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Mechanomyography of intrinsic laryngeal muscles in Göttingen minipigs

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Introduction: A pressure-measuring device (PMD) was developed for mechanomyography of intrinsic laryngeal muscles (LAR).
Methods: Physical properties of PMD (saline-filled PVC balloon glued to a plastic tube): 1) pressure-volume-curves (dp/dV), 2) pressure increase (dp) at 0.5 N (various preloads), 3) linearity (dp/F; F:0.02-8 N; various preloads), 4) resonance frequency.
In vivo: 10 Göttingen minipigs (Animal Protection Commission consent). Methohexitone/fentanyl anesthesia; high-frequency ventilation via tracheostoma; mechanomyography of flexor digitorum muscle (FLEX) and LAR (single twitch stimulation, 0.1 Hz): onset and neuromuscular block (NMB) of individual ED9OFLEX of vecuronium (VEC).
Results: 1) Linearity of dp/dV; 2) constant dp under 0.5 N; 3) linearity of dp/dF; 4) resonance frequency: 13±1.3 Hz.
In vivo: highly reliable, stable signal quality (12 hours).
Table: NMB and onset of ED9OFLEX (0.203±0.0149 mg/kg VEC) at LAR and FLEX, M#pmSEM.

	NMB [%]	Onset [s]
FLEX	90±1.0	160±11.0
LAR	84±2.2	136±7.0*

* p< 0.05: LAR vs FLEX (t-Test)

Conclusion: 1) The system is suitable for larynx muscle mechanomyography due to its physical properties and reliable signal quality. 2) Pharmacologically, Göttingen minipig laryngeal muscles resemble those of man (1).
Literature: (1) Anesthesiology 74:833-837,1991.

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Using the World-Wide Web for the interactive simulation of the anesthesia machine

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Introduction: Instead of consulting textbooks, manuals or reference sources computer simulation of respirator function has established as a common pathway in visualizing the interaction of respirator function and lung mechanics. Moreover, the World-Wide Web (WWW) is capable of easily distributing this simulation via the Internet by using the program language Java instead of specialized software.
Methods: Approaching a flexible analogy model to ventilation by means of computer simulation attention commonly is directed to an electrical equivalent circuit as a standard of excellence that contains essential features denoting properties of the pulmonary system when ventilated and different respirator settings. Applying equations of state and equations of output to appropriately solve the differential equations provides the most suitable method. These equations then constitute the kernel of the computer simulation by using the program language Java. The model of ventilation we implemented permits real-time simulation and to interactively change pulmonary parameters and respirator settings. The simulation can be received via the Internet and then runs by simply using a WWW browser.
Results: When compared to complex simulation software, the use of Java is favorable because of easy implementation of the underlying mathematical algorithms and in supporting a practical human-machine interface. The simulation program code fragments are provided by a WWW server with these code units, called applets, subsequently being requested by the WWW client (browser). After receiving the applets an interactive and real-time simulation is present on the client's graphical display. Thus, Java offers the advantage of being platformindependent.

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Efficacy of imaging bedside monitoring in pediatric/neonatal ECMO patients

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Objective: To evaluate the impact of serial imaging monitoring on treatment and outcome of patients on ECMO.
Patients and Methods: The imaging findings of 30 patients (age: neonate to 3 years) on venovenous ECMO were evaluated. Serial chest plain films were taken and serial ultrasound exams of the head, the abdomen, the chest and the catheterized vessels were performed. The findings were evaluated as to their impact on therapy and prognosis as well as with in regard to detection of complications.
Results: Chest X-rays were evaluated by a self defined score and demonstrated the changes in lung disease, no correlation could be found in regard to prognostic assessment. Ultrasound had its impact on therapy by detecting cerebral changes like bleeding and impaired perfusion and by demonstrating renal perfusion, catheter positions and vessel situation (fluid management, thrombosis...). It especially proved helpful for early detection of complications, when performed prompt at clinical demand.
Conclusion: Regular bedside imaging monitoring proves to be essential for successful ECMO management. Nevertheless, frequency and extend can be modified by clinical informations and known risk periods. Experienced and adequat imaging must be available especially for emergencies like catheter perforation.

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A fuzzy-controlled weaning system in the intensive care unit

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Abstract
Introduction: Weaning patients with respiratory insufficiency from artificial ventilation is complex and requires expertise obtained by long clinical practice. Fuzzy-KBWean is a real-time open-loop weaning system formally based on fuzzy controlled rules representing the knowledge and expertise of intensivists.
Methods: The respirator settings and physiological parameters are taken from a PDMS continuously as input. Instead of controlling the ventilator directly, the system operates by displaying suggested changes to the intensivist, who then decides whether to execute the recommended changes or not.
Results: Fuzzy-KBWean is based on Delphi®, running on a WindowsNT® platform, stores all data in a database and is used in an intensive care unit (ICU) for post-operative cardiac patients at the Vienna General Hospital. The application is in a prototype stage and is currently being tested. The system is fully designed and represents an excellent paradigm for weaning post-operative patients, because expert knowledge about the problem has been utilized.
Conclusion: The ultimate aim is to grasp the trends in the field of weaning in order to design a closed loop system.