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Oxygen and cardiac arrest: the timepoint matters

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Dear Editor,

In their editorial, Ball and Ranzani [1] elaborate on the use of high-dose inspired oxygen and a potential toxicity of “hyperoxia” in a wide spectrum of disease including cardiopulmonary resuscitation (CPR). Indeed, there is accumulating evidence that after successful CPR and return of spontaneous circulation (RoSC) as well as during the following stay in the intensive care unit, an increased oxygen tension (paO₂) over longer time periods (reflected by a calculated “cumulative exposure to hyperoxia”) may be detrimental (reviewed in [2], [3]). However, many of the respective blood gas analyses were obtained many hours after RoSC. Moreover, this association has not yet been demonstrated at least prospectively or, better, in a randomized controlled trial.

Therefore, Ball and Ranzani conclude that “persuasive evidence” makes it worth considering studies

with substantially lower inspired oxygen fractions (FiO₂) than 100 % during and after CPR. Although this may be true for the post-resuscitation period, the only human study (to the best of our knowledge) that investigated the arterial paO₂ during CPR in relation to survival leaves no basis for such a proposal. In fact we observed improved survival with increasing paO₂ measured during CPR [4].

Whether this may or may not be an effect of oxygen itself or of the conditions leading to hyperoxia (good pulmonary function, proper ventilation and lung perfusion) is a matter of discussion that remains to be determined.

Chest compressions generate a systemic circulation that only vaguely resembles that of a spontaneous cardiac output. We therefore believe that the situation during CPR has to be pathophysiologically differentiated from the phase of reperfusion immediately following RoSC and that these two must be considered separately, as already discussed [5]. As a result of the indisputable threat of severe hypoxia following aggressive reduction of FiO₂ during CPR, we cannot see—at the moment—the persuasive evidence that would mandate such an approach.

Conflicts of interest On behalf of all the authors, the corresponding author states that there is no conflict of interest.

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