

Edible Vaccines From Plants

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Injectable Vaccines



Edible Vaccines



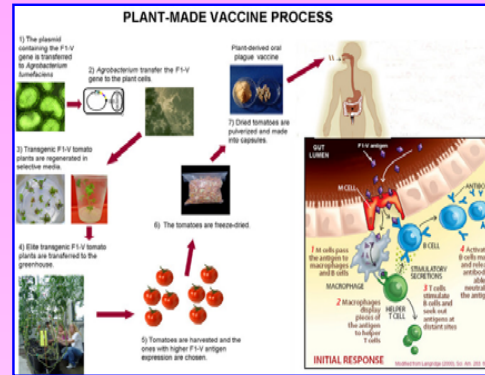
Why Use Bananas?

- Common food in many countries
- No refrigeration needed
- More readily available
- Usually eaten raw
- They taste great
- Kids love them

World Health Organization estimates that about 10 million kids die in 3rd World countries from infectious diseases that could have been prevented by vaccination



- Expensive
- Need sterile syringes
- Need refrigeration
- Need skilled staff to administer injections
- Only gives systemic immunity

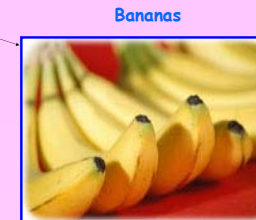
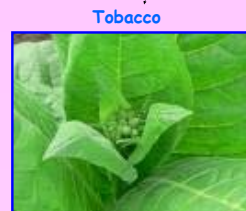


Vaccines for Hepatitis B, Rabies, Plague, Norwalk Virus, Diarrhea, SARS, Cholera, Bird Flu & RSV have been engineered from:

- Cheaper
- Safer
- Easy to store
- Can be grown or freeze dried
- Gives systemic & mucosal immunity
- Mucosal immunity fights infections in mucous membranes of the nose, mouth, lungs, gut & genital areas

Clinical Trial using Potatoes:

- In 2005, Dr. Arntzen gave pieces of raw potato, engineered with the protein from Hepatitis B, to 42 volunteers
- Antibodies rose in over 60% of the volunteers



Making Cholera Vaccine

- Cholera structural gene is spliced into *E. coli*
- *E. coli* multiplies, creating millions of copies
- This recombinant DNA is spliced again into *Agrobacterium*, a common infectious bacterium in plants
- *Agrobacterium* then infects the banana plant
- Banana cells produce cholera protein
- Banana cells are cloned & develop into seedlings
- When bananas are eaten, cholera proteins cause an immune response

