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P105 | Validation of a new data-driven method for identification of muscular activity in REM sleep behaviour disorder

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Objectives/Introduction: REM sleep behaviour disorder (RBD) is a parasomnia characterized by lack of atonia during REM sleep. Gold standard methods for RBD diagnosis require manual REM sleep without atonia (RSWA) scoring, which is time-consuming and subjective. We propose and validate a new data-driven algorithm and compare it to other automatic methods based on RSWA detection for identifying RBD patients.

Methods: We included 27 control subjects (C), 29 idiopathic RBD patients and 36 patients with periodic limb movement disorder (PLMD). After artefact removal, mean absolute amplitude values of 1-s windows of chin, tibialis left and right EMG signals during REM from 9 randomly selected controls were used to define a probabilistic model delineating atonia. For the remaining subjects, each 1-s window was labelled as *movement* if its probability of being atonia was lower than an optimized threshold. For each EMG signal, we calculated the percentages of 1-s windows with movements and the median intra-movement distance during REM and NREM. Using these indices, a classification algorithm was trained and tested (5-fold cross-validation) to distinguish the three subject groups. For comparison, the REM atonia index (RAI), Frandsen index (FRI) and Kempfner index (KEI) were calculated for the same cohort and an analogous classification algorithm was applied to each of them. The overall test accuracies, sensitivities and specificities for C, RBD and PLMD were calculated for each method.

Results: The following test performances were achieved (mean and standard deviation across the five folds in %): Overall accuracy: 79.58±9.16 (this work), 44.56±6.27 (RAI) 46.73±5.40 (FRI), 49.08±11.82 (KEI); RBD sensitivity: 81.67±17.08 (this work), 53.67±13.03 (RAI), 58.71±10.94 (FRI), 58.81±28.37 (KEI); RBD specificity: 83.98±5.09 (this method), 83.59±4.12 (RAI), 85.48±4.18 (FRI), 77.80±5.54 (KEI). Further, the proposed method achieved higher sensitivity and specificity for identifying C and PLMD than the other ones.

Conclusions: The proposed data-driven method outperforms other automatic methods in distinguishing C, RBD and PLMD subjects and is more sensitive for RBD detection. Compared to the other methods based only on RSWA detection, this method uses also NREM muscular activity to characterize patients groups. The obtained high performances thus confirm previous findings of increased NREM muscular activity in RBD patients.

Disclosure: Nothing to disclose.

P106 | Sleep disorders in *Praxeos medicae universae praecepta* by Joseph Frank (1771 - 1842)

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Objectives/Instruction: Joseph Frank (1771–1842) was a graduate of the University of Pavia, whose most famous teachers were Antonio Scarpa (1752–1832), Alessandro Volta (1745–1827), and his father Johann Peter Frank (1745–1821). J. Frank spent 20 years in Vilnius (1803–1823): he was Professor of Special Therapy and Clinical Medicine, an organiser, a reformer, a founder of clinics, institutes, and medical societies.

Methods: We analyzed descriptions and clinical cases presented in J. Frank's textbook *Praxeos medicae universae praecepta… continens doctrinam de morbis systematis nervosi in genere et de iis cerebri in specie* ("Practical Textbook of General Medicine… Containing Doctrine of Nervous System Diseases and the Special Diseases of Cerebrum"), written in Vilnius in Latin and published in 1818 in Leipzig.

Results: J. Frank analyzed the phenomena of hypersomnia (*cataphora*), insomnia (*agrypnia*), snoring (*rhonchus*), restlessness with or without limb movements (*jactatio*), leg cramps, hot flushes (*ardor*), night terrors (*pavor in somno*), nightmares (*somnia terrifica*), breathlessness with feeling pressure on the chest (*incubus*), somnambulism, catalepsy and other diseases described in his chapter devoted for the sleep disorders. The author analyzed the predisposing factors, causes and symptoms of the diseases, prognosis (for example, stated that snoring predisposes patients to apoplexy and headaches), and also discussed about treatment options, mentioning the importance of antiphlogistic methods (bloodletting, leeches, cupping therapy, laxatives, diuretics), stimulating drugs (camphor, aether), opium, animal magnetism and proper sleep hygiene (recommended diet, safe environment, gymnastics, fast walks, to avoid long sitting and sleeping during daytime).

Conclusions: J. Frank presented the most important sleep disorders in his textbook, devoted for nervous system diseases, and suggested using antiphlogistic methods for the treatment, based on humoral theories that were still very popular in the beginning of the nineteenth century in Vilnus and other European universities and clinics.

Disclosure: Nothing to disclose.