Announcing the dissertation defense of Ms. Roli Kumar for the degree of Masters in Biomedical Engineering.

Date: May 9, 2002
Place: University of Connecticut
Biomedical Engineering Department
Storrs, CT
Time: 3:00pm.
Room: UTEB 150

Stress proteins are proinflammatory in vivo.
Implications for bioengineers.

Abstract

Fibrosis of biosensors, placed in vivo, represents a major hurdle to the widespread application of real-time monitoring of biochemical and metabolic processes in animals and humans. The fibrotic reaction to biosensors is the end result of the acute inflammatory response typical of acute wounds and foreign body reactions. Significant tissue trauma occurs at the time of biosensor placement and is likely to be associated with an increased expression of cellular stress proteins around the device. Stress-proteins may represent biological signals of threat, and as such act as potent inducers of acute inflammation. We tested the hypothesis that subcutaneous injection of stress proteins will cause acute inflammatory swelling in a murine model in vivo. The left ear of all animals received sterile, isotonic saline (10μL) to control for swelling due to needle injury. Ten week old, C3H mice (n=57) were divided into 6 groups based on the protein they received in the subcutaneous tissue of the right ear. Group 1 serum, Group 2 heat-treated serum (60°C x 45min), Group 3 HSP70 plus serum, Group 4 HSP70 plus heat-treated serum, Group 5 GRP78 plus serum, and Group 6 GRP78 plus heated-serum. Ear thickness was measured (μm) at 24 and 48 hours using a hand-held, spring-loaded micrometer. Specific ear swelling was determined by calculating the difference between left (saline) and right (protein) ear for each animal and the means of the differences reported. Comparisons between groups were preformed using the Student’s t-test and significance accepted when p <0.05.

Subcutaneous injection of stress proteins, HSP70 and GRP78, were associated with significantly increased acute swelling in this in vivo murine model in comparison to serum or heated serum alone. The pro-inflammatory effect of HSP70 and GRP78 was attenuated by admixing with heat-treated serum. The 48 hour data were not different from the 24hr data. Stress proteins, within the acute wound environment, are proinflammatory and as such support the concept of their behavior as “chaperokines”. Stress proteins may be future targets for therapeutic manipulation wherever acute inflammation is followed by problematic fibrosis in the in vivo setting.

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Updike, S.J. Achieving long term performance in a subcutaneous glucose sensor.