

A Novel Method for Assessment and Characterization of Pancreatic Pain

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INTRODUCTION

- Pain is common and problematic in patients with pancreatitis.¹
- Effective therapy remains a considerable challenge, fundamentally limited by challenges in assessing pain.²
- Abnormal processing in central pain pathways in pancreatitis has major implications for treatment.
- Methods to assess and characterize central pain processing in pancreatitis are not available for clinical use.³

AIMS

To present a clinically feasible method to assess pancreatic pain via Quantitative Sensory Testing (QST).
Derive adult normative reference values to facilitate clinical implementation.

METHODS



Pin-Prick Simulator



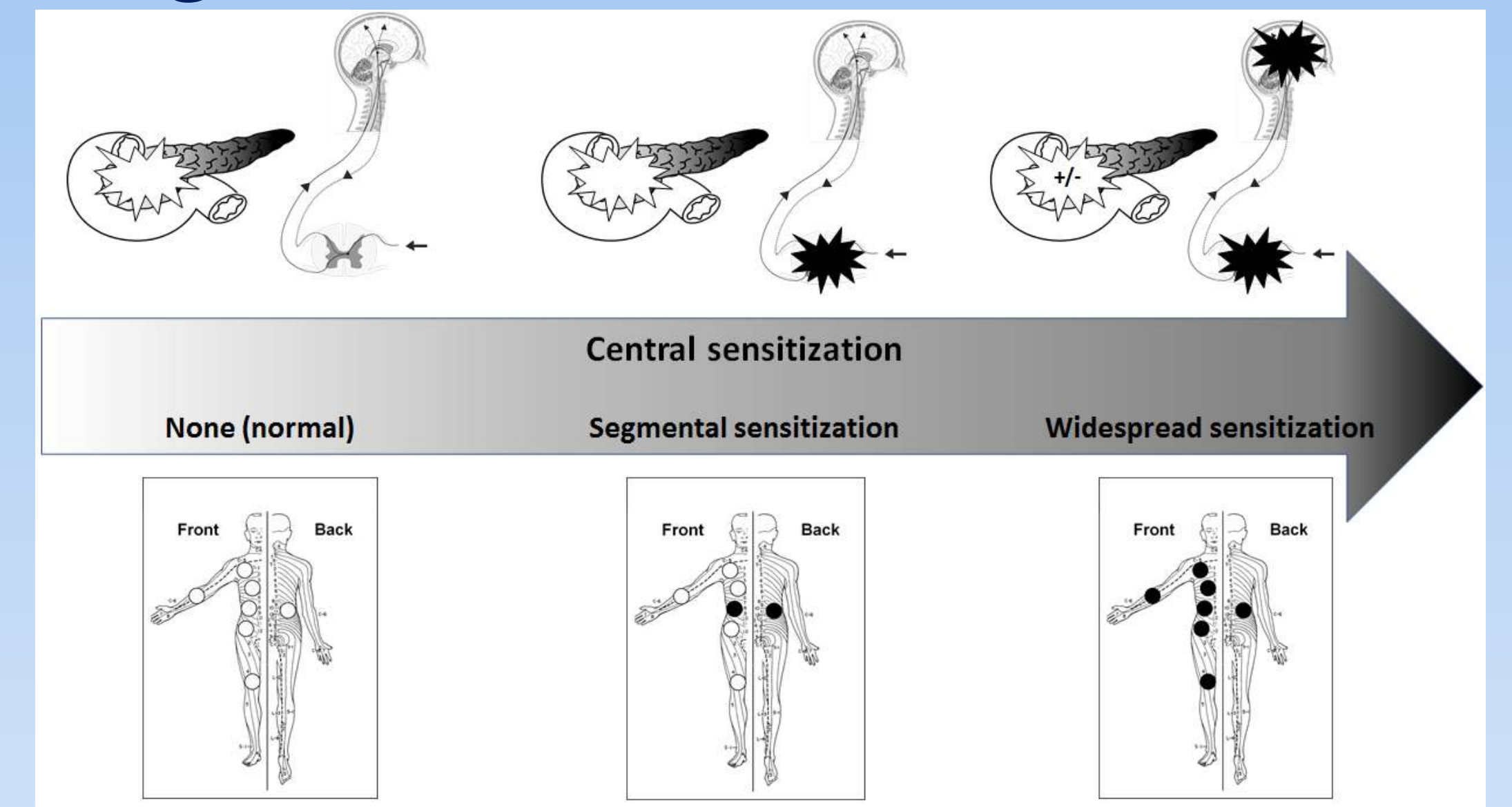
Pressure Algometer



Cold-Pressor Test

- Cross-sectional, multicenter study, 122 control subjects across equal gender and age groups without abdominal pain
- Exclusion criteria:
 - Medical or surgical disease that could affect Pancreatic Quantitative Sensory Testing (P-QST)
 - Chronic abdominal pain
 - Chronic narcotic use
 - Chronic pain syndrome
 - Pregnancy
- Pain detection thresholds (pPDTs): Kilopascal level at which patients first felt pain in response to increasing muscle pressure stimulation
- Pain tolerance thresholds (pPTT): Kilopascal level at which patients reached maximal tolerance to muscle pressure stimulation
- Temporal summation (TS): increase in discomfort following repeated same-site fine sensory stimulation measured on scale from 1-10
- Conditioned Pain Modulation (CPM) was assessed by measuring maximal pressure tolerance before and after a 2 minute cold water hand immersion test
- Ratios and sum scores were calculated to accommodate interindividual differences in absolute thresholds and create clinically useful scoring system
- Effects of age and gender on QST assessment parameters were investigated using regression models
- Normative reference values were derived

Pancreatic Quantitative Sensory Testing (P-QST)



EQUATIONS

$$pPDT\ Sum = pPDT\ C5 + pPDT\ T10\ back + pPDT\ T10\ abd + pPDT\ L1 + pPDT\ L4$$

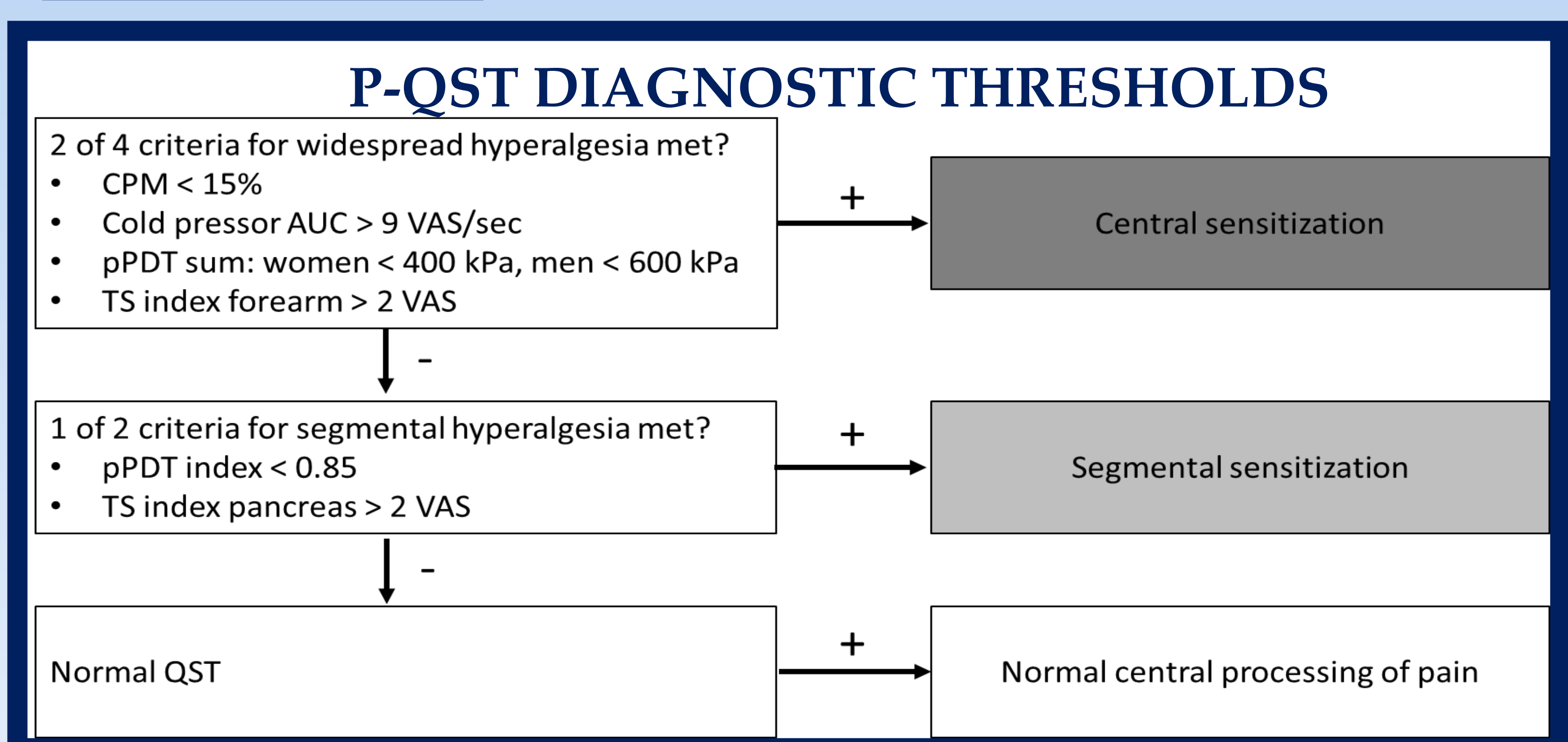
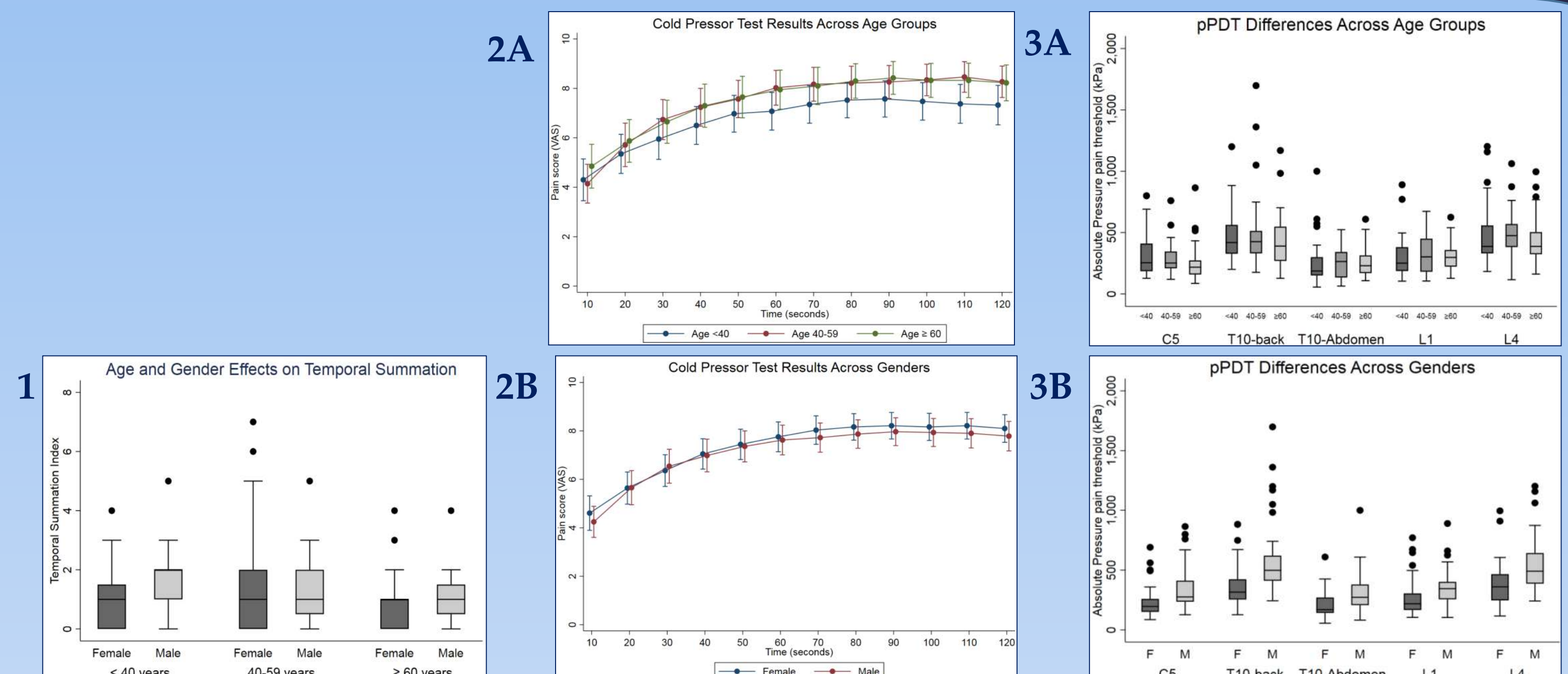
$$TS\ Index = 10stim - 1stim$$

$$pPDT\ or\ pPTT\ Index = \frac{mean(T10^{ABD} + T10^{BACK})}{mean(C5 + L1 + L4)}$$

$$CPM = \frac{pPTT^{AFT} - pPTT^{BEF}}{pPTT^{BEF}}$$

RESULTS

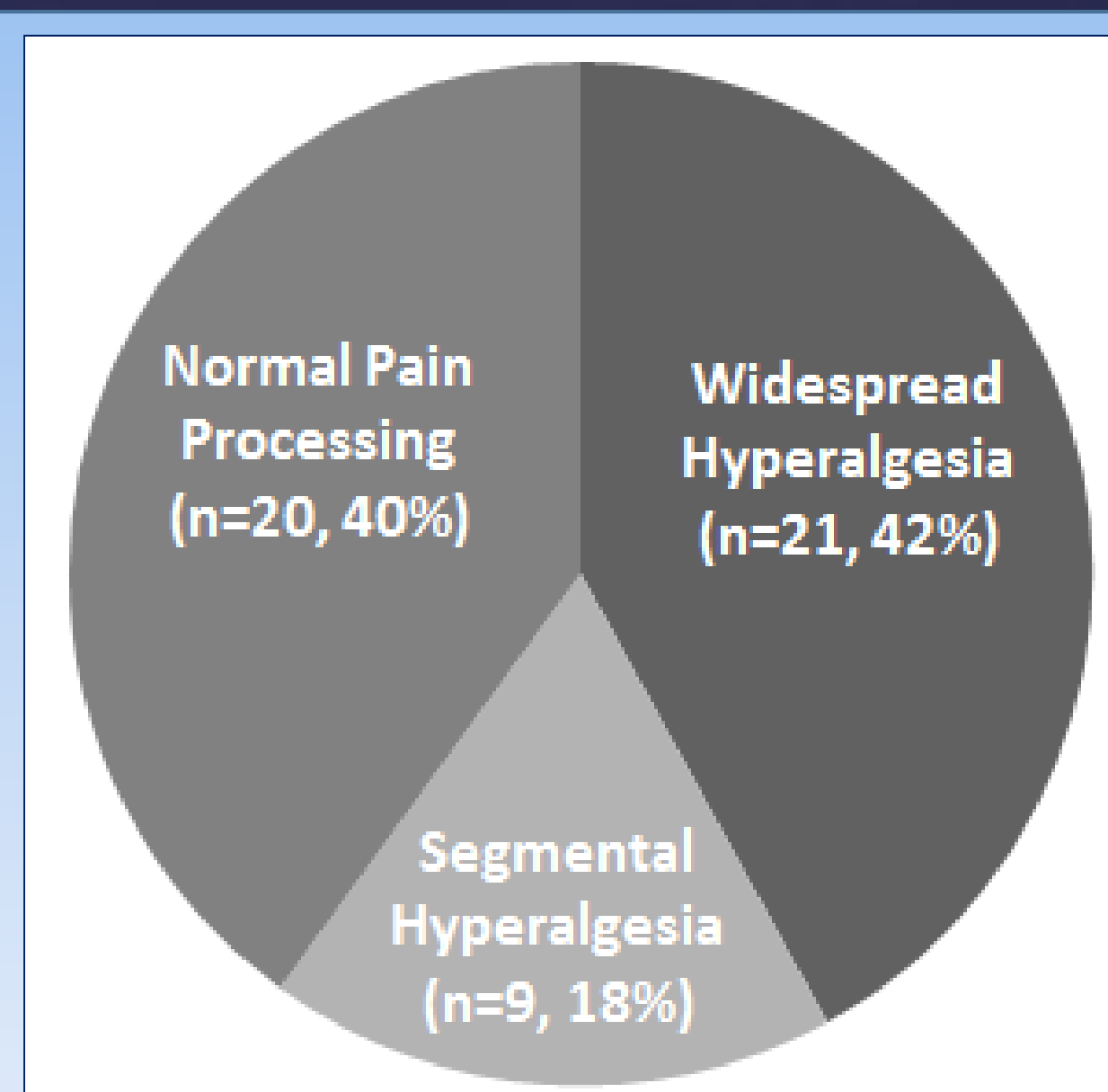
- Absolute pPDTs were region specific and significantly lower in women than men (all p<0.05).
- No age or gender effects were observed for the primary QST assessment parameters:
 - TS Index (Fig 1)
 - AUC Cold Pressor (Fig 2A, 2B)
 - pPDT-index (Fig 3A, 3B)
 - CPM Index (not shown)
- Median and IQR evaluated, used for thresholds of:
 - TS Index (Median 1.0, 75th percentile 2.0)
 - AUC (Median 7.3, 75th percentile 8.8 VAS)
 - pPDT Index (Median 1.0, 25th percentile 0.87)
 - Male pPDT Sum scores (Median 786, 25th percentile 626 kPa)
 - Female pPDT sum scores (Median 520, 25th percentile 403 kPa)
- CPM based on within-subject coefficient of variation in CPM test stimulus
 - Percentage variation in ref popul: 13.0% (95% CI 10.9% - 15.2%)
 - CPM effect <15% indicated impaired descending pain modulation



Segmental Sensitization	Central Sensitization
pPDT Index	pPDT Sum
TS Index (Abdomen)	TS Index (Forearm)
	AUC Cold Pressor Test
	CPM Index

FEASIBILITY STUDY CP Patients with Pain

N=50
Mean age 54.4 ± 12.3 years
30 (60%) male
32 (64%) EtOH etiology



CONCLUSION

- We have developed normative reference values for a clinically feasible test for the characterization of pancreatic pain in adult patients.
- Application of this standardized QST protocol in patients will allow providers to infer mechanisms of underlying pain modulation, which may be used to better characterize pain and to inform treatment.