Enzyme Structure Characterization

Why we need to know the structure of an enzyme?

- To understand function we need a structure
  - To fix a car we need a manual
- To get structure we need to “look” at the molecule
  - Molecules are too tiny to be seen by microscopes
- To “see” we need many molecules stuck together
  - Crystal is molecules stuck together in a periodic way
- Still it is hard to “look” at the crystals
  - So we use x-rays since they have short wavelengths
Enzyme Characterization

Why we need to know function?

- To benefit
  - We can make use of the function to our for advantage
  - Blaber lab works on hFGF-1 (pro-angiogenic factor)

- To avoid problems
  - We can stop the function if it is harmful
  - Li lab work on Cbf5 protein (dyskeratosis congenita)
Enzyme Characterization

Why we need to know structure?

- With structure
  - Know how it works >>> The mechanism
  - Make it efficient >>> Better product
  - Make it economical >>> Save money or resources

- Without structure
  - Conduct lots of biochemical experiments
  - Carry out lots of biophysical studies
  - Still guess the mechanism >>> No easy solution
Enzyme Characterization

Why we need a crystal?

- Molecules are too tiny to see
  - Random molecules don’t give enough information
  - We need many molecules stuck together
  - Regularly arranged molecules give more information
  - Crystals are regularly arranged molecules
  - So we need crystals
Enzyme Characterization

Why we need x-rays?

- Molecules inside crystals are still too small to see
  - We need a probe the size of the molecule
  - Molecular sizes are 100s of picometer
  - X-rays have wavelength in that range (154.1 pm)
  - So we use x-rays to “see” molecules
  - But x-rays can’t be focussed so we can’t use a x-ray microscope
  - So we use x-ray diffraction and deduce the structure
For more information

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