

Gene expression and physiologic responses of the heart to the initiation and withdrawal of caloric restriction.

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Aging increases and caloric restriction (CR) decreases morbidity and mortality associated with the cardiovascular system. Using Affymetrix microarrays, we identified changes in heart gene expression induced by aging and CR in male mice. Eight weeks of CR (CR8) reproduced 19% of the long-term CR (LTCR)-related expression changes. Because CR8 begins to extend the life span of these mice, these genes may be keys to its cardioprotective effects. CR8 and LTCR changed gene expression in a manner consistent with reduced remodeling and fibrosis, and enhanced contractility and energy production via lipid beta-oxidation. Molecular and histochemical [tissue chemistry] studies indicated that CR reduced natriuretic [describes diuretics that promotes the sodium excretion] peptide precursor type B and collagen expression, and reduced perivascular [located around blood or lymph vessels] collagen deposition. We found smaller cardiomyocytes [heart muscle cells] in the left ventricle of old-LTCR mice, suggesting reduced age-related cell death. Eight weeks of control feeding returned 97% of the LTCR-responsive genes to control expression levels. Thus, key CR-induced effects are rapidly responsive to diet, suggesting reduced caloric intake has rapid, positive effects on the heart.

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