“The best part of molecules and cells is that contrary to what I expected, the material is interesting. I expected it to be more of memorizing concepts type of class, but it is nice to see that we actually apply math and engineering to explain the science.”
Data from VARK survey

- Aural: 3%
- Kinesthetic: 8%
- Visual: 9%
- Read/Write: 18%
- Multimodal: 62%

http://vark-learn.com/
Team Based Learning

• Students will take a 10-question, multiple choice individual quiz (iRAT), followed by a group quiz (gRAT) (50% each)

• Teams of five students based on section

• Most Fridays
The basal plasma concentration of insulin in an experimental subject is $1 \times 10^{-11}$ M. The $K_D$ for the insulin receptor in adipose cells of this subject is $2 \times 10^{-8}$ M. Approximately what percentage of the insulin receptors is occupied under these basal conditions?

a. 0.0005%  

b. 0.005%  

c. 0.05%  

d. 0.5%  

e. 5.0%
iRAT (individual Readiness Assessment Test)

iRAT = 65 +/- 22

n=137 students, averaged over 9 TBLs
gRAT (group Readiness Assessment Test)

gRAT = 90 +/- 12*

93% felt Team Based Learning was a useful learning experience

The best part of Molecules and Cells is... 

“having to work with teams for the gRAT. It taught me how exciting and useful it is to work as a team.”

“Working with my study group for both completing the homeworks and studying for the tests”
The best part of Molecules and Cells is...

“I get to **have my ideas challenged** when going over questions where others disagree. In these situations, whether I am right or wrong, I always am more likely to come out of the situation with a **greater likelihood of retaining** the knowledge pertaining to the question.”
Significant decrease in test score after five months.
Students retained more material when taught through TBL.

Students scored significantly better on material taught with TBL.
Students retained more material when taught through TBL

Retest 5 months after the final exam

- Final Exam: TBL 86%, No TBL 67%*
- Retest: TBL 78%, No TBL 48%*
10% increased their score on retest

Final Exam  Retest

- TBL: 52% to 77%
- No TBL: 47% to 86%*
Take Home Message

• A diverse learning environment improves content retention

• Team-based learning can improve content retention *long after exposure* to the material
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THANK YOU!

JOHNS HOPKINS
BIOMEDICAL ENGINEERING