RIBOZYMES

Ribozymes are catalytically active RNA molecules or RNA–protein complexes, in which solely the RNA provides catalytic activity. The term ribozyme refers to the enzymatic activity and ribonucleic acid nature at the same time. After their discovery in the early 1980s, ribozymes have been found in the genomes of many species from all kingdoms of life. Ribozymes are RNA molecules that can carry out enzymatic function by speeding up the rate of a chemical reaction. There are nine known classes of ribozymes extant in nature, and many more that have been designed in the laboratory. In addition, numerous artificial ribozymes were developed by in vitro evolution in the past years. All natural ribozymes fall into two major groups which are the small and large ribozymes. Ribozymes catalyze reactions such as RNA splicing, RNA cleavage and protein synthesis. Catalysis is mainly achieved by forming complex tertiary structures that provide an active site with ideal geometrical restraints to perform nucleophilic substitution reactions for phosphoryltransfers. The catalytic mechanism relies on acid–base catalysis assisted by metal ions and the ribonucleosides. Ribozymes are found in the genomes of species from all kingdoms of life. The well-established natural ribozymes known to date are the hairpin, hammerhead, Hepatitis delta virus (HDV), Varkud Satellite, and *glmS* ribozymes, which form the classes of small ribozymes, as well as the group I and II introns, the ribosome, spliceosome, and RNase P, which are classified as large ribozymes.

Abzymes:

As the name suggest abzymesor catalytic antibody are antibody molecule that have conjugated with enzyme to carry out catalysis of some substrate. The abzymes are discovered nearly three decades ago and now with the advancement in the area of protein engineering they show tremendous possibilities.

What are abzymes ?

Abzymes are antibodies with variable regions possessing enzymatic activity. Naturally occurring abzymes have been observed in normal individuals (Eg., anti-vasoactive intestinal peptide autoantibodies) and individuals with autoimmune problems (Eg. DNAse abzymes in systemic lupus erythematosus). Also, a number of "artificial enzymes" or "designer abzymes" are being developed with any desired enzyme activity and specificity.

Production of abzymes

For this reason abzymes are not produced naturally. A catalytic antibody is produced in response to molecules that have a structure similar to the proposed expected transition state of the substrate of the reaction to catalyse which the antibody is sought. The details on Abzymes production

Uses of abzymes

The words said by Dr. Paul on abzymes,"Unlike regular antibodies, abzymes degrade the virus permanently. A single abzyme molecule inactivates thousands of virus particles. Regular antibodies inactivate only one virus particle, and their anti-viral HIV effect is weaker."
So abzymes production is one of innovation and there use in HIV treatment may become a future hope for millions of patient suffering from HIV.

Isoenzymes:
Isoenzymes (also called isozymes) are alternative forms of the same enzyme activity that exist in different proportions in different tissues. Isoenzymes differ in amino acid composition and sequence and multimeric quaternary structure; mostly, but not always, they have similar (conserved) structures. Their expression in a given tissue is a function of the regulation of the gene for the respective subunits. Each isoenzyme form will have different kinetic and/or regulatory properties that reflect its role in that tissue. Isoenzymes are generally identified in the clinical laboratory by electrophoresis. Isozymes or isoenzymes, are enzymes that differ in amino acid sequence yet catalyze the same reaction. Usually, these enzymes display different kinetic parameters, such as K_M, or different regulatory properties. They are encoded by different genetic loci, which usually arise through gene duplication and divergence. Isozymes differ from allozymes, which are enzymes that arise from allelic variation at one gene locus. Isozymes can often be distinguished from one another by biochemical properties such as electrophoretic mobility.

The existence of isozymes permits the fine-tuning of metabolism to meet the particular needs of a given tissue or developmental stage. Consider the example of lactate dehydrogenase (LDH), an enzyme that functions in anaerobic glucose metabolism and glucose synthesis. Human beings have two isozymic polypeptide chains for this enzyme: the H isozyme highly expressed in heart and the M isozyme found in skeletal muscle. The amino acid sequences are 75% identical. The functional enzyme is tetrameric, and many different combinations of the two subunits are possible. The H4 isozyme, found in the heart, has a higher affinity for substrates than does the M4 isozyme. The two isozymes also differ in that high levels of pyruvate allosterically inhibit the H4 but not the M4 isozyme. The other combinations, such as H3M, have intermediate properties depending on the ratio of the two kinds of chains. We will consider these isozymes in their biological context in.

An **allozyme** is a form of an enzyme that differs from a closely related enzyme, but differs only a little bit. An allozyme differs by a single allele (alternative form of the same gene) at a single locus (location on the gene).

Why do we care about allozymes? Well, these tiny differences, though they might not change the function of an enzyme, can tell us a lot about the evolutionary history of the organism they inhabit. These tiny differences come from **mutations**, or random changes in the molecular sequence of our DNA. Though the changes themselves are random, they occur at a relatively predictable rate. Thus, there would be fewer of these changes between you and a closely related species than between you and a more distantly related species.