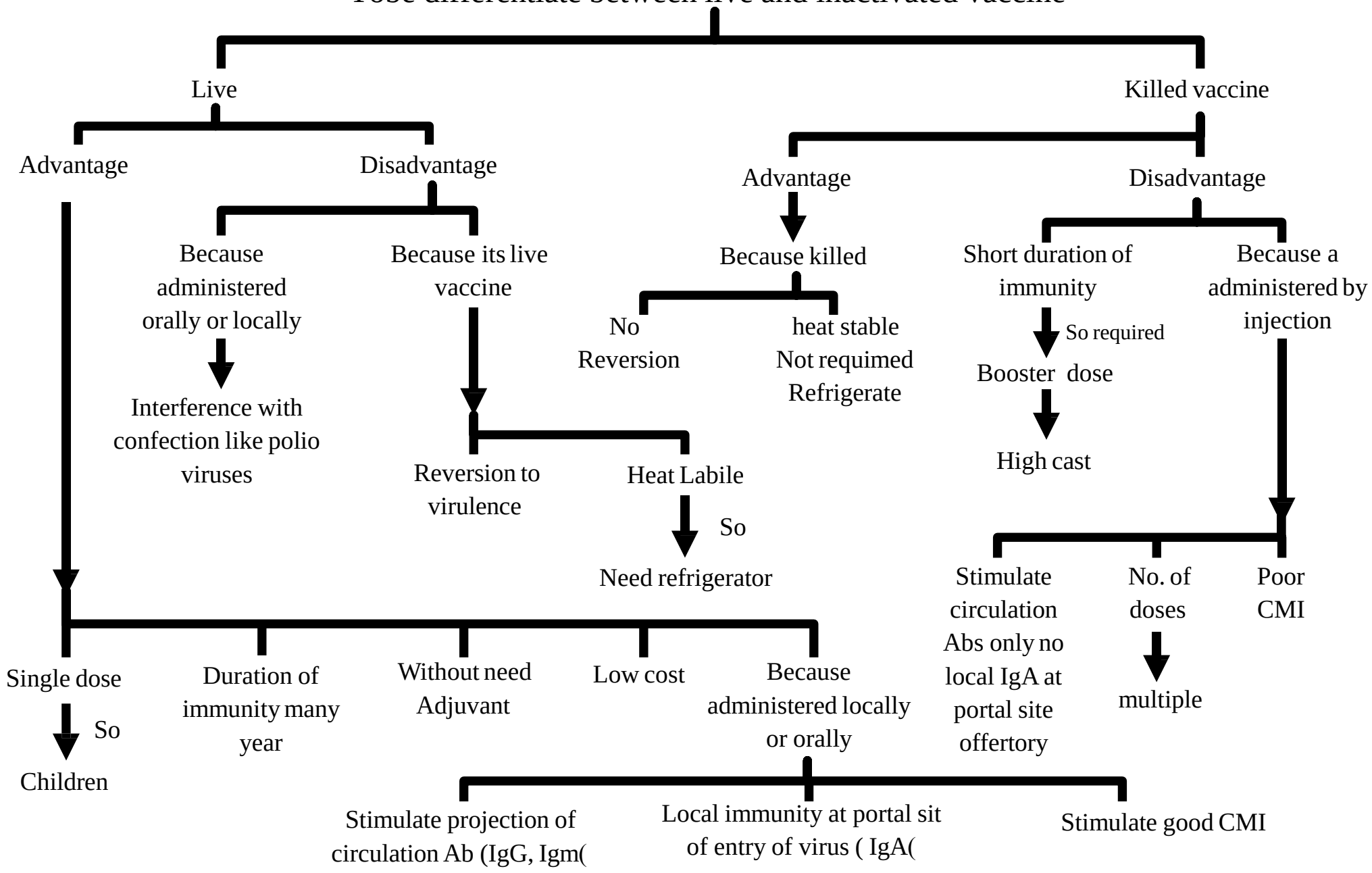
Vaccine

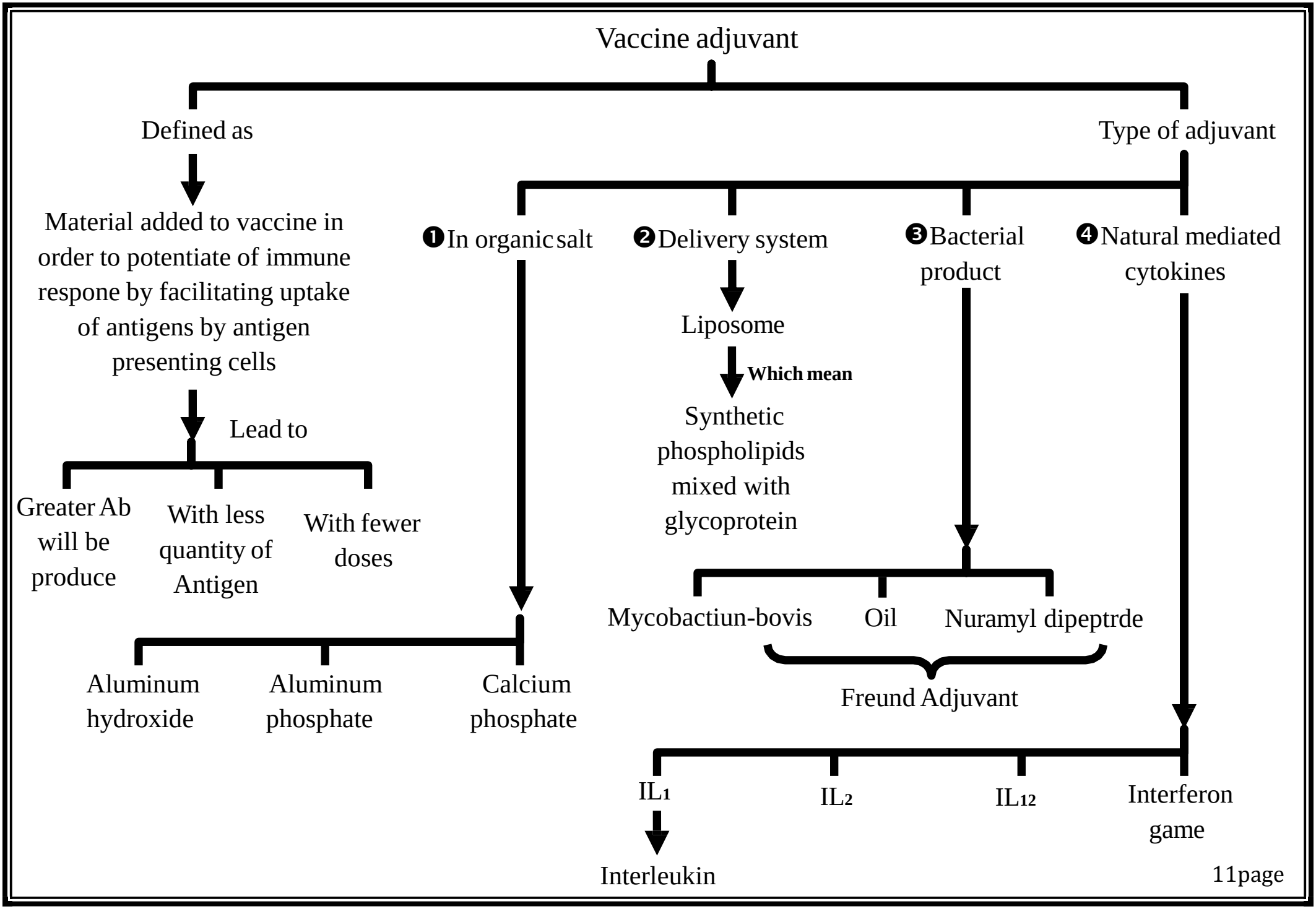


Liposome

)synthetic phosphate(

Tobe differentiate between live and inactivated vaccine




Vaccine adjuvant
Defined as
Type of adjuvant
Material added to vaccine in order to potentiate of immune respone by facilitating uptake of antigens by antigen presenting cells
Lead to
Greater Ab will be produce
With less quantity of Antigen
With fewer doses
❶In organic salt
❷Delivery system
❸Bacterial product
❹Natural mediated cytokines
Liposome
Which mean
Synthetic phospholipids mixed with glycoprotein
Mycobactiun-bovis
Oil
Nuramyl dipeptrde
Freund Adjuvant
Aluminum hydroxide
Aluminum phosphate
Calcium phosphate
IL1
IL2
IL12
Interferon game
Interleukin
11page

new approaches to vaccine design

❶ Synthetic peptide vaccine

↓

Identify of relevant interesting Antigent in virulency and determined of its aminoacid sequence and synthetic in vitro (sequencing of A A(

↓ Lead to

Formation of viral proteins of interest antigenic determinant

- This synthetic viral peptide stimulate production of neutralizing Ab, but the titer is less than titer produce by inactivated vaccine
- Example of this vaccine
  - Hepatitis B vaccine
  - Polio vaccine
  - Influenza vaccine
  - H S V vaccine

❷ Recombinant DNA Technique or gene cloning or Recombinant vaccine

↓ Made by

Cleavage of portion of the viral genome that carry code for protective Ag (surface glycoprotein) and inserted or inoculated either in

- Bact (E. coli) as
  - Influenza
  - Herpes
  - Hepatitis B
  - Rabies
- Mammalian cell
  - Influenza
  - Polio
  - We need

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- Yeast

↓

Hepatitis B

❸ Recombinant by incorporating cloned gene from other virus (Avirulent v. vector(

❹ Edible vaccine

↓

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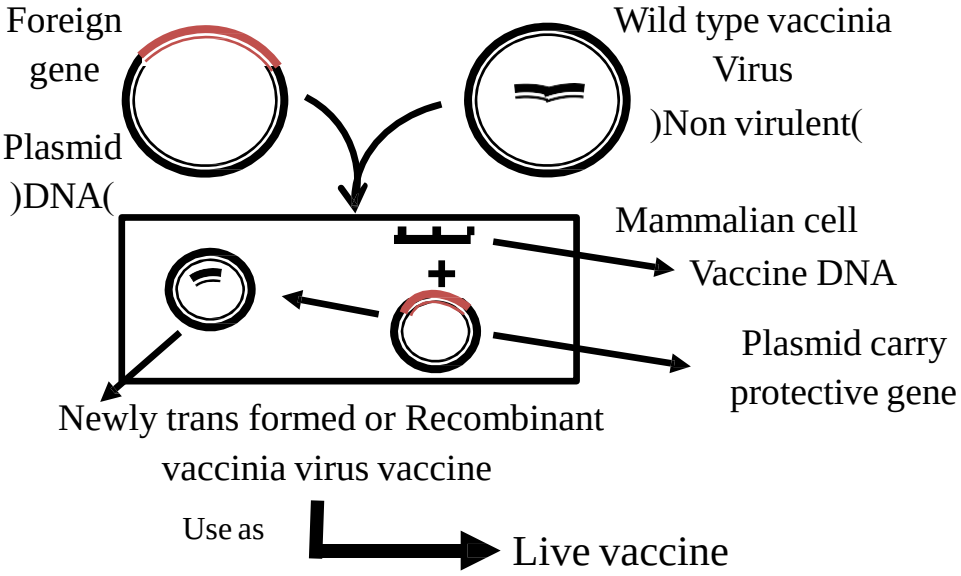
❸ Recombinant by incorporating cloned gene from other virus (Avirulent v. vector(

Gene for protective Antigen carried on plasmid

Genome of a virulent virus (vaccine virus(

Can be uses as a live vaccine



❹ Edible vaccine

Which are genetically engineered plants to produce forgein protein (protective(

By using patato or banana

So

When eating such plant the person will have a vaccination

We need

vector

restricted enzyme

Mammalian cell

Phage

Plasmid