THERMAL THERAPY, NAMED WAON THERAPY, REDUCES CARDIAC OXIDATIVE STRESS, APOPTOSIS AND FIBROSIS OF TO-2 CARDIOMYOPATHIC HAMSTERS WITH HEART FAILURE

ACC Poster Contributions
Ernest N. Morial Convention Center, Hall F
Sunday, April 03, 2011, 10:00 a.m.-11:15 a.m.

Session Title: Emerging Nonpharmacological Treatment for Heart Failure
Abstract Category: 24. Myocardial Function/Heart Failure—Clinical Nonpharmacological Treatment
Session-Poster Board Number: 1019-8

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Background: Oxidative stress is implicated in the pathogenesis of chronic heart failure (CHF), which leads to cardiac apoptosis and fibrosis. We have reported that Waon therapy, which is a form of thermal therapy using a far infrared-ray dry sauna at 60 degrees centigrade, improves cardiac function and prognosis in patients with CHF. The aim of this study is to investigate whether Waon therapy reduces cardiac oxidative stress, apoptosis and fibrosis in CHF hamsters.

Methods: Thirty-week old TO-2 cardiomyopathic hamsters with CHF were divided into Waon therapy (WT) or control group. WT group underwent Waon therapy daily for 4 weeks. In contrast, control group did not take any treatment. We performed ELISA for 4-hydroxy-2-nonenal (4-HNE), TUNEL assay and Azan staining of hearts to assess oxidative stress, apoptosis and fibrosis, respectively. Several markers of oxidative stress and apoptosis were assessed by Western blot. All examinations were performed after 4 weeks of treatment.

Results: Echocardiography demonstrated that 4-week Waon therapy increased fractional shortening compared to control (WT: 23.3±4.3 vs. control: 16.5±4.2%, P<0.01). The concentration of cardiac 4-HNE in WT group was lower than that of control (3.57±0.96 vs. 5.53±1.17μg/ml, P<0.05). Cardiac apoptosis and fibrosis of WT group decreased compared to control. Cardiac expressions of manganese superoxide dismutase (Mn-SOD), heat shock protein 27 (HSP27) and Bcl-2 in WT group, which negatively modulates oxidative stress and apoptosis, increased compared to control (Mn-SOD, 0.81±0.20 vs. 0.52±0.16, P<0.01; HSP27, 1.25±0.30 vs. 0.27±0.16, P<0.01; Bcl-2, 0.90±0.10 vs. 0.71±0.02, P<0.05). In contrast, cardiac expressions of Caspase 3 and Cytochrome C in WT group, which lead to apoptosis, decreased compared to control (Caspase 3, 0.76±0.11 vs. 1.01±0.04, P<0.01; Cytochrome C, 0.68±0.12 vs. 1.10±0.13, P<0.01). Furthermore, WT increased hypoxia-inducible factor-1β, which is an angiogenic factor and is degraded by oxidative stress, compared to control (0.76±0.28 vs. 0.33±0.08, P<0.05).

Conclusions: Waon therapy reduces oxidative stress, apoptosis and fibrosis in failing hearts of TO-2 cardiomyopathic hamsters.