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Impedance-guided Treatment Prevents Acute Heart Failure in the Course of Acute Myocardial Infarction. Proof of Concept

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Objective To determine whether repetitive non-invasive measurement of lung impedance (LI), a measure of lung electrical resistance, reliably reflects changes in lung fluid content (LFC) and predicts the evolution of AHF, and whether it enables early effective therapy.

Background Patients sustaining an acute myocardial infarction (AMI) frequently develop acute heart failure (AHF) during hospitalization, and are treated only after the appearance of overt signs of lung fluid overload. Ongoing monitoring of the status of LFC in AMI patients may enable prediction of impending AHF and prompt early therapy thus precluding AHF and improving outcomes.

Method and Results 619 patients admitted for AMI, with no radiological signs and clinical manifestations of AHF underwent LI monitoring for 94±42 hrs. 423 patients did not develop AHF. Their maximal LI decrease from baseline during monitoring was 5.8±3.2 % (p<0.01 compared to normal subjects). 135 patients developed overt AHF. Patients were asymptomatic when their LI decreased by 14%. LI decreased from baseline by 18.2% (p< 0.001) at the onset of overt AHF and by 35.8% (p<0.0001) at peak AHF. Early therapy was evaluated in 61 other patients and initiated in the absence of symptoms when LI decreased by 13.6±0.6%. AHF developed in only 15% of them. Compared to conventional therapy in AMI patients with AHF, LI-guided therapy reduced hospital stay 1.4-fold (p<0.01), re-admissions during 1-year 1.6-fold (p<0.01) and 4-year mortality 3.3-fold (p<0.01).

Conclusion Monitoring of LI in AMI patients reliably reflects LFC and predicts AHF. Early therapy in these patients prevents clinical AHF in 85% of patients, and improves outcomes.