

## Cardiomyocyte health and preservation of function is dependent on the capillary cell 2-step dance-step rhythm

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We postulate that in a healthy, precisely timed and counter balanced 2-step dance-step rhythm; interstitial space cells facilitate cardiomyocyte health and longevity. Cardiomyocytes are work horse cells that utilize Oxidative Phosphorylation (OXPHOS) for 95% of ATP production. With such a demanding role and low proliferative ability, the cardiomyocyte must rely on an external support system consisting of helper cells to preserve functionality. Such cells include the resident cardiac macrophage, progenitor cell and fibroblast. The cardiac macrophage, with its intimate relationship to the cardiomyocyte may be capable of activating silenced cardiomyocyte embryonic genes through growth factors to replace cardiomyocyte infrastructure. In coordination with the capillary cell 2-step dance-step rhythm, cardiomyocytes predominantly utilize OXPHOS while the capillary cell and helper cells use nitric oxide production and a modified TCA cycle. Coordinated with interstitial space sanitation and inflammatory mediators, the helper cells facilitate a cytokine excitatory signal to the capillary cell causing an increase in luminal permeability to plasma immune arsenal. Increased permeability requires immediate and abundant ATP provided by a simultaneous swing to OXPHOS. Similarly, helper cells respond to the capillary cell and also swing combustion to OXPHOS for the purpose of interstitial space sanitation, extracellular matrix repair and cardiomyocyte repair/proliferation. In contrast, the cardiomyocyte responds to the capillary cell by decreasing permeability to a hostile interstitial space and swings to nitric oxide production. Once interstitial space sanitation is achieved the capillary and helper cells swing back to nitric oxide production and decrease luminal permeability while the cardiomyocyte increases permeability to a sanitized interstitial space and resumes OXPHOS. As such, during the macrophage OXPHOS phase it becomes essential to cardiomyocyte repair. In a counterbalanced 2-step dance-step rhythm the macrophage accomplishes both cardiomyocyte repair and interstitial space phagocytosis during OXPHOS for the purpose of preserved end organ functionality.

### Biography

Robert Buckingham, MD, FACP, received his MD from University of Illinois, Chicago, residency at Northwestern University and has been a practicing internist for 43 years. In addition to internal medicine, he subspecializes in cardiometabolics. He also holds several medical director positions and has published five books regarding chronic inflammation and metabolism.

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