

Demonstrating Drug Delivery

An Exploration of the
Scientific Method

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Warm-Up

Q1: What do these images have in common?

Q2: Can you sort these images into categories?

Q3: What trait did you use to classify these images?

Drug Delivery

Drug Delivery - the method or process of administering a pharmaceutical compound to achieve a therapeutic effect.

Administration Routes

1. Oral, Transmucosal, Inhalation:

Delivery of pharmaceutical through the mouth, mucus membrane, or lungs

2. Transdermal: Delivery of pharmaceutical through the skin

3. Injectable: Delivery of pharmaceutical directly through veins or arteries

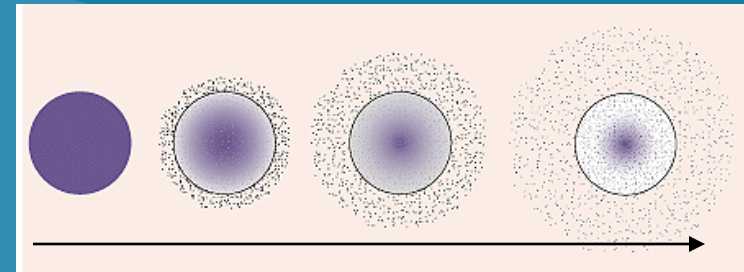
Novel Drug Delivery Systems

Controlled Release:

Releasing the drug at a constant rate (diffusion and osmotic delivery)

Brannon-Peppas, MPB, 1997

Controlled Release



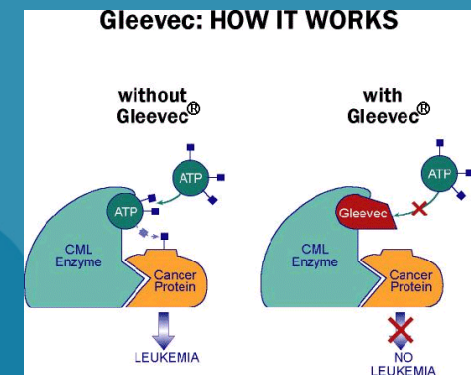
Time

Drug encapsulated in polymer

Targeted Delivery:

Delivering medication to a patient in a manner that increases the concentration of the medication in some parts of the body relative to others (passive vs. active)

Targeted Drug Delivery



<http://www.accessexcellence.org/WN/graphics/gleevec.jpg>

Turns "off" cell growth signal

1. Delivery Routes

Oral, Transmucosal, Inhalation



2

<http://images.medscape.com/pi/features/drugdirectory/octupdate/MCN58500.jpg>



5

http://deepblue.lib.umich.edu/html/2027.42/61991/asthma_inhaler_sm.jpg



7

http://www.reporter.bz/images/articles/2009_05/3464/u1_tamiflu.jpg



9

http://www.wired.com/images_blogs/photos/uncategorized/2007/07/01/alukaseltzer.jpg



11

<http://www.dixieems.com/Upload/Thums/629767.JPG>



13

<http://images.google.com/imgres?imgurl=http://www.femtalks.com/wp-content/uploads/2009/03/aspirin.jpg>

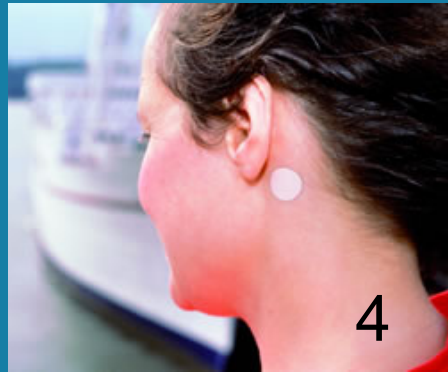


17

<http://www.nobledrugstore.com/upload/NI-FEDIPINE-aDALAT.jpg>

2. Delivery Routes

Transdermal



<http://www.pharmj.com/Hospital/Editorial/200706/pictures/p189.jpg>



http://drugtopics.modernmedicine.com/drugtopics/data/articlestandard//drugtopics/152006/319157/i2_t.jpg



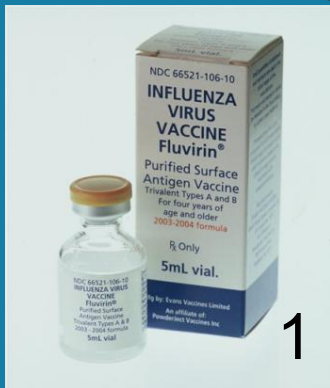
<http://medicineworld.org/images/blogs/2-2008/microneedles-drug.jpg>



http://ecx.imagesamazon.com/images/I/51Z2HP131L_AA280_Pbundle1_TopRight,0,0_AA280_SH20_.jpg

3. Delivery Routes

Injectables



1

http://static.biotech-weblog.com/biotech-weblog.com/imgnamechiron_files_for_eu_approval_for_pandemic_flu_vaccine---50226711--Flu_vaccine.jpg

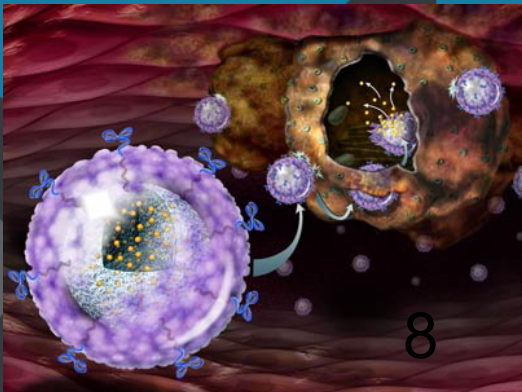


http://www.onlinepharmacynz.com/images/products/49-108-Epi_Pen_2_035.jpg



6

http://www.ideo.com/images/uploads/work/case-studies/large/Humalog_Lilly_cd.jpg



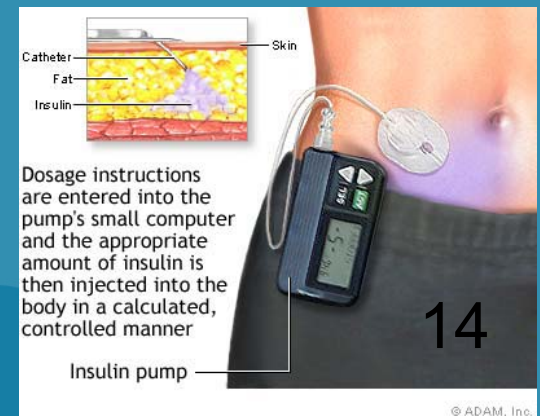
8

<http://web.mit.edu/newsoffice/2008/nanoparticles.jpg>



10

<http://www.patentbaristas.com/archives/zoladex.jpeg>



14

Dosage instructions are entered into the pump's small computer and the appropriate amount of insulin is then injected into the body in a calculated, controlled manner

Insulin pump

© ADAM, Inc.

<http://www.nlm.nih.gov/medlineplus/ency/images/ency/fullsize/18035.jpg>

What do YOU need to know?

What is a mg? What is a dL?

What is a mg/dL?

What is a solution? In science, what does “concentration” refer to?

What is a polysaccharide? Give an example.

What is an ion? Give an example.

What does “rate” refer to? Give an example.

If you have a nagging cough, what kind of medication would you prefer; rapid release or sustained delivery? Why?

?

Who Knew?!?!

?

What does this...

have to do with this...



http://www.ubcbotanicalgarden.org/potd/fucus_gardneri.jpg

?

?

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http://www.globalpackagegallery.com/main.php?g2_view=core.DownloadItem&g2_itemId=62

?

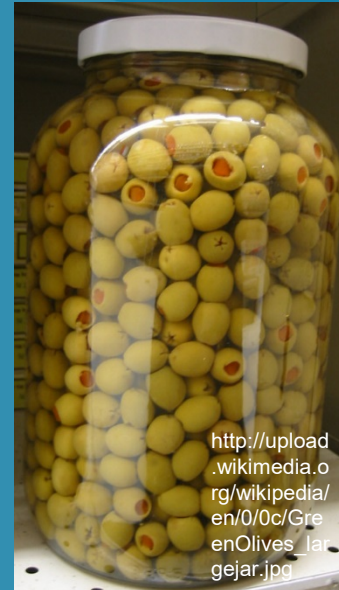
?

Sodium Alginate (a.k.a. Alginate)

Alginate - a class polysaccharides derived from brown algae (of the class *Phaeophyceae*)

Used in...

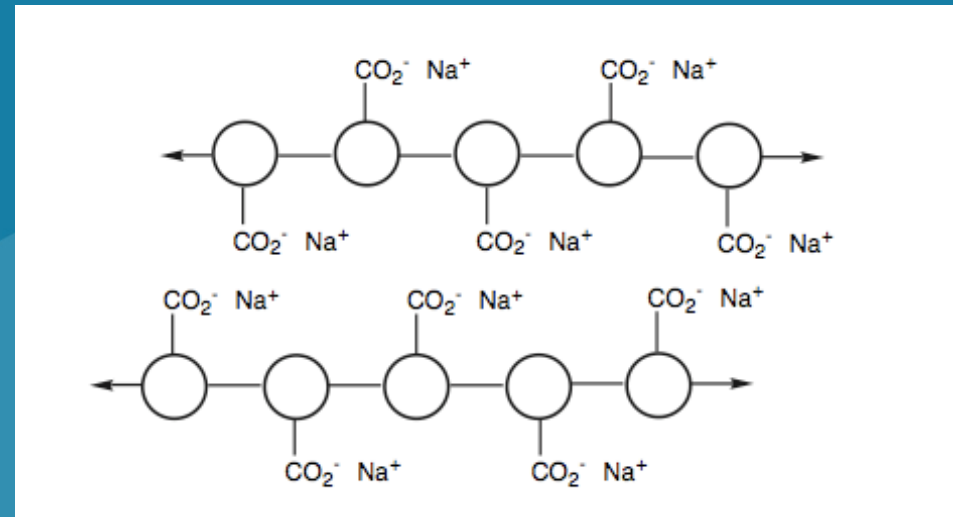
- The food industry as a thickener in ready-to-eat snacks and pimentos,
- The paper industry to enhance greaseproof properties of the starch, and
- The pharmaceutical industry as a filler and binder for tablets



Sodium Alginate Properties

Chemical composition

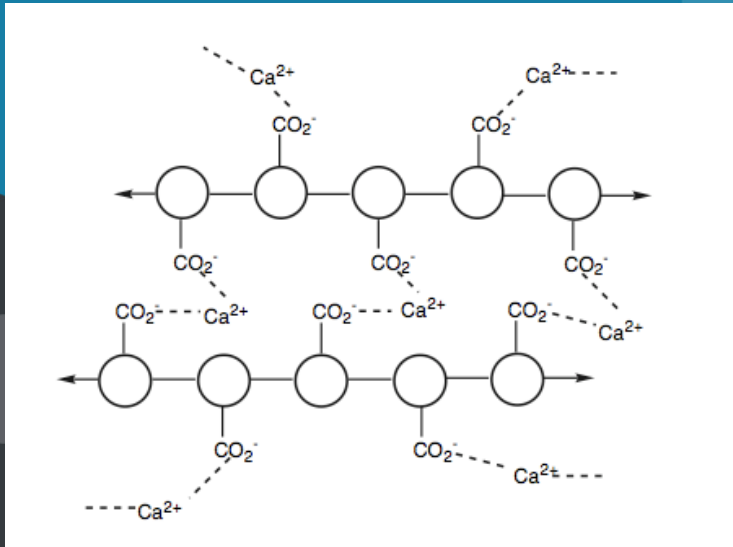
- Guluronic acid (G) and Mannuronic acid (M) in varying ratios depending on seaweed species



Waldman, et al. JCE Vol. 75, No. 11, Nov. 1998

Crosslinking

- When sodium alginate encounters CaCl_2 , the calcium replaces the sodium
- This reaction links nearby polymer chains forming "cross-links" - observed as a "membrane"



Waldman, et al. JCE Vol. 75, No. 11, Nov. 1998

Homework?

Yes, there is homework!

- Visit the class website at

<http://web.mac.com/rav3>

- Watch the *QuickTime* video of the procedure you will be following tomorrow.
- Be prepared to answer some pre-lab questions based on the video (Note: There will be 2 versions of this... you should definitely watch the video!!!)