Effects of Severe Motion on Newer Pulse Oximeters during Normoxia and Hypoxia in Volunteers.
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Introduction
Pulse oximetry has become a key element of polysomnographic recording. However, motion artifact is a common cause of oximeter failure and loss of accuracy. The purpose of this study is to evaluate effects of motion on two newer pulse oximeters and compare pulse oximeter data with co-oximeter values (SaO_2).

Methods
Seven healthy volunteers whose average age was 38 years were monitored by 2 different types of pulse oximeters; Nellcor N-395 and Masimo SET. Sensors were placed on digit 2 and 4 of the hand and foot. The Opposite hand was used to insert an arterial cannula. Hypoxia was induced by decreasing the fraction of inspired oxygen to change SpO_2 values from 100 % to 68 %. We measured the time from hypoxia onset until onset of the SpO_2 dip (on-lag) and time until lowest SpO_2 during nonmoving periods and then hand and foot motions of tapping or rubbing for 1 minute were studied. SpO_2 and pulse rate from each oximeters were recorded digitally throughout the experiment. Artifact during motion was defined as the increase or decrease in SpO_2 of 4% or greater than SaO_2.

Results
The on-lag times were 37 s and 43 s and the times until lowest SpO_2 were 143 s and 157 s for the Masimo and Nellcor oximeters respectively. The incidence of artifact was 26 % of the Masimo placed in hand, 32 % of the Masimo in foot, 38 % of the Nellcor in hand and 47 % of the Nellcor in foot.

Conclusions
The lowest SpO_2 values for both pulse oximeters during hypoxic challenge were not significantly affected by motion. The results were in disagreement with the previous reports. Our study demonstrated that Masimo SET significantly reduced the number of motion related artifact; This result shows that the Masimo SET may improve the reliability of desaturation detection in sleep apnea patients.

References: Brouillette RT et al.. Anesth Analg 2002; 94: S47-S53.