

A Novel Method for the Production of Heat Shock Proteins

Background

Heat shock proteins are a group of highly conserved proteins produced by cells in response to a variety of stressful conditions such as injury, disease, nutrient deprivation, inflammatory responses and bacterial infection. These proteins are responsible for protecting the structure and function of cells. In response to stress, the transcription of most other RNA in the cell is suppressed while that of heat shock proteins is increased thereby allowing the cells to endure stress. These proteins also play a major role in cellular function in its basal state by maintaining normal homeostasis and also as “chaperones” ensuring the proper folding and conformation of proteins.

Heat shock proteins have been implicated in a variety of diseases including autoimmune and inflammatory diseases such as rheumatoid arthritis, scleroderma, and SLE. Heat shock proteins are also known to confer drug resistance to cancer cells thereby interfering with cancer treatment.

Heat shock proteins have also been observed to elicit cellular immunity against tumor cells, which is attributed to the unique tumor specific antigenic peptides that are bound to the heat shock proteins. Thus, heat shock proteins may have therapeutic applications as vaccines in the treatment of a variety of diseases such as cancers and infectious diseases. Thus, there is a need to purify patient specific heat shock proteins in large quantities for the generation of customized vaccines.

Although heat shock proteins are commercially available, they are typically available only in small quantities and at very high cost. Moreover, commercially available heat shock proteins are recombinant animal proteins purified from a bacterial system and cannot be used for diagnostic or therapeutic purposes. **Thus, there is a significant unmet need to develop inexpensive native human and animal heat shock proteins in large quantities for use in research, therapeutics and diagnostic assays.**

Description of the Technology

Heat shock proteins are produced by treating the subject tissue in a manner to initiate coagulative necrotic changes. The coagulative necrotic changes can be initiated by heating the subject tissue at a predefined temperature to induce the production of heat shock proteins. The tissue is then cooled and incubated in a growth medium and the heat shock proteins are collected from the supernatant. The production of heat shock proteins is increased upon the initiation of coagulative necrosis and progresses until tissue death occurs. The method described in the invention results in the inexpensive production of heat shock proteins that can be separated and purified.

Other methods of stress induction such as incubation in a bioreactor, such as a microgravity culture system of the rotating cylindrical cell culture vessel (RCCS bioreactor) available from Synthecon, Inc. may also be used for the production of heat shock proteins.

Advantages

- . •Method of production is scaleable and inexpensive.
- . •Proteins produced are in their native form.
- . •This method is rapid and effective
- . •The method can be used to produce proteins for a variety of applications.

Applications

- . • Research
- . • Diagnostic assays: to quantify the level of antibodies present in a patient as a marker.
- . • Therapeutics:

-Vaccine development: The heat shock proteins produced by the method disclosed in the invention may be conjugated to antigens and used in the preparation of vaccines for therapeutics and prevention of diseases.

Patent Status

- . • PCT patent application filed
- . • PCT application published on August 14, 2003; Publication No.: WO 03/066092 A1.

Licensing Opportunity

- This technology will be licensed non-exclusively for research applications and exclusively for therapeutic or diagnostic applications.

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