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Letter to the Editor

Establishing the role of cerebral oximetry during cardio-pulmonary resuscitation of cardiac arrest patients

To the Editor,

Our group evaluated the prognostic role of cerebral regional oxygen saturation (rSO2) in predicting the return of spontaneous circulation (ROSC) during cardiopulmonary resuscitation in victims of cardiac arrest (CA). After an exploratory analysis conducted in 2015,[1] we recently performed an updated meta-analysis and found that greater initial and overall values of rSO2 monitored with near infrared spectrometry (NIRS) are both associated with higher possibilities of ROSC.[2] These findings were consistent for both in-hospital and out-hospital CA settings, as well as from geographic perspectives (analyses conducted differentiating Japan from other countries).

However, our study did not address the robustness of our results, lacking the estimation of the power of the meta-analysis itself on the investigated outcomes. This did not allow to quantify the need for further research in this field before establishing (or not) a role for rSO2 monitoring during cardiopulmonary resuscitation. Therefore, we think the meta-analysis would benefit from trial-sequential analyses (TSAs), thus calculating the required "information size" before drawing firm conclusions. Hereby, we would like to add this contribute.

We imported meta-analysis data in the TSA Software (Copenhagen Trial Unit's TSA Software®; Copenhagen, Denmark). The information size was computed assuming an alpha risk of 5% with a power of 80%. The estimated effects were set estimating a weighted-average from the results of the included studies. We used a random effect model with outcome measures analyzed as mean difference and a low-bias variance. According to the weighted averages, the estimated mean differences for initial and overall NIRS values were 21.85% and 9.96%, respectively. The alpha-spending boundary were calculated according to the O'Brien-Fleming method applying inner wedge. Further details on TSA and its interpretation are available elsewhere.[3]

We conducted two TSAs. As shown in Fig. 1a, the significantly higher initial NIRS values in patients achieving ROSC is a robust finding. Indeed, the number of patients recruited in the included studies (n = 2870) is higher than the information size needed (sample estimated 2217). It seems even more robust the result of significantly higher overall NIRS values in patients achieving ROSC, where the number of patients recruited is more than double the information size needed (n = 894/417, Fig. 1b).

With the addition of the TSAs results, we now demonstrate that our findings of higher initial and overall rSO2 values are well-powered in predicting greater chances to achieve ROSC in CA patients. The decision to clinically implement (or not) its use should not rely on the need for further studies.

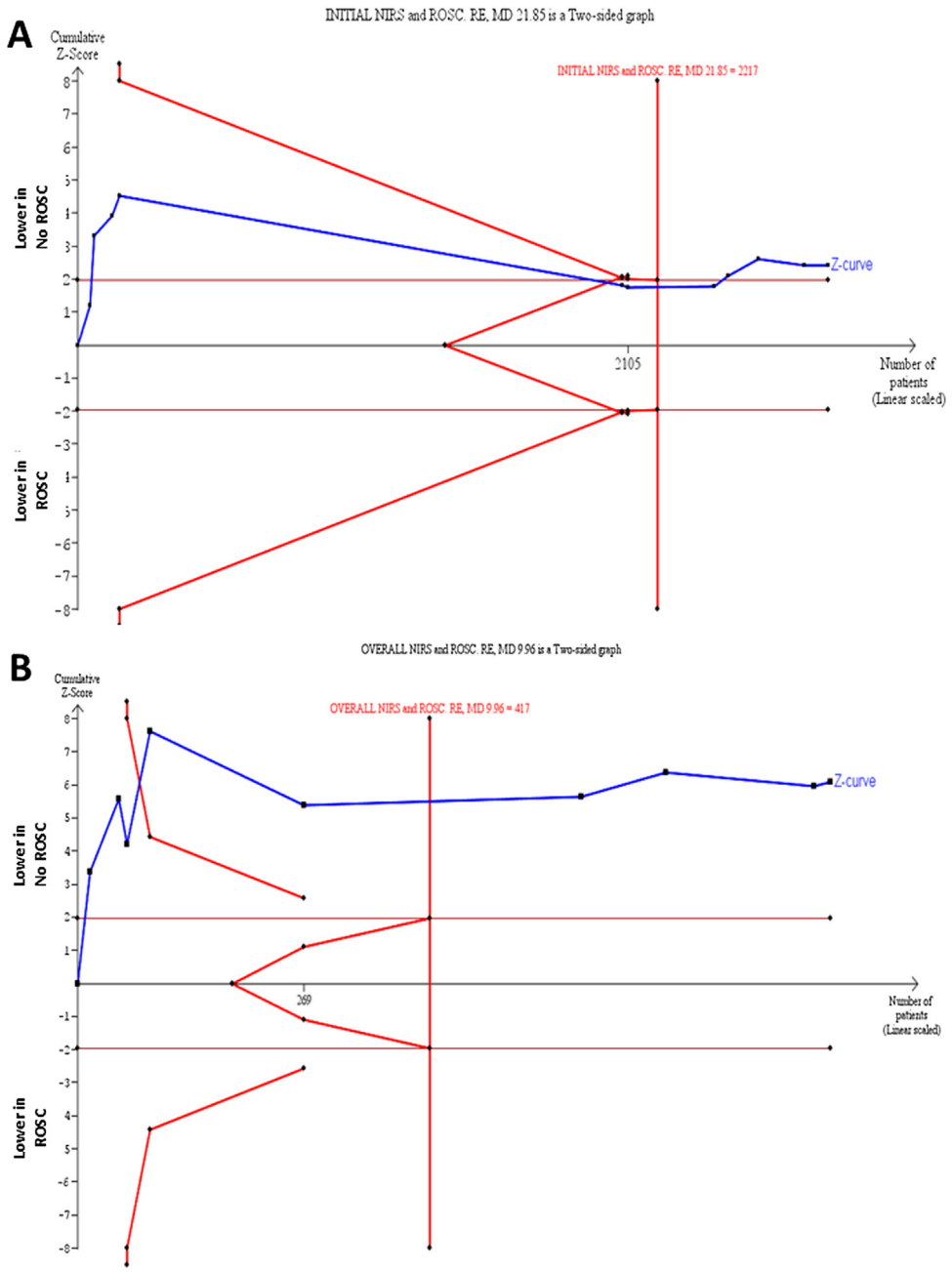

Fig. 1 – Trial sequential analyses on near infrared spectrometry (NIRS) and return of spontaneous circulation (ROSC). (A) Initial NIRS values; (B) Overall NIRS values.
MD: mean difference; RE: random effect model.

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Filippo Sanfilippo*
Luigi La Via
Stefano Tigano
Marinella Astuto
Department of Anaesthesia and Intensive Care, A.O.U. Policlinico-San Marco, Catania, Italy

* Corresponding author.
E-mail address: filipposanfi@yahoo.it (F. Sanfilippo).

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