



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2006 Volume V: Engineering in Modern Medicine

The Challenge to Deliver Insulin

Guide for Curriculum Unit 06.05.09
by Chris Willems

This curriculum unit is intended primarily for the high school biology and chemistry classroom. The focus is on chemistry and cellular functioning as it relates to diabetes.

Insulin assists the cellular uptake of glucose liberated during carbohydrate digestion and also regulates the storage of glucose as glycogen. Diabetes is a disease resulting from insufficient insulin production or destruction of the insulin by the immune system.

The development of recombinant human insulin in the 1980s has been a major improvement to the treatment of diabetes. The gene which produces insulin is located on chromosome 11 of humans and was successfully inserted into K-12 strain of *E. coli* bacteria. All animals use insulin, so why were pig and cow insulin used to supplement human insulin? Why not squirrel, elephant or starling insulin?

As a culminating activity for the unit, students are challenged to evaluate their risk of developing diabetes, based on current lifestyle choices. They also design a drug delivery system for insulin, or some other large polypeptide. They must consider cost, effectiveness, and patient comfort.

(Developed for Biology, grade 10; recommended for Biology, Chemistry, and Biotechnology, High School grades)

<https://teachersinstitute.yale.edu>

©2021 by the Yale-New Haven Teachers Institute, Yale University
For terms of use visit <https://teachersinstitute.yale.edu/terms>