Abstract PWE-096 Figure 1

Conclusions Rectal hypersensitivity is more common in an IBS population compared to controls. This indicates that pain sensation is altered in an IBS population and confirms that an altered rectal pain threshold is a marker of IBS. Rectal hypersensitivity is not a phenomenon normally present in IBD except during active flares of the diseases. The mechanisms behind rectal hypersensitivity are not fully understood but are likely due to a combination of peripheral and central factors that require further study to develop mechanism-based management approaches. However, it is unlikely that rectal hypersensitivity that likely occurs in IBS is due to the low-grade inflammatory burden.

PWE-097 MACHINE LEARNING CAN ACCURATELY CLASSIFY CHRONIC CONSTIPATION PATIENTS BY SYMPTOM BURDEN USING PAIN MEASURES ALONE

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Introduction The Patient Assessment of Constipation Symptoms (PAC-sym) is a widely validated questionnaire that numerically quantifies symptom burden in patients with constipation. PAC-sym evaluates various domains, including pain, bloating, tenesmus, rectal bleeding, straining and the quality of the bowel movement by volume or hardness of stool passage.

Machine learning presents an opportunity to assist gastroenterology practice¹. We investigated if machine learning could accurately classify patients with a high or low total symptom burden, using *only* self-reported pain severity and frequency.

Methods 768 patients attending with chronic constipation to a tertiary service underwent quantification of symptom measures in a prospective cohort study design. We used the PAC-sym questionnaire to quantify overall symptom burden, and patients were stratified to high or low symptom burden by a total score of >2.5 or <2.5, respectively. Pain severity and frequency were further quantified separately, and a coarse Gaussian support vector machine (SVM) model was developed, using 70% of patient data for training, 5-fold cross-validation, and the remaining samples model performance testing.

Results The SVM accurately stratified patients into high and low symptom groups with an area under the receiver operator characteristic curve (AUROC) of 0.72 (Figure 1). The predictive metrics of this model were as follows: low total symptom burden – true positive rate (TPR) 87%, false negative rate (FNR) 13%, positive predictive value (PPV) 70%, false discovery rate (FDR) 31%; high total symptom burden – TPR 44%, FNR 56%, PPV 69%, FDR 31%.

Conclusions A machine learning model was able to predict with >70% accuracy whether an individual would belong to a 'high' or 'low' total symptom burden subgroup, using pain severity and frequency *alone*. This adds weight to the importance of evaluating pain in patients with chronic constipation. Moreover, in a clinical setting when quantifying symptom burden in chronic constipation, the most important questions to assess is how severe and frequent a patient's pain is.

REFERENCES

1. Ruffle JK, Farmer AD, Aziz Q. Artificial Intelligence Assisted Gastroenterology - Promises and Pitfalls. *Am. J. Gastroenterol.* 2018; ePub ahead of print.

Abstract PWE-097 Figure 1: Receiver operating characteristic (ROC) curve of machine learning model to predict high or low symptom burden from pain frequency and severity alone.

PWE-098 A PILOT VALIDATION STUDY OF AN AT-HOME HYDROGEN BREATH TEST DEVICE

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Introduction Hydrogen breath testing is a valuable tool to aid in the diagnosis of carbohydrate malabsorption, however this procedure can be time consuming and costly for both the patient and clinician. *Here*, an existing bench-top clinical breath test device is compared to a hand-held, app-connected breath test device, which could allow for at-home use, enabling a more time and cost-effective physician-patient interaction and treatment pathway.

Methods Fourteen healthy adult volunteers mean age 31 (2–3) yrs, were recruited. Breath tests were performed by each volunteer using two of the proposed devices and the results were compared against those of the existing clinical device, a reference standard benchtop device. A baseline reading was recorded using each device prior to the ingestion of 10g of lactulose, a non-absorbable carbohydrate substrate. Each volunteer took a breath reading every five minutes, sequentially switching between each device, such that over a 15-minute interval, three breath samples were recorded, each with a different device. Over the course of three hours, this yielded 39 data points per volunteer. The exclusion criteria for analysis

was a baseline breath hydrogen concentration of >15ppm on any of the devices. One volunteer was excluded from the final data analysis due to a high H₂ baseline leaving 13 subjects for analysis. The H₂ concentrations recorded by the reference device were used to assess whether malabsorption had occurred. In instances where there was a >20ppm increase in H₂ over the initial baseline (Pimentel et al, *Am J Gastroenterol.* 2000 Dec;95(12):350–), the test was considered positive, otherwise it was considered negative. The H₂ concentrations from each device were compared at 15-minute intervals, using concentration plots created for each volunteer, by linearly interpolating the H₂ concentrations over time.

Results There was diagnostic agreement in 13 out of 13 (12 positive and one negative) cases between the proposed devices and the reference device. The mean difference was 3.6 ppm and the mean absolute difference was 7.4 ppm.

Conclusions Initial testing on healthy volunteers suggests that the proposed device may offer results comparable to those delivered by the reference benchtop device. Furthermore, the use of the proposed device via the associated smartphone app could allow for the immediate transmission of results to the clinician, for use in further consultation and guidance. Further validation studies are necessary to assess the performance of proposed device over a longer time period, using a larger cohort of patients, with a focus on those with functional digestive disorders.