Research #1- Temperature Effects on Enzyme Activity
Scott Stagg

Every enzyme has a temperature range of ideal activity. Outside that temperature range the enzyme becomes inactive and is said to be totally ineffective. This occurs because as the temperature changes, there is energy to break the protein structure. When this structure is disturbed and changed, this causes a change in the active site. The active site is changed beyond its ability to attach to the substrate and cannot complete the chemical reaction it was intended to speed up.

Most enzymes (and there are hundreds within the human organism) within the human cells will shut down at a body temperature below or above a certain value. This can happen if body temperature gets too low (hypothermia) or too high (hyperthermia).

Research #2- Enzymes: A Quantitative Approach
Cara Council-Garcia

Many chemical reactions such as some metabolic processes are essential for an organism to survive but, unfortunately, are not quick enough to maintain life. Biological catalysts, or enzymes, are chemical agents that influence the rate of a reaction without changing the reaction. An enzyme is a protein that allows reactions to occur at much faster rates. With the help of enzymes, those slow reactions can occur quickly enough to sustain life.

Enzymes are substrate-specific. This means they are very "picky" and only react with specific substrates to form products. In a normal enzyme reaction, the enzyme and substrate collide randomly in a solution and join at the enzyme's active site. This collision works much like a lock and key. The active site has a specific shape that only a particular substrate fits into. When the two are joined they react and the substrate is converted into a product. Once the reaction is complete the enzyme and newly formed product separate with the enzyme left unchanged.

Enzymes are proteins that function based on their 3-D shape. The easiest way to change the 3-D shape of a protein is to heat it. At high temperatures the protein will denature, or lose its 3-D shape, and no longer function. Temperature can also affect a reaction by increasing or decreasing the rate of collision between enzyme and substrate. If heat is increased, molecules (in this case enzyme and substrate) will move more quickly in solution, collide at higher rates, and react more quickly. Conversely, if the temperature is decreased than those same molecules will move more slowly, collide less frequently and therefore, react more slowly. Using the above information, one would expect that with increasing heat the enzyme reaction rate will also increase, BUT, only to a certain point. If the temperature is too high, then the enzyme will denature and the reaction will not run.

Research #3- Enzymes Make the World Go 'Round
Andrew Rader

Enzymes are proteins that act as catalysts and help complex reactions occur. You all know about cars and the assembly lines where they are made. There are giant robots helping people do specific tasks. Some lift the whole cars, some lift doors, and some just put bolts on. Enzymes are like those giant robots. They grab one piece, do something to it, and then release it. Once their job is done, they move to the next piece and do the same thing again. Enzymes complete very, very specific jobs and do nothing else. Just like the robot that was designed to move a car door can't put brakes on the car, enzymes are the same.

There are four steps in the process of an enzyme at work:

1. An enzyme and a substrate are in the same area. The substrate is the biological molecule that the enzyme will work on.
2. The enzyme grabs on to the substrate at a special area called the active site. The active site is a specially shaped area of the enzyme that fits around the substrate.
3. A process called catalysis happens. Catalysis is when the substrate is changed. It could be broken down or combined with another molecule to make something new.
4. The enzyme lets go. When the enzyme lets go, it returns to normal, ready to work on another molecule of substrate. The first molecule is no longer the same. It is now called the product.