

Recent Trends in Fibrinolytic Therapeutic Enzyme

Chitte RR*

Division of microbial sciences, MACS- Agharkar Research Institute, Pune, India

***Corresponding author:**

Ratnakar R Chitte,
Division of microbial sciences, MACS- Agharkar
Research Institute, Pune 411 004, India,
E-mail: rrc10@rediffmail.com

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1. Abstract

Enzyme therapy has important role in treatment of cardiovascular disease. There are many fibrinolytic enzymes had been discovered and characterized. Few are them gone through pipeline of preclinical and clinical trial. Some of them commercialized and marketed. Variant, mutant and recombinant form are also in discovery line.

Still these products have limitations such as breeding complication, allergic in nature, secondary immune response, expensive etc. so search of new molecule is in continued to overcome these limitations. The available enzymes are costly and have several side effects. The search of new enzyme is always in need for better enzyme. The engineering of the various genetical molecules launches for better activity and super to others. The origin of the genetical make up is different but activities properties diverse.

2. Introduction

In physiological condition the blood vessel get narrow down as per age of the human being [1]. In disease condition the blood get form clot and restrict the blood flow. The commercial enzymes are available these are Streptokinase, Urokinase, t-PA and recombinant form various trade names are available in market. The various forms are reported [2]. Some are mutated and some are recombinant form are cited in the reference work. The enzyme base molecule is good tool rather than the surgical procedure [3]. The most effectiveness to overcome drawbacks like less side effect, non-hemolytic in nature, stable molecules. The natural fibrinolytic system presents in some of fruits, vegetable present as natural constitute, if such fruits and food eaten by the human will be health beneficial effects [4].

2.1. Pharmacological Aspect

There are several fibrinolytic enzymes are reported from different microorganisms. The optimum enzyme activity parameters will be different with each other's. Some are reported from mesophiles and thermophiles. Reported fibrinolytic enzyme activity parameters were distinct with each other.

2.2. Effects on Fibrin Network

The breakdown of the fibrin is important parts during the disease condition. The blood clot composed of the fibrin network, this would be break down into D-dimer and monomers of fibrin. There are many molecules are reported and their mode of action on fibrin network is different and some of them having common action among them. The fibrinolytic enzyme molecules having.

Fibrin clot network dissolution studies using the fibrinolytic enzyme actinokinase [5].

2.3. Cost of The Drug

The molecules cost depends on throughout the process of its development up to available in the market. The simple isolation procedure, production recovery, trials and licensing procedure etc. effects on the total cost of the product.

In general drug molecules cost is expensive, total enzyme therapy needs as per body weight dose so cost per patient is high. The development need to reduce the cost and effective molecule is always in search for effective and less expensive to common people.

3. Enzyme Used in Percentage

3.1. Recommendation of Daily Diet

The daily diet is also important to prevent the disease. Types of

food intake also affects the health condition. Gomatra cow urine contains natural fibrinolytic enzymes having several health benefits.

3.2. Vegetable and Fruits

Garlic stimulates and activates the fibrinolytic enzyme, it is reported that the garlic extract has medicinal value. The antioxidant properties of fruits and vegetables in daily diet are good health benefits.

3.2.1. Antioxidant Fruits: Antiseptic, antibacterial, Turmeric, Pomegranate

3.2.2. Peptides in Therapy: Fibrinolytic and Alzheimer disease

3.3. Microbial Bio-fertilizer and Its Impact On the Food

Bio-fertilizer increases the quality of food. The food or fruit grows up naturally, while chemical pesticides residues are found in the food and fruits as well in vegetables such as content if eaten that causes serious diseases like cancer. Microbes get colonies in the soil and root its vicinity and produce the useful hormones and enzymes which are used to take the simple form of nutrient from the soil. The role of microbial enzymes to convert into useful products or biochemical. These dissolved the inorganic form of phosphate, potassium etc. The simple dissolved form of the nutrient taken by the plant root for their metabolic activities. Some of the endophytic bacteria produce the growth promoters for good growth of the plant.

3.4. Fibrinolytic Enzyme Actinokinase from Thermophilic Microorganism

The fibrinolytic enzyme isolated from the thermophilic *Streptomyces* sp. which is isolated from the hot spring water of western coast of Maharashtra. The microorganism grows at 55°C and the enzyme shows optimum activities at both temperatures 37°C and 55°C. So the enzyme could work at normal physiological body temperature. The enzyme is secreted extracellularly. The crude yield of enzyme is about 200 mg/l. The enzyme production carried out at 5 L capacity fermenter took the successive five batches. The yield of the enzyme is consistent. In vitro clot evaluation of the enzyme also carried out using estimation of fibrin degradation products. These products are semi-quantitatively measured. The agglutination of the FDP (Fibrin degradation products) and D-dimer were observed.

3.5. Comparative Features of Enzyme Actinokinase

Thermophilic enzyme production but the active at room temperature. Non-hemolytic properties of the enzyme. The N-terminal sequence match with serine endopeptidase, shows high substrate specificity. Tolerate pH range 6.5 to 9.5, The enzyme thermostable at 60 – 65 °C. While other reported enzymes are allergic in nature.

3.6. Process Economy of Enzyme Recovery

Once the culture gets isolated the identification of the culture carried out, next task to isolate the enzyme in lab scale as well as

bioreactor processing total scenario affects the process economy of the enzyme. Also production cost and trial cost up to commercialization process.

During preclinical and clinical trials, the number of molecules enters more only few molecules screened for the next clinical studies. The drug discovery process takes almost 10 -15 years if proper funding and resources are available.

3.7. Fibrinolytic Enzyme of Global Economy

As the lifestyle of the human being changes with time, the health gets affected. As we chose advanced technology for a luxurious lifestyle, the human being doesn't want to take more physical work and eat improper food. The lifestyle has changes on physical and mental behavior, improper eating and sleeping creates the health problem. Age also matters for deposition of the lipids, bad cholesterol and dead cells on the walls of the blood vessel. This arises the cardiovascular diseases. The clotting of blood vessel, would be treated using the enzyme therapy. Most of the enzymes are expensive and have side effects. The fibrinolytic enzyme from *Streptomyces* sp. [6] will be a better substitute for current enzyme therapy if clinical prove the tests.

4. Conclusion

There are several molecules isolated and studied from various sources. These molecules are needed detail experiment from laboratory to clinical studies are successful that goes into the path of various trials. Here said studied carried out on the enzyme from *Streptomyces* sp. Some fruits constitute the fibrinolytic enzyme, through eating its enter in body and have physiological effect on blood thinner so nature constitute as edible form.

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