

Abstract Submitted  
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**Synchronization of Cardio-Respiratory Dynamics in Critically Ill Patients.** ANTON BURYKIN, TIMOTHY BUCHMAN, Washington University in St. Louis — We studied changes in cardio-respiratory synchronization and dynamics of cardiovascular system during transition from mechanical ventilation to spontaneous respiration in critically ill patients. This observational study exploits a standard clinical practice—the spontaneous breathing trial (SBT). The SBT consists of a period of mechanical ventilation, followed by a period of spontaneous breathing, followed by resumption of mechanical ventilation. We collected continuous respiratory, cardiac (EKG), and blood pressure signals of mechanically ventilated patients before, during and after SBT. The data were analyzed by means of spectral analysis, phase dynamics, and entropy measures. Mechanical ventilation appears to affect not only the lungs but also the cardiac and vascular systems. Spontaneous cardiovascular rhythms are entrained by the mechanical ventilator and are drawn into synchrony. Sudden interruption of mechanical ventilation causes gross desynchronization, which is restored by reinstatement of mechanical ventilation. The data suggest (1) therapies intended to support one organ system may propagate unanticipated effects to other organ systems and (2) sustained therapies may adversely affect recovery of normal organ system interactions.

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