MEETING ABSTRACTS

Abstracts from the 18 th European Headache Congress (EHC)

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AL001
Overuse of analgesics can affect the fertility biomarker Anti-Müllerian hormone in females. A translational study

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Objective: Over-the-counter analgesics (OTC) have been associated with disrupted male endocrinology, while effects on female endocrinology remains nearly unknown. The aim was to understand the effect of long-term analgesic exposure in females with medication overuse headache (MOH) on Anti-Müllerian Hormone (AMH), a surrogate measure of female fertility.
Methods: Using a translational approach, an observational prospective clinical study was conducted to determine AMH-levels in females with MOH, in combination with pre-clinical investigation of primary granulosa cells (GC) to understand the effects of analgesics on GC-function.
Results: We included 21 females (mean-age 30.0 years; SD (7.3)) for AMH-measurement. AMH increased by 21% from baseline (mean 20.1 pmol/L; SD (8.7)) after withdrawal of analgesics ((mean 24.3pmol/L; SD (12.0)); p=0.0023). Exposing primary GCs to analgesics (acetaminophen (100 and 200 μM, n = 9–10) and ibuprofen (150 and 200 μM, n = 12–13)) did not reduce AMH-levels. In contrast, *de novo* DNA synthesis in GCs (n=6) exposed to acetaminophen was reduced with 78% (p=0.0036) compared to controls, suggesting that cellular proliferation was restricted.
Conclusion: Frequent use of OTC was associated with repressed AMH-levels likely through disruption of GC proliferation. Further research is crucial to investigate a potential effect of analgesics on adult female reproductive endocrinology.

AL002
Sex differences in RAMP1/RAMP2 expression in the human middle meningeal artery match functional response to CGRP

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Objective: CGRP induces vasodilation after binding to the CGRP receptor (CLR-RAMP1), but can activate the adrenomedullin receptor (CLR-RAMP2) as well. Previously, age-dependent sex differences were observed for CGRP-induced relaxation of human middle meningeal arteries1. In addition, RAMP1 and RAMP2 mRNA expression was highly variable between patients2. The current study aims to investigate whether RAMP1 and RAMP2 expression differs between men and women and varies throughout life.
Methods: RNA was isolated from homogenized human middle meningeal arteries (14 F, 12 M, age 51±3 years) and qPCR was performed for RAMP1 and RAMP2 mRNA expression. The ratio between RAMP1 and RAMP2 expression with increasing age was investigated for men and women separately.
Results: The RAMP1/RAMP2 ratio significantly decreases with age in men, while a positive trend can be observed for women. These findings match the pattern of maximum relaxation to CGRP as observed in a previous study1, with a significant decrease with age in men and a trend for increased maximum relaxation with age in women.
Conclusion: The current study suggests that the maximum effect of CGRP-induced relaxation of human middle meningeal arteries matches the ratio of RAMP1/RAMP2 expression, and changes in a sex-dependent manner with increasing age. Interestingly, migraine is generally most prevalent in pre-menopausal women. Here, these young women show a relatively high RAMP2 and low RAMP1 expression, suggesting predominance of the adrenomedullin receptor over the canonical CGRP receptor in this population. Possibly, increased exposure of CGRP in young women results in downregulation of RAMP1. Future research should investigate whether RAMP1 and RAMP2 expression is altered in migraine patients.

Objective: Laser acupuncture (LA) has shown efficacy in migraine prevention, but its effectiveness in addressing anxiety and depression related to chronic migraine (CM) remains inconclusive. We aimed to examine the effectiveness of LA in CM related anxiety and depression.
Methods: From February 2022 to August 2023, patients over 20 with CM who completed an LA add-on treatment were included in the experimental group. A comparator group was established using 1:1 propensity score matching (PSM), matching for age, gender, body mass index, headache duration, and scores of Hospital Anxiety and Depression Scale (HADS) from the migraine database of Taichung Veterans General Hospital, which enrolled CM patients managed pharmacologically. Migraine diagnosis was confirmed by a neurologist, and anxiety and depression were assessed using the HADS. The LaserPen-Expert 511 A, a device emitting 810 nm light at 5 W/cm^2, was used to deliver laser radiation at 150 mW to each acupoint. The baseline was defined as the start of LA treatment for the experimental group or enrollment in the database for the comparator group. The primary outcome was HADS scores in the 12th week from baseline.
Results: The LA group comprised 30 patients, and 30 matched migraine patients were selected as the comparator group. After the PSM process, the two groups had no significant differences in age, gender, body mass index, headache duration, or HADS scores. The LA group experienced a mean of 20.8 ± 4.5 headache days per month at baseline, compared to 19.3 ± 3.6 days in the comparator group (p=0.80). After four weeks of LA treatment followed by eight weeks of follow-up, HADS scores in the LA group significantly decreased from a mean of 11.9 ± 6.5 to 8.7 ± 6.1 by the 12th week (p < 0.01), while scores in the comparator group changed from 11.7 ± 6.9 to 11.0 ± 6.1 (p = 0.24).
Conclusion: LA has a beneficial effect on reducing anxiety and depression in CM patients. We recommend LA as an adjunctive treatment for CM related anxiety and depression.
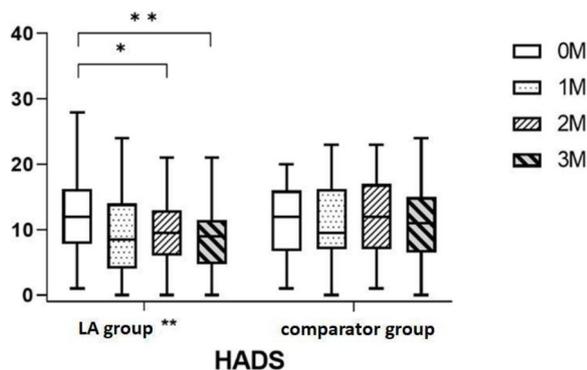
Fig. 1 (Abstract P221). See text for description

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Telemedicine suitability prediction in migraine care – a machine learning approach

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Objective: Artificial intelligence is being integrated into many areas of medicine. We aim to develop a machine learning model to predict the suitability of telemedicine for migraineurs.
Methods: An electronic anonymous survey was administered to collect sociodemographic details, migraine history, management, comorbidities, and prior telemedicine experiences from migraine patients, which served as the dataset for developing the machine learning models. Using Python 3.11.4 four machine learning models including Random Forest (RF), Logistic Regression, Support Vector Machine (SVM) and XGBoost were developed.
Results: From 847 patients 601 (71.0%) would agree to participate in teleconsultation in the future. Upon implementing the machine learning models, it was found that the RF model outperforms the XGBoost, SVM and Logistic Regression ones. RF model demonstrated significant performance with an accuracy of 81.7%, sensitivity of 85.0%, and specificity of 78.2%. RF model had the highest area under the ROC curve value (0.90), followed by XGBoost (0.87), SVM (0.81) and Logistic Regression (0.81). Confusion matrix results were: 159 True Positive, 136 True Negative, 38 False Positive, 28 False Negative. Not the migraine features, but sociodemographic details such as higher education (SHAP value=0.101), intellectual work (SHAP value=0.093), remote work (SHAP value=0.080) were most impactful factors for the prediction of telemedicine suitability.
Conclusion: Our study presents a developed machine learning model for predicting the suitability of telemedicine for migraine patients. The proposed model can be useful for optimizing the allocation of health care system resources and improving patient-centred care.
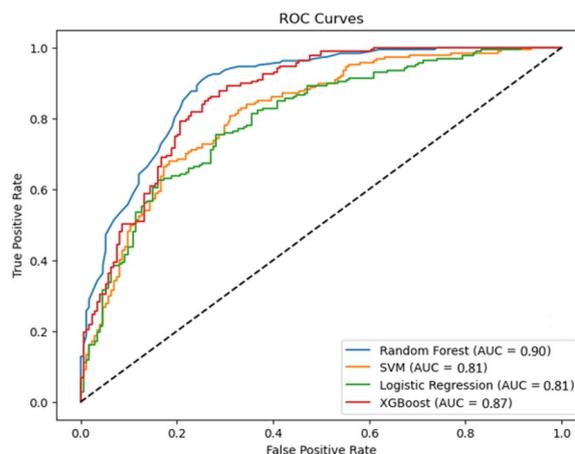
Fig. 1 (Abstract P222). See text for description

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Phenotyping migraine patients according to clinical and psychophysical characteristics

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Objective: Assess migraine patients in different phases and identify those with increased pain sensitivity; identify variables that could predict the presence of IPS independently by the phase of the assessment could be identified
Methods: This observational study included Episodic(EM) and Chronic Migraine(CM). Patients were firstly divided into two cohorts according to the phase in which the evaluation occurs (interictal; ictal/perictal). In each cohort, distinct subgroups of migraine patients were identified according to clinical and psychophysical characteristics. Then, migraine patients were treated as one cohort, and clinical predictors able to include patients in each subgroup were assessed
Results: 198 EM and CM were included (98 assessed during the interictal phase, while 100 assessed during the ictal/perictal phase). In both cohorts, two subgroups of migraine patients were identified: 18–19% of had No Increased pressure-Pain Sensitivity (NoIPS), while the remaining 81–82% had Increased pressure-Pain Sensitivity (IPS). In both cohorts, the IPS groups had reduced pressure pain threshold