

# So What Exactly Is Genetic Engineering?

- Genetic engineering, sometimes called genetic modification, is the process of altering the DNA in an organism's genome.
- The first genetically modified organism to be created was a bacterium, in 1973.
- Genetic engineering is now widely used in biomedicine and agriculture, yet there remain some concerns that use of this technology involves scientists 'playing God' or acting 'against Nature'.
- Genetic engineering has been important for the manufacture of rare human proteins such as insulin and growth hormone and the development of many other pharmaceuticals and vaccines for the treatment of different diseases.
- In plants, genetic engineering has been applied to improve the resilience, nutritional value and growth rate of crops such as potatoes, tomatoes and rice.

## Health

Product	Recombinant Protein	Condition
Insulin	Hormone	Diabetes (Type I)
Growth Hormone	Hormone	Growth retardation
Factor VIII	Anti-coagulant	Haemophilia
Herceptin	Antibody	Breast Cancer
Remicade	Antibody	Rheumatoid Arthritis
Yervoy	Antibody	Melanoma
Nivolumab	Antibody	Lymphoma, Kidney CA
Gardasil	HPV-vaccine	Cervical cancer
Engerix	Hepatitis B antigen	Hepatitis
Infanrix	B.Pertussis anti-toxin	Whooping-cough
Bexsero	Meningitis B antigens	Meningococcal group B
rVSV-ZEBOV	rVSV-Ebola antigens	Ebola virus
Zika Virus	Aedes aegypti mosquito	Birth Defects

## Agriculture

Organism	Genetic Modification	Benefit
Soybean	Herbicide Tolerance	Improved yields
Maize	Insect Resistance	Decreased pesticides
Cotton	Insect Resistance	Decreased pesticides
Potatoes	Blight Resistance	Crop protection
Papaya	Virus Resistance	Crop protection
Golden Rice	Beta-Carotene Synthesis	Nutrition → Vitamin A
<b>Developing Technologies</b>		
Wheat	Nitrogen Fixation	↓ Chemical Fertilizers
Maize	Drought Resistance	Improved Yields
-	Improved Photosynthesis	Improved Yields