A NOVEL APPROACH TO MONITORING PULMONARY CONGESTION IN HEART FAILURE: INITIAL ANIMAL AND CLINICAL EXPERIENCES USING REMOTE DIELECTRIC SENSING (REDS) TECHNOLOGY

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Background: High readmission rates due to heart failure continue to plague the healthcare system and have led to federal involvement aimed at improving patient care. Dyspnea resulting from pulmonary fluid overload has been proven a key pathophysiological mechanism leading to clinical decompensation and multiple studies have by now demonstrated that a wide patient population could benefit from accurate detection of pulmonary fluid buildup (congestion) prior to the development of overt symptoms. An effective non-invasive methodology has eluded the cardiological community to date. In this study, we present for the first time a novel monitoring technology for pulmonary congestion based on non-invasive remote dielectric sensing (ReDS) technology.

Methods: Preclinical and clinical results are reported herein. In our animal model, six discrete experiments of acute fluid overload followed by administration of diuretics were performed. The ability of ReDS to accurately quantify lung fluid content compared to computerized tomography (CT) was tested.

Results: A nearly linear pattern between the change in ReDS and CT fluid concentration values was observed (Pearson correlation = 0.96). Results from 16 patients admitted with ADHF are also reported. In these patients, ReDS values decreased by 16.53±9.31% throughout hospitalization, indicating pulmonary “drying”. This correlated with both patients’ clinical course and fluid balance status (Pearson correlation = 0.86 (95% Confidence Interval: 0.81-0.91), R2 = 0.74).

Conclusion: These findings indicate that ReDS technology accurately quantifies lung fluid concentration non-invasively and may aid in monitoring and treating heart failure patients throughout hospitalization and at home.