Editorial

Food as preventive medicine

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Editorial

Cardiovascular diseases (CVDs) are one of the leading causes of death around the world. According to world health organization (WHO) report, in 2012, around 17.5million people have died with CVDs, representing 31% of all global deaths. CVDs are projected to remain the single leading cause of death and it is estimated that the death number will increase to reach 23.3million by 2030.[1] Intravascular thrombosis is one of the major reasons of CVDs including acute myocardial infarction, ischemic heart disease, and high blood pressure.[2] Fibrin is the major insoluble protein component of blood clot/thrombus, which is formed from fibrinogen by the action of thrombin (EC 3.4.21.5). Under normal healthy conditions, fibrin clot formation and fibrinolysis are well balanced, while in unbalanced state, clots are not lysed which result in thrombosis.[2] Formation of thrombus is a very complicated physiological process which involves many factors. Fibrinolytic enzymes can degrade fibrin clot into fibrin degradation products. Based on their mode of action fibrinolytic enzymes can be grouped as plasminogen activators (indirect type), where they activate plasminogen into plasmin; whereas the other group plasmin like proteins (direct type) can act directly on thrombus or fibrin clot.[3,4] Anticoagulants such as various inhibitors of coagulation process and thrombolytic agents are used for the prevention and treatment of thrombosis.[5] Clinically, most of the thrombolytic agents used are tissue-type plasminogen activator (t-PA), a urokinase-type plasminogen activator (u-PA), and streptokinase from bacterial origin.[2] Although they are widely applied, these thrombolytic agents have undesirable side effects such as excessive bleeding caused by proteolytic degradation of other blood proteins, low specificity towards fibrin and are relatively expensive.[4] Therefore, researchers are actively searching for novel thrombolytic agents from different sources. Fibrinolytic enzymes are studied from different sources such as microorganisms,[3] insects,[6] polychaetes,[7] earthworms,[8] snake venoms,[9] fermented foods[5] and mushrooms.[10]

Nattokinase (NK) was first discovered from Japanese traditional fermented food "natto[11]" and its oral administration enhanced fibrinolysis in Canine plasma.[12] These results imply the possibility of consuming fermented foods to prevent cardiovascular diseases and laid the foundation to search for fibrinolytic enzymes from other foods and food grade microorganisms. Several potential fibrinolytic enzymes have been purified and characterized from various Asian fermented foods such as Chinese douche,[13] Korean fermented soybean sauce, Chungkook-Jang[14] and deonjang,[15] Korean fermented sea-food, Jeot-gal,[16] Korean salt-fermented fish-food, Anchovy-joet,[17] fermented shrimp paste[18] and Indonesian fermented soybean, Tempeh.[19] Fibrinolytic enzymes present in these traditional foods are mostly produced by Bacillus sp. Mushrooms are commonly consumed as food and also used in traditional oriental medicine. In recent years, mushrooms have become an attractive source of various bioactive compounds. Therefore, fibrinolytic enzymes from non-toxic mushrooms received wide research attention for thrombolytic therapy. Several fibrinolytic enzymes have been reported from various mushrooms.[10]

Researchers around the world are actively working on health benefits of foods by identifying the functional constituents, their biochemical structures and mechanisms. Beyond their dietary essential, understanding the health benefits of food in prevention and treatment of chronic diseases is a promising research.[5] Fibrinolytic enzymes derived from food grade microorganisms have great potential to be developed as functional food additives and drugs to prevent/cure thrombotic diseases.[2]

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Conflict of interest

The author declares no conflict of interest.

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