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MICROSENSOR TECHNOLOGY TO EVALUATE PATIENT ADHERENCE WITH REMOVAL ORAL APPLIANCES

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Objective: The aim of this study was to evaluate the accuracy of 3 thermosensitive microsensors, which record "wear-time" of removable oral appliances (OA).

Methods: *In vitro* testing was undertaken for TheraMon (Sensor T, n=20), AIR-AID SLEEP (Sensor A, n=30) and DentiTrac (Sensor D, n=16) microsensors, which were placed in a water bath to simulate long and short durations of "wear" of OA. Their accuracy when embedded into 3 different materials, acrylic, polyvinylchloride, and thermoactive acrylic, was also assessed. In vivo testing included 14 volunteers who wore maxillary retainers embedded with Sensor A and D for 30 nights. Logs of appliance usage were compared to the sensors' readouts.

Results: In the *in vitro* long durations of "wear" assessment, Sensor A, with a mean absolute response difference (MARD) of 1.67 ± 1.41 mins, was significantly more accurate than Sensor T, with MARD of 3.53 ± 9.80 mins, and Sensor D, with MARD of 4.48 ± 8.46 mins. For short durations of "wear", Sensor A (MARD of 1.41 ± 3.60 mins) and Sensor T (MARD of 1.68 ± 7.64 mins) were equal in accuracy and significantly better than Sensor D (MARD of 14.07 ± 10.20 mins). There was no effect of the embedding material on the recording accuracies of the microsensors. In the in vivo phase, there was no significant difference between Sensor A and Sensor D.

Conclusion: All 3 microsensors have high accuracy and reliability and can be used to record the wear-time of a removable OA fabricated from different materials.