

Discussion Topics

A New Insulin Given Approval for Use in U.S. –

Altman, Lawrence K., Oct. 30, 1982. A New Insulin Given Approval for Use in U.S. The New York Times.

<http://www.nytimes.com/1982/10/30/us/a-new-insulin-given-approval-for-use-in-us.html>

Areas for students to research:

- What modifications need to be made to express a human gene in bacteria? (intron splicing, codon usage, post translational modifications)
- In 1982, Humulin was sold over the counter and cost more than animal insulins. Are Humulin and animal insulins currently sold over the counter? What is the relative cost of each? What percentage of insulin sales for human use are of Humulin? Animal insulins? After 25 years of use, was the FDA correct in assuming they could rapidly approve Humulin based on their experience with animal insulins – or have risky side effects of using Humulin come to light?
- What other genetically engineered drugs/proteins are currently on the market? What illnesses do they treat? What are the ethical issues associated with genetically engineering drugs/proteins?

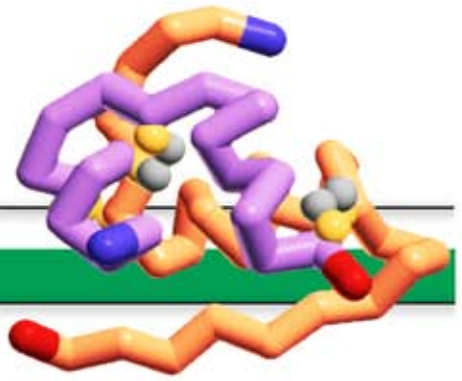
Lilly Drops Inhaled Insulin –

Jarvis, Lisa, March 17, 2008. LilyDrops Inhaled Insulin. Chemical & Engineering News. 86(11):9

<http://pubs.acs.org/cen/news/86/i11/8611notw2.html>

Areas for students to research:

- What two methods have been used to generate genetically engineered insulin? Which is the preferred method, and why? Why was the alternate method used originally? What do you think is the function of the C peptide within the human insulin gene? Why is it not needed when building a genetically engineered insulin?
- What is the difference between genetically engineered insulin and semi-synthetic insulin?
- Discuss the challenges that are involved in creating a genetically engineered drug.
- How are insulin analogs made, and what is their purpose?



Discussion Topics (continued)

Other articles

- <http://cen.acs.org/articles/86/i11/Lilly-Drops-Inhaled-Insulin.html> - discusses large pharmaceutical companies abandoning development of inhaled insulin – could be used in a discussion of what is entailed in developing and bringing a drug to market
- <http://pubs.acs.org/cen/coverstory/83/8325/8325insulin.html> - great background on the isolation of insulin, development of a drug, differences among species, and methods of producing (and advantages)

Other questions to explore

- Some patients create antibodies against porcine insulin. Are the antibodies actually detecting differences between porcine and human insulin structures? Or are the antibodies against contaminants that are found in the isolated porcine insulin?

Raskin, Philip, Guthrie, Richard A., Leiter, Lawrence, Riis, Ander and Jovanovic, Lois. 2000. [Use of Insulin Aspart, a Fast-Acting Insulin Analog, as the Mealtime Insulin in the Management of Patients with Type 1 Diabetes](#). *Diabetes Care* 23:583-588.

