RECOMBINANT PROTEINS TECHNOLOGY

Proteins that result from the expression of recombinant DNA within living cells are termed recombinant proteins. When recombinant DNA encoding a protein is introduced into a host organism, the recombinant protein will not necessarily be produced.

Recombinant DNA (rDNA) molecules are DNA molecules formed by laboratory methods of genetic recombination (such as molecular cloning) to bring together genetic material from multiple sources, creating sequences that would not otherwise be found in the genome.

Expression (Gene expression) is the process by which information from a gene is used in the synthesis of a functional gene product. These products are often proteins, but in non-protein coding genes such as transfer RNA (tRNA) or small nuclear RNA (snRNA) genes, the product is a functional RNA. The process of gene expression is used by all known life—eukaryotes (including multicellular organisms), prokaryotes (bacteria and archaea), and utilized by viruses—to generate the macromolecular machinery for life.

LISTS OF RECOMBINANT PROTEINS: The following is a list of notable proteins that are generated from recombinant DNA, using biomolecular engineering, focusing on those that are used in human and veterinary medicine. In many cases, recombinant human proteins have replaced the original animal-derived version used in medicine. The prefix "rh" for "recombinant human" appears less and less in the literature.

A much larger number of recombinant proteins is used in the research laboratory. These include both commercially available proteins (for example most of the enzymes used in the molecular biology laboratory), and those that are generated in the course specific research projects.

Human recombinants that largely replaced animal or harvested from human types

- Human growth hormone (rHGH): Humatrope from Lilly and Serostim from Serono replaced cadaver harvested human growth hormone
- human insulin (BHI): Humulin from Lilly and Novolin from Novo Nordisk among others largely replaced bovine and porcine insulin for human therapy. Some prefer to continue using the animal-sourced preparations, as there is some evidence that synthetic insulin varieties are more likely to induce hypoglycemia unawareness. Remaining manufacturers of highly purified animal-sourced insulin include the U.K.'s Wockhardt Ltd. (headquartered in India), Argentina's Laboratorios Beta S.A., and China's Wanbang Biopharma Co.
- Follicle-stimulating hormone (FSH) as a recombinant gonadotropin preparation replaced Serono's Pergonal which was previously isolated from post-menopausal female urine
- Factor VIII: Kogenate from Bayer replaced blood harvested factor VIII

Human recombinants with recombination as only source

- Erythropoietin (EPO): Epogen from Amgen
- Granulocyte colony-stimulating factor (G-CSF): filgrastim sold as Neupogen from Amgen; pegfilgrastim sold as Neulasta
- alpha-glactosidase A: Fabrazyme by Genzyme
- alpha-L-iduronidase: (rhIDU; laronidase) Aldurazyme by BioMarin Pharmaceutical and Genzyme
- N-acetylgalactosamine-4-sulfatase (rhASB; galsulfase): Naglazyme by BioMarin Pharmaceutical
- Dornase alfa, a DNase sold under the trade name Pulmozyme by Genentech
- Tissue plasminogen activator (TPA) Activase by Genentech

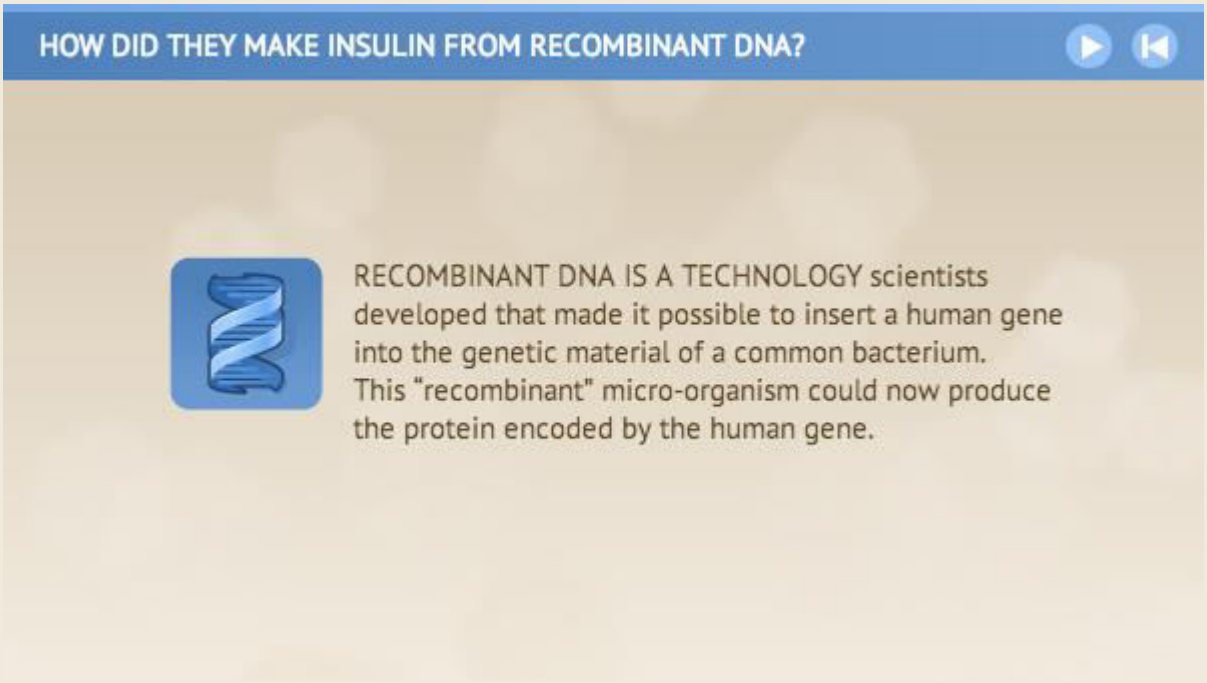
- Glucocerebrosidase: Ceredase by Genzyme
- Interferon (IF) Interferon-beta-1a: Avonex from Biogen Idec; Rebif from Serono; Interferon beta-1b as Betaseron from Schering
- Insulin-like growth factor 1 (IGF-1)

There are other animal and viral recombinant proteins

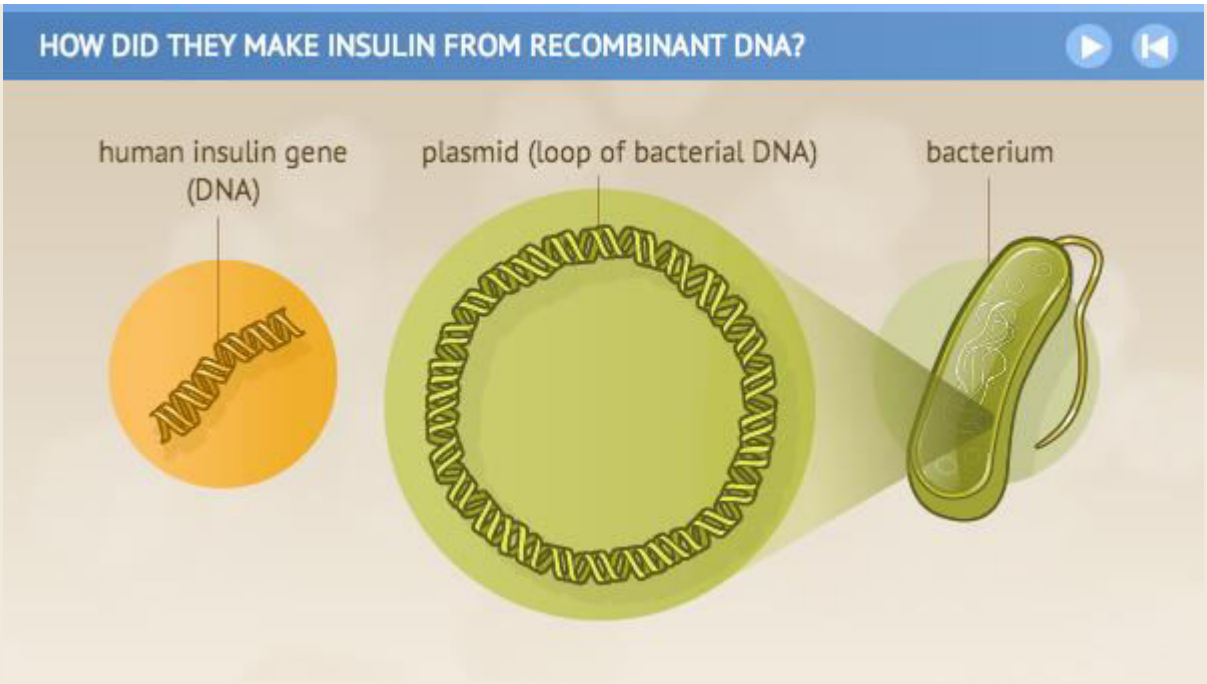
INSULIN PRODUCTION FROM YEAST USING RECOMBINANT DNA TECHNOLOGY

NB: plasmid is a small DNA molecule within a cell that is physically separated from a chromosomal DNA and can replicate independently. They are most commonly found in bacteria as small circular, double-stranded DNA molecules; however, plasmids are sometimes present in archaea and eukaryotic organisms.

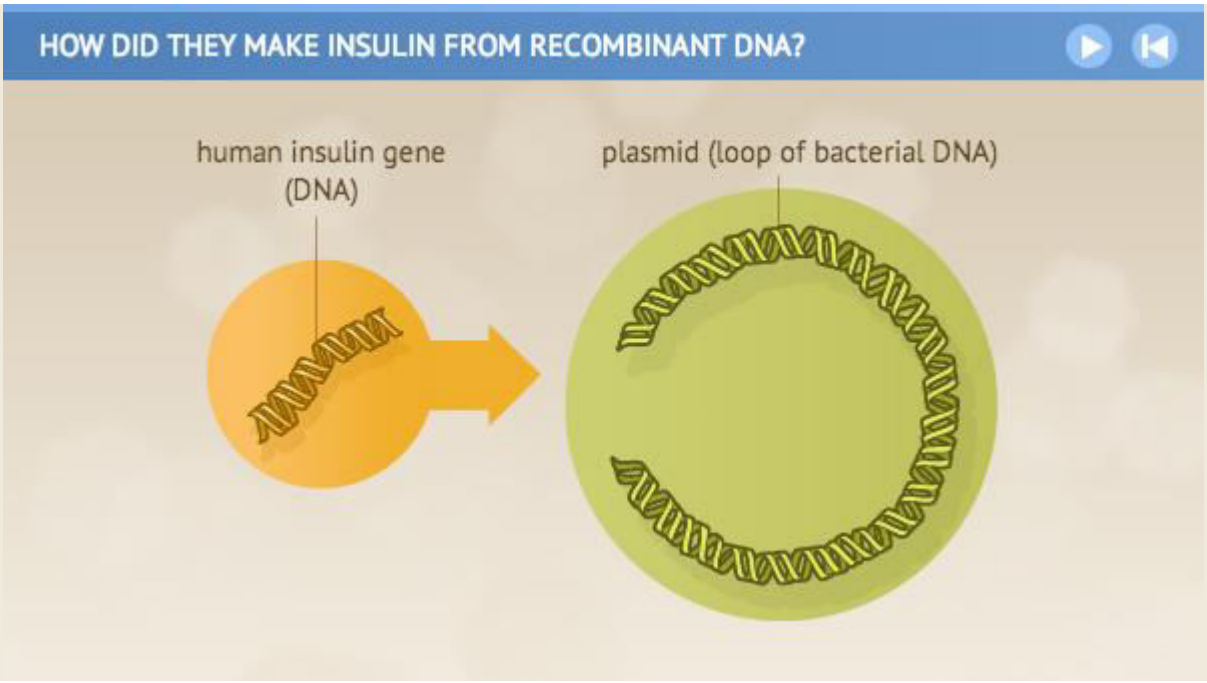
How did they make insulin from recombinant DNA?



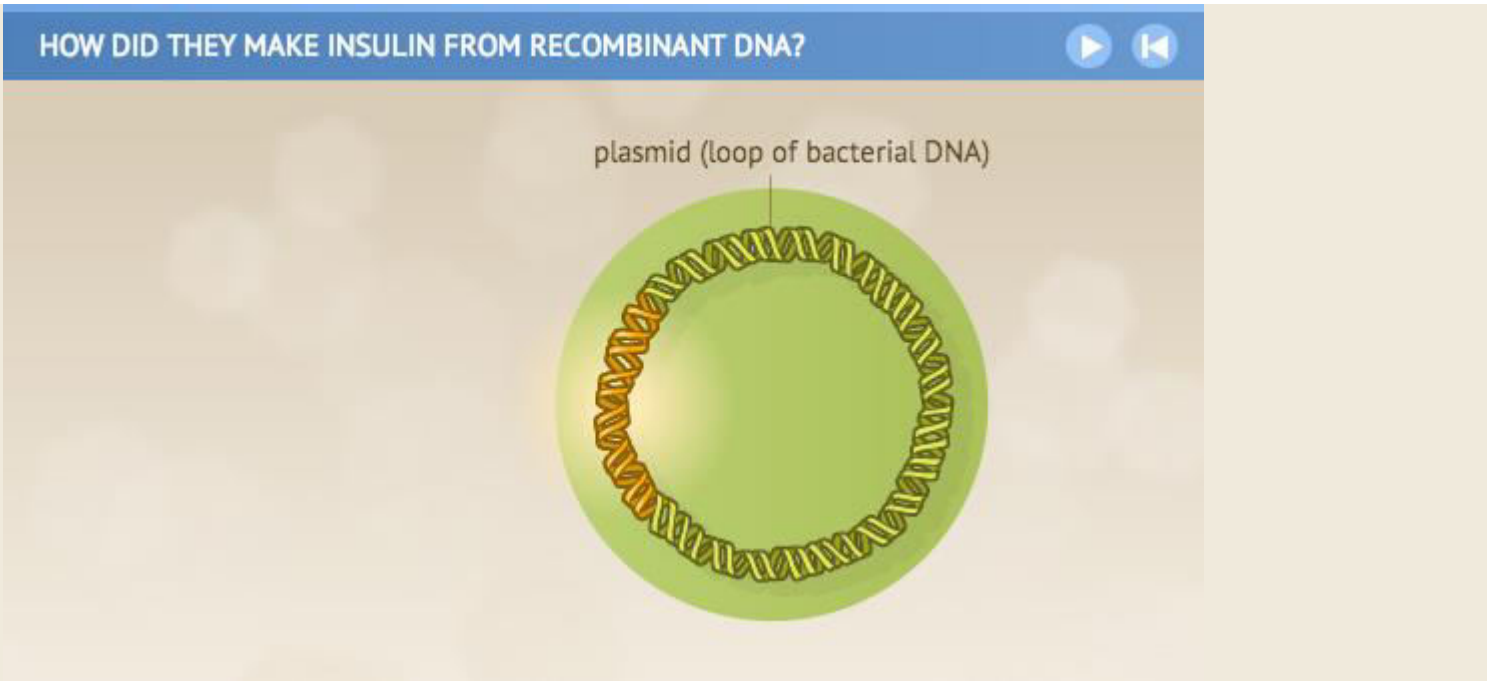
Recombinant DNA is a technology scientists developed that made it possible to insert a human gene into the genetic material of a common bacterium. This “recombinant” micro-organism could now produce the protein encoded by the human gene.

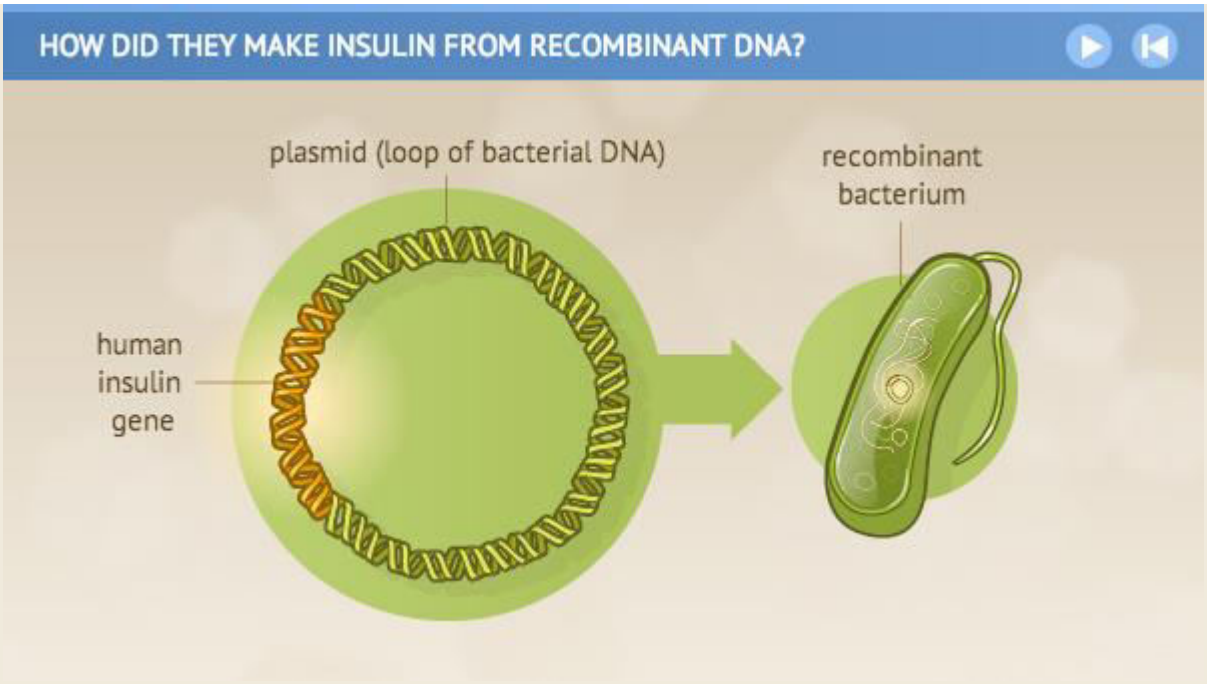


Scientists build the human insulin gene in the laboratory. Then they remove a loop of bacterial DNA known as a plasmid and…

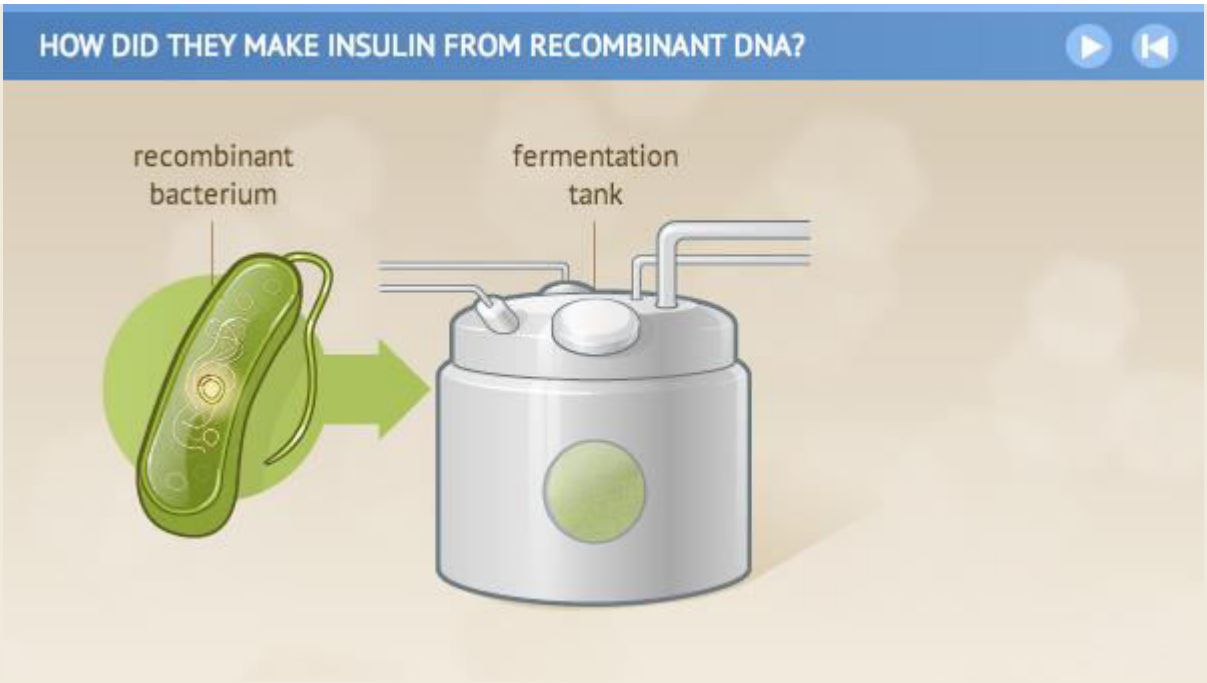


insert the human insulin gene into the plasmid.

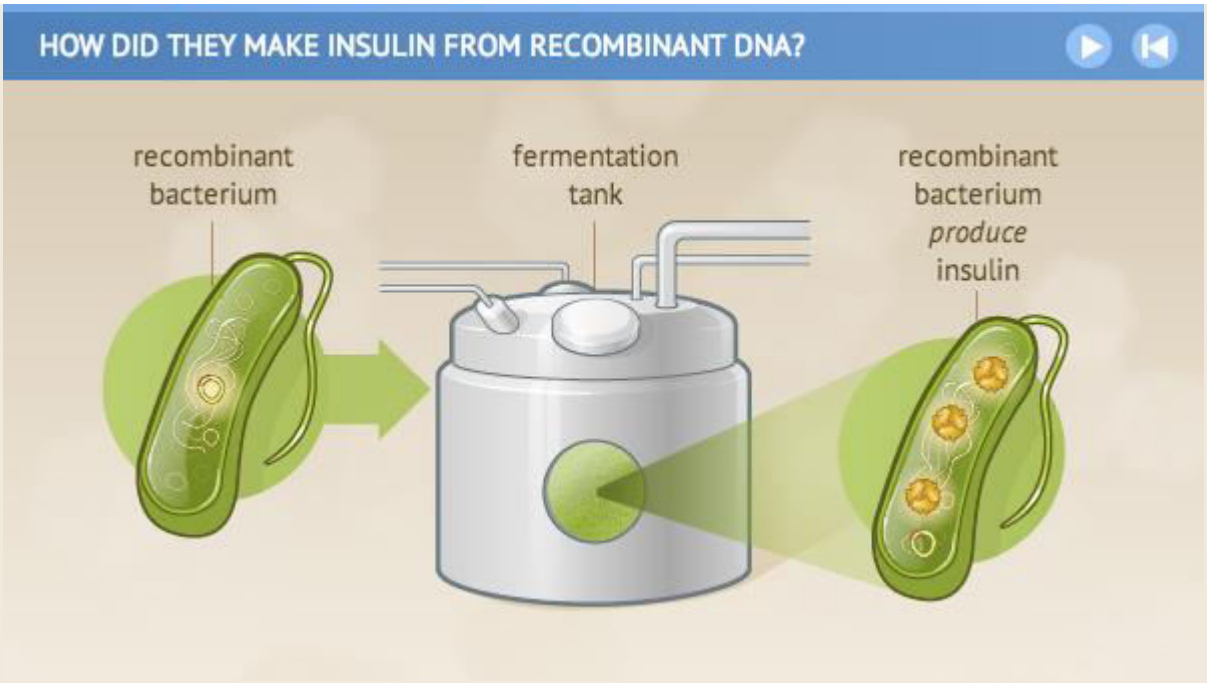




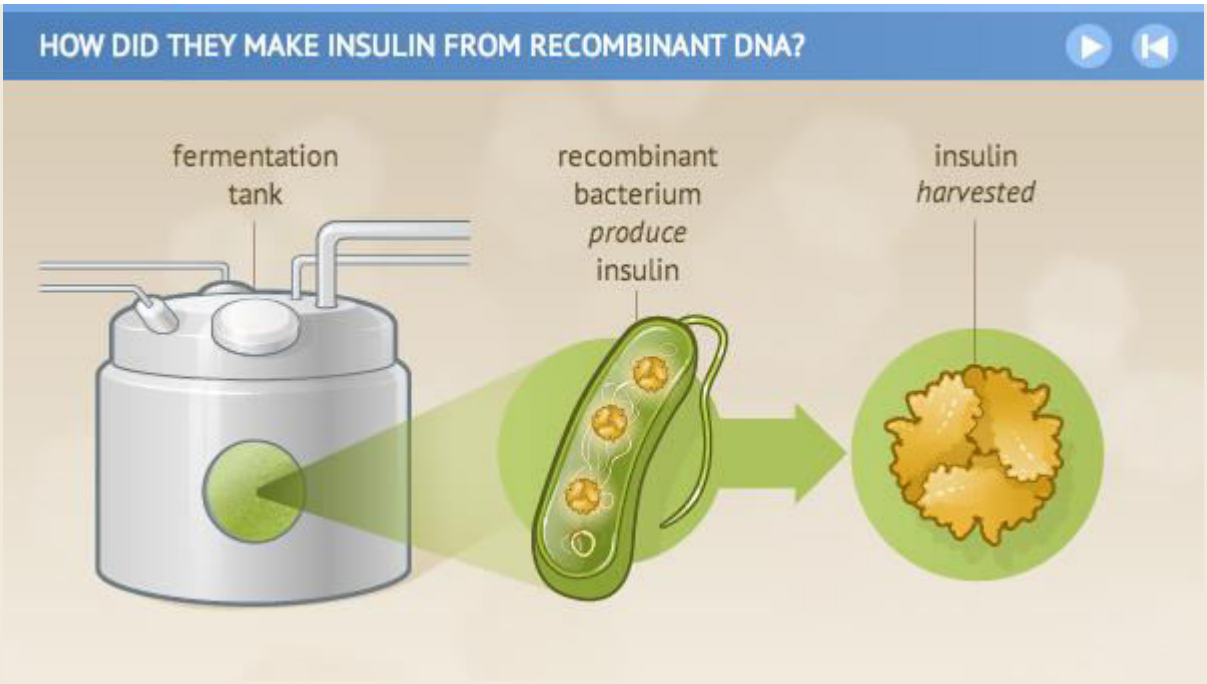
Researchers return the plasmid to the bacteria and…



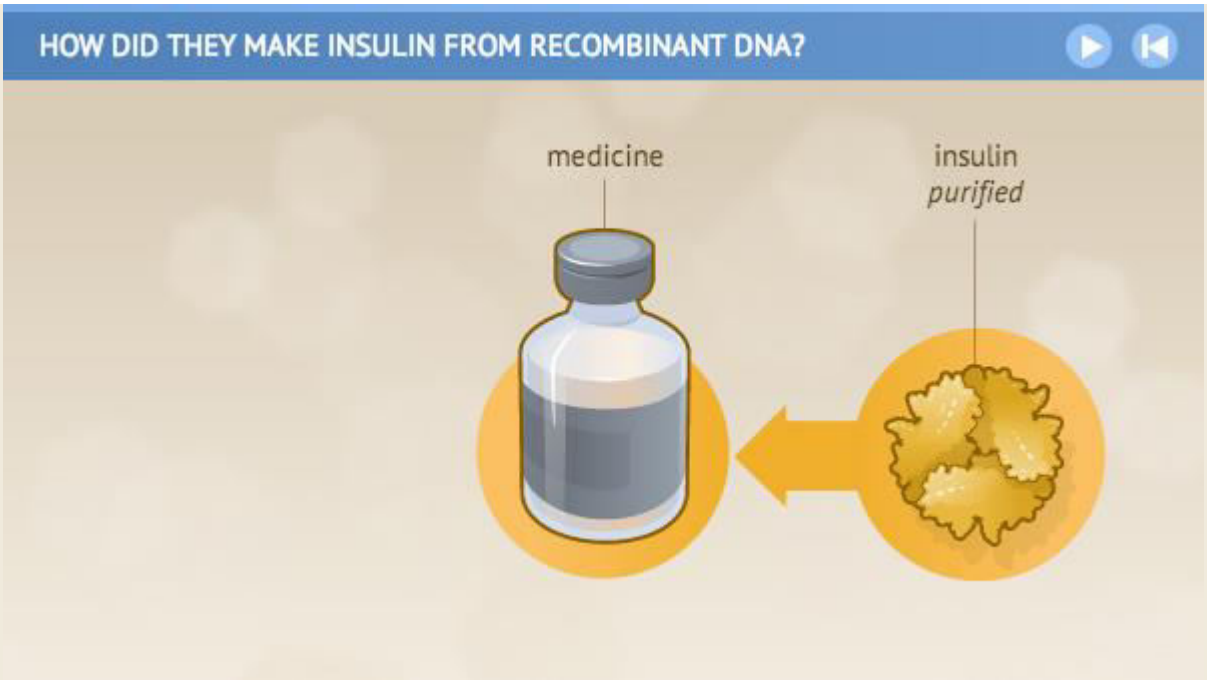
put the “recombinant” bacteria in large fermentation tanks.



There, the recombinant bacteria use the gene to begin producing human insulin.



Scientists harvest the insulin from the bacteria and…



purify the substance for use as a medicine for people.