

Kolloquium

Biomedizinische Technik und verwandte Gebiete

Sommersemester 2015

Dienstag, 31.03.2015, 17:00 - 18:30 Uhr

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(Moderation: Univ.-Prof. Dr.-Ing. Dr. med. Steffen Leonhardt,
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„Automatic Control of Artificial Ventilation Therapy“

Abstract:

This comprehensive work focuses on an examination and therapeutic approaches using artificial ventilation for acute respiratory distress syndrome (ARDS). ARDS is a rapidly evolving and life-threatening respiratory syndrome, leading to an impaired gas exchange with severe progressive hypoxemia and hypercapnia. The mortality rate is approximately 43%, which remained unchanged for decades. Thus, it is a great challenge in intensive care medicine to reduce this rate and the following topics are addressed.

- Analysis of abnormal breathing sounds
- A mathematical model for carbon dioxide (CO₂) elimination
- Control system design for the control gas exchange based on oxygen and CO₂
- Automatic control of an artificial ventilation

Based on porcine dynamics with induced ARDS, the algorithmic performances were assessed by biochemical properties of standard arterial blood gas analysis, mechanical properties of the setting ventilatory variables, and the pathophysiological change non-invasively measured by real-time electrical impedance tomography. The distinctive outcomes endorse the feasibility of automatic ventilation therapy in clinical practice.

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