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NONLUNG OXYGENATION: REVISING OF THE OLD IDEA

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Background and goals of the study: Severe hypoxemia due to acute pulmonary gas exchange derangement remains the common reason for patients' mortality. One of the alternative ways to alleviate hypoxemia is non-lung oxygenation. The goal of this study was to reexamine the old idea concerning O_2 administration to the gastro-intestinal tract, aiming systemic oxygenation instead of the local one [A.Charniy, 1961, N.Sirotinin, 1968, S.Gelman, 1975].

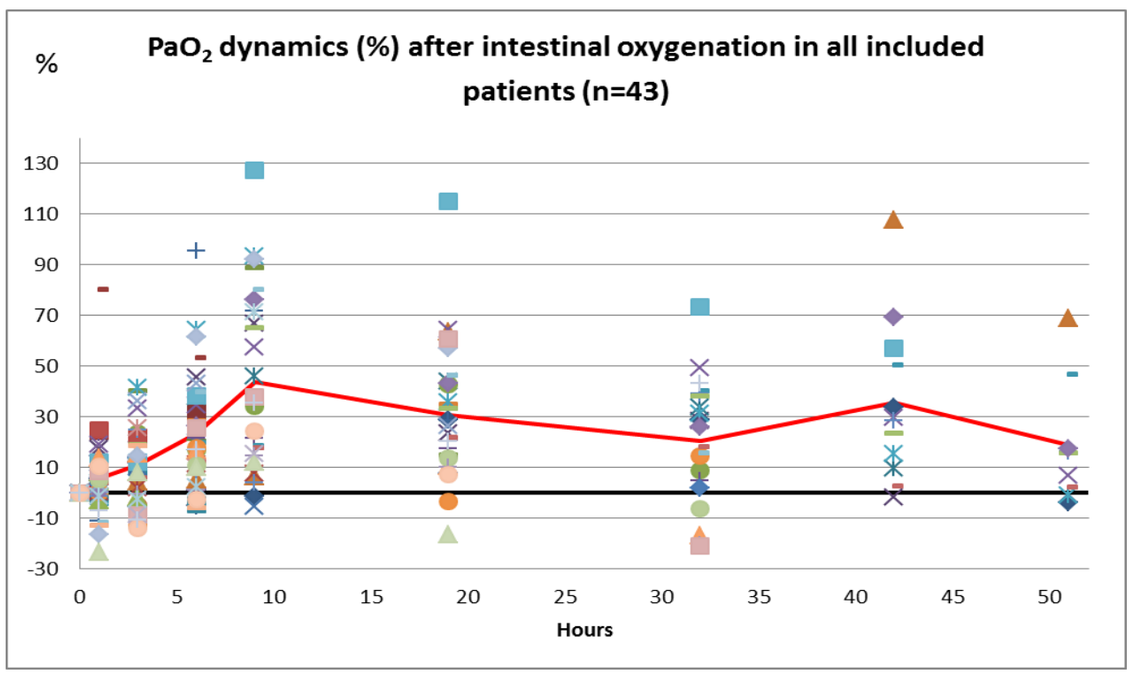
Material and methods: 43 ICU (medical and surgical) ventilated patients with undamaged gastro-intestinal tract were investigated. 100% of oxygen was introduced to the patients' intestine by the nasointestinal tube, connected to an extra respirator. Special parameters creating low gas flow were used: breath rate 5-8 min, tidal volume 30-80 ml, inversed I:E ratio (3:1, 4:1). The average volume of the introduced oxygen was 150-400 ml/min, or 3-7 l/hr. The time of the procedures was 40-90 min. Intra-abdominal and intra-intestinal pressures were monitored while insufflating. The arterial blood gases were tested: before, 1, 3, 6, 9, 19, 32, 42, 51 hrs after the procedure. None of the lung ventilation parameters (FiO_2, PEEP, I:E, Vt, MV) were changed during the procedure and the evaluation time. Received PaO_2 figures were standardized as percent of total increment relating to their initial values. The data presented as M±SD.

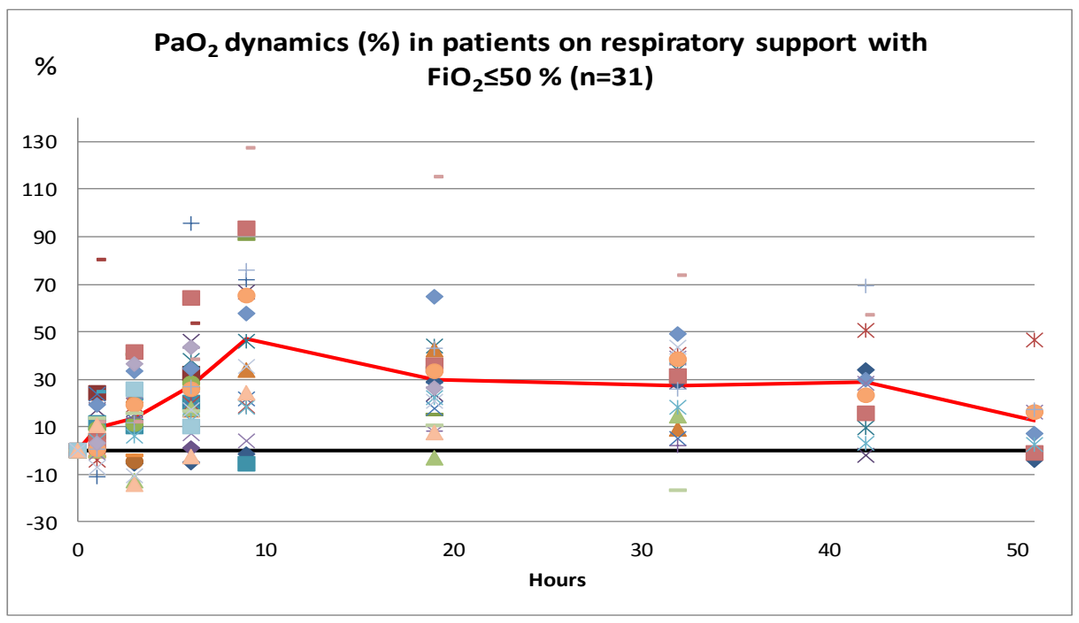
Results: The received results allow us to state that oxygen administered to the gastro-intestinal tract produces the delayed but long lasting blood oxygenation growth.

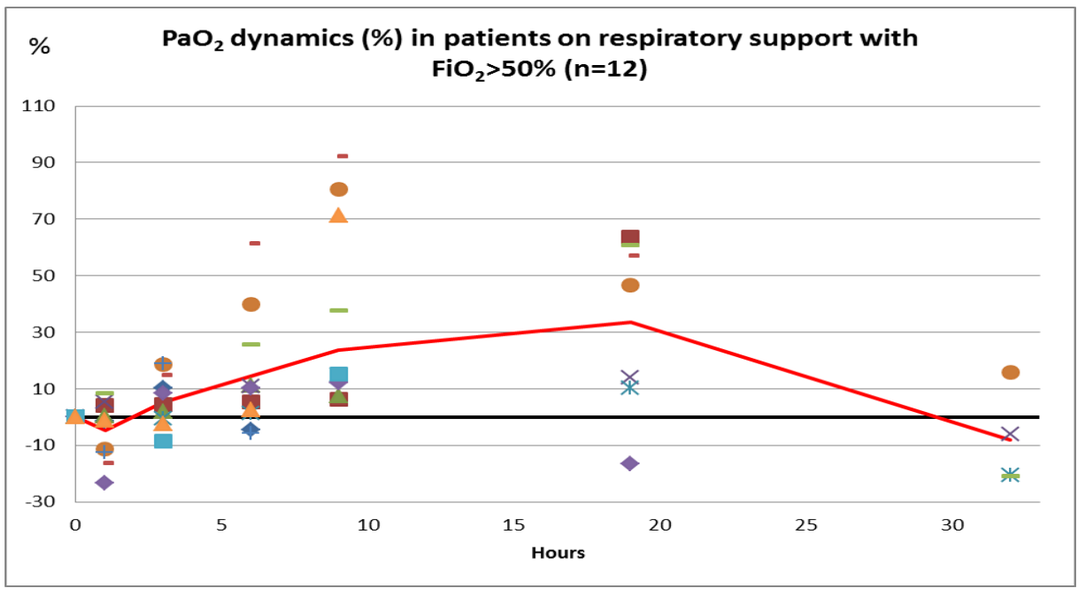
Discussion: In most the presented cases the maximal PaO_2 growth was detected in 9 hrs after the oxygen insufflation. At the same time, the direct relation – the more the quantity of administered oxygen, the more the systemic oxygenation effect – was not set; secondly, the total quantity of insufflated oxygen was definitely not enough for such prolonged improvement of oxygenation effect realizable due to the direct intestinal absorption only. Finally, the other PaO_2 dynamics could be expected, namely the greatest oxygenation increase straight after insufflation diminishing in accordance with the empting of the created depot.

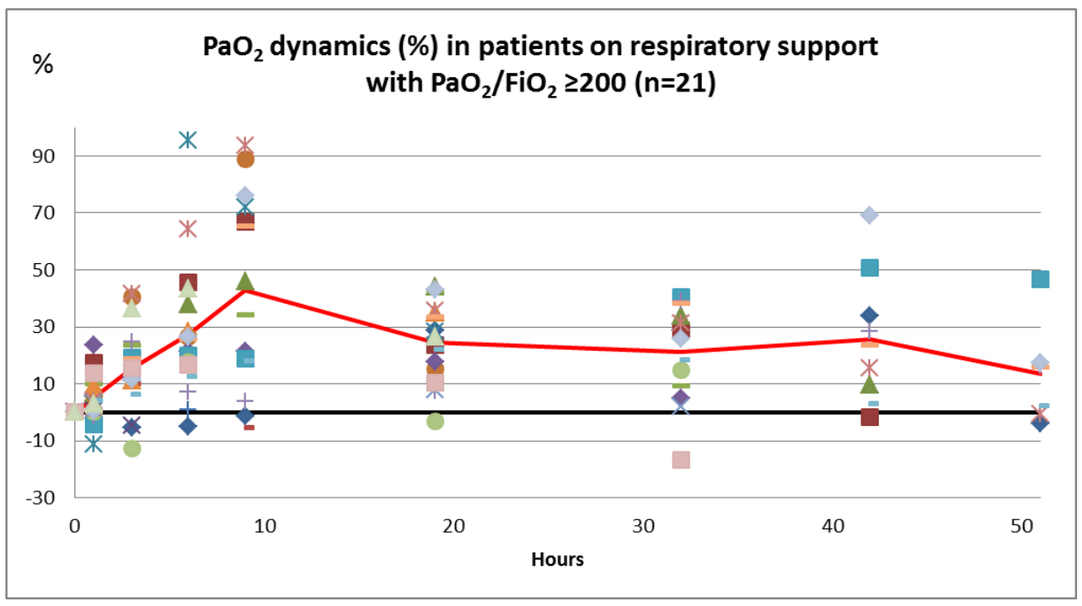
Thus, the achieved result is probably a consequence of any other – physiological or biochemical metabolic reactions, causing either cascade amplification of the initial stimulus or its transformation into the processes resulting in restoration of the pulmonary gas exchange functions. In this context, for example, it is possible to suppose the decrease of the extravascular lung water or the increase of the surfactant synthesis and maximization of the "intestinal oxygenation" effect especially in situations where respiratory insufficiency is mediated by its break (ARDS).

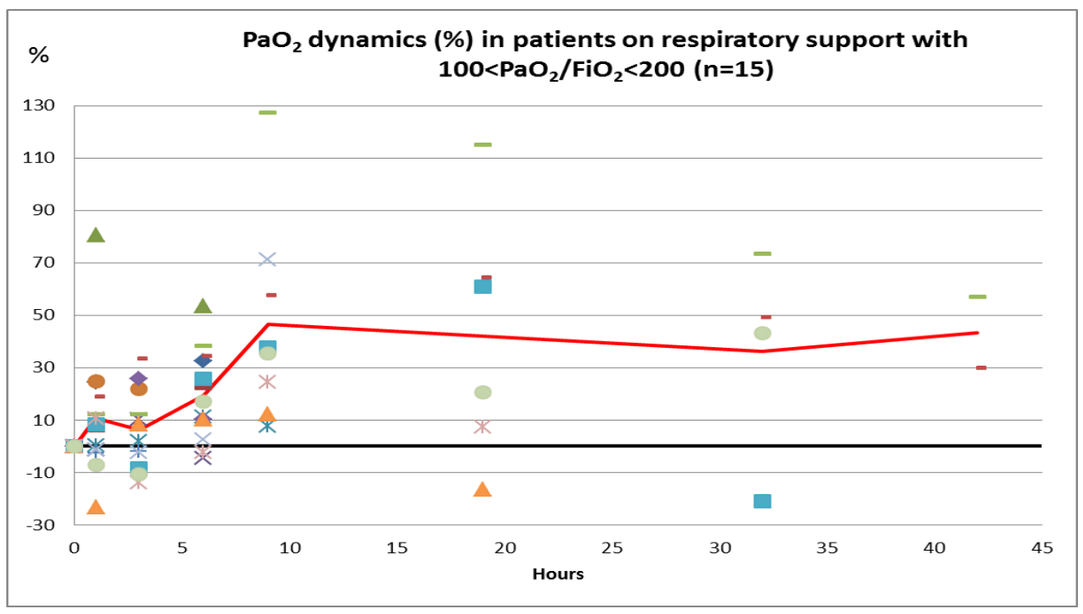
Conclusion: Further research is needed to prove clinical benefits of the intestinal oxygenation and to clarify the proper indications for practical usage of this method.











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