NEUMOLOGÍA EN OSTEOPATÍA
BIOQUÍMICA POR ALIMENTACIÓN
Parte 2

AFERENTES VAGALES QUE INERVAN ÓRGANOS TORÁCICOS:

El dolor procedente del las vías aéreas proximales y del esófago proximal es mediado por aferentes vagales peptidérgicas (CGRP y sust P) que inervan la mucosa de estos órganos.
Sus cuerpos celulares se localizan en el ganglion yugular superior.

La activación de estas aferentes genera inflamación neurogénica en la mucosa.
El dolor procedente de las porciones distales del esófago y vía aérea, así como de los brónquios, es mediado por la estimulación de los aferentes viscerales de la columna y no vagales.

PULMÓN, VÍA AÉREA Y NERVIO VAGO:

PULMÓN: estimulable mediante trabajo fascial, técnicas linfáticas, mediastino y cilindros (es mecanosensible).

Physiol Rev. 2016 Jul;96(3):975-1024. doi: 10.1152/physrev.00039.2015.

Vagal Afferent Innervation of the Airways in Health and Disease.

Mazzone SB[1], Undem BJ[1].

Author information

1 School of Biomedical Sciences, The University of Queensland, St Lucia, Brisbane, Australia; and Department of Medicine, Johns Hopkins University Medical School, Asthma & Allergy Center, Baltimore, Maryland.

Abstract

Vagal sensory neurons constitute the major afferent supply to the airways and lungs. Subsets of afferents are defined by their embryological origin, molecular profile, neurochemistry, functionality, and anatomical organization, and collectively these nerves are essential for the regulation of respiratory physiology and pulmonary defense through local responses and centrally mediated neural pathways. Mechanical and chemical activation of airway afferents depends on a myriad of ionic and receptor-mediated signaling, much of which has yet to be fully explored. Alterations in the sensitivity and neurochemical phenotype of vagal afferent nerves and/or the neural pathways that they innervate occur in a wide variety of pulmonary diseases, and as such, understanding the mechanisms of vagal sensory function and dysfunction may reveal novel therapeutic targets. In this comprehensive review we discuss historical and state-of-the-art concepts in airway sensory neurobiology and explore mechanisms underlying how vagal sensory pathways become dysfunctional in pathological conditions.

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Las aferentes vagales constituyen la principal aferencia desde la vía aérea y pulmones. En múltiples enfermedades pulmonares se pueden producir múltiples alteraciones en la sensibilidad y en el fenotipo neuroquímicos de los aferentes vagales, lo que debería justificar nuevas dianas terapéuticas.

PULMÓN, VÍA AÉREA Y NERVIO VAGO:

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VÍAS TRAQUEOBRONQUIALES:

Vías aéreas: las vías traqueobronquiales están inervadas por tres rutas parasimpáticas.
Dos vías que suministran de neuronas broncocontrictoras colinérgicas parasimpáticas (al ms liso) y una vía a las glándulas de las vías respiratorias.
(Canning y Mazzone 2005).

Las neuronas de estas vía se activan mediante la estimulación de los nociceptores de las vías respiratorias, quimiorreceptores arteriales, **mecanorreceptores** de las vías respiratorias superiores o aferentes esofágicas.

RESEARCH ARTICLE

Parasympathetic Stimuli on Bronchial and Cardiovascular Systems in Humans

Emanuela Zannin[1]*, Riccardo Pellegrino[2], Alessandro Di Toro[3], Andrea Antonelli[2], Raffaele L. Dellacà[1], Luciano Bernardi[4]

1 Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Milano, Italy, 2 Allergologia e Fisiopatologia Respiratoria, ASO S. Croce e Carle, Cuneo, Italy, 3 Dipartimento di Medicina Interna, Università di Pavia e IRCCS Policlinico S. Matteo, Pavia, Italy, 4 Folkhälsan Institute of Genetics, Folkhälsan Research Center, Biomedicum Helsinki, Helsinki, Finland

Methods

Respiratory system resistance (Rrs, forced oscillation technique) and cardio-vascular activity (heart rate, oxygen saturation, tissue oxygenation index, blood pressure) were assessed in 13 volunteers at baseline and during a series of parasympathetic stimuli: O_2 inhalation, stimulation of the carotid sinus baroreceptors by neck suction, slow breathing, and inhalation of methacholine.

Conclusions

All parasympathetic stimuli affected bronchial tone and moderately affected also the cardiovascular system. However the response differed depending on the nature of the stimulus. Slow breathing was associated with large tidal volumes that reversed the airways narrowing effect of parasympathetic activation.

Background

It is not known whether parasympathetic outflow simultaneously acts on bronchial tone and cardiovascular system waxing and waning both systems in parallel, or, alternatively, whether the regulation is more dependent on local factors and therefore independent on each system. The aim of this study was to evaluate the simultaneous effect of different kinds of stimulations, all associated with parasympathetic activation, on bronchomotor tone and cardiovascular autonomic regulation.

Results

Pure cholinergic stimuli, like O_2 inhalation and baroreceptors stimulation, caused an increase in Rrs and a reduction in heart rate and blood pressure. Slow breathing led to bradycardia and hypotension, without significant changes in Rrs. However slow breathing was associated with deep inhalations, and Rrs evaluated at the baseline lung volumes was significantly increased, suggesting that the large tidal volumes reversed the airways narrowing effect of parasympathetic activation. Finally inhaled methacholine caused marked airway narrowing, while the cardiovascular variables were unaffected, presumably because of the sympathetic activity triggered in response to hypoxemia.

La estimulación colinérgica pura, como la inhalación de oxígeno y la estimulación de los barorreceptores, generó un aumento en la resistencia del sistema respiratorio y una reducción en la frecuencia cardiaca y la presión arterial. La respiración lenta llevó a bradicardia e hipotensión sin cambios en la resistencia respiratoria. De cualquier manera la respiración lenta se relacionaba con las inhalaciones profundas, los volúmenes corrientes importantes revertían el estrechamiento de la vía aérea

AFERENTES VISCERALES:

Neuronas implicadas en muchas funciones de regulación orgánica, regulaciones neuroendocrinas, relacionadas particularmente con aferentes vagales y aferentes espinales sacrales.
Las molestias y el dolor viscerales: relacionados con aferentes viscerales espinales.
El dolor se refiere a los tejidos somáticos profundos, otros órganos viscerales y la piel, así como los cambios en las zonas mencionadas mediadas por el sistema nervioso simpático.

Las emociones son dependientes de estas aferentes viscerales.
El comportamiento inhibido del enfermo se relaciona con la excitación de estas aferentes vagales del tracto gastrointestinal.

La regulación neural y neuroendocrina de la hiperalgesia y la inflamación está relacionada sobretodo con las afrentes vagales.
(Watkins andMaier, 1999)

AFERENTES VAGALES:

Alrededor el 85% de las fibras nerviosas del vago son aferentes.
La mayoría de estas aferentes son amielínicas, las fibras se proyectan hacia el núcleo del tracto solitario. Las neuronas de segundo orden se proyectan al troncoencéfalo, hipotálamo, amígdala estableciendo rutas neurales que son la base para diferentes regulaciones orgánicas y percepciones corporales.

J Auton Nerv Syst. 2000 May 12;80(3):117-29.

Sensory channel specific modulation in the nucleus of the solitary tract.

Paton JF[1], Kasparov S.

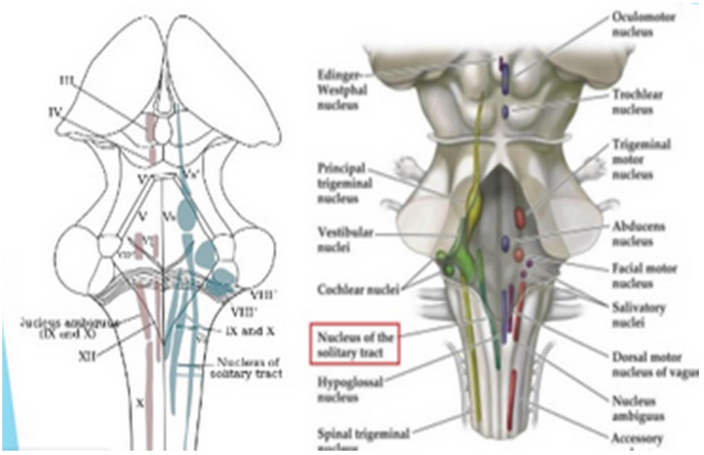
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PMID: 10785277 DOI: 10.1016/s0165-1838(00)00077-1

NTS:
ESTRUCTURA CEREBRAL LOCALIZADA EN LA PORCIÓN CAUDAL DEL BULBO RAQUÍDEO, SITIO DE TERMINACIÓN Y PROYECCIÓN DE FIBRAS AFERENTES VISCERALES Y CARDIOVASCULARES DE LOS NERVIOS GLOSOFARÍNGEO Y VAGO HACIA EL SNC.
ESTE PROYECTA A LA FORMACIÓN RETICULAR, LAS NEURONAS PREGANGLIONARES PARASIMPÁTICAS, EL HIPOTÁLAMO Y EL TÁLAMO, FORMANDO CIRCUITOS QUE CONTRIBUYEN A LA REGULACIÓN AUTONÓMICA.
LA PARTE INFERIOR DORSAL RECIBRE INFLUYOS DE SISTEMA CARDIORRESPORATORIO Y GASTROINTESTINAL Y LA PARTE ALTA Y ANTERIOR (VENTRAL) RECIBE EL GUSTO.

NTS: DE ACUERDO CON LUIS GONZAGA D.O CIOST 2020.
LLEVA LA INFORMACIÓN VISCERAL DEL AMBIENTE INTRAPERITONEAL INFLUENCIANDO LOS NÚCLEOS PARAVENTRICULARES Y LA RED AUTONÓMICA CENTRAL DONDE SE INTEGRA EL ESTÍMULO Y SE GENERA LA RESPUESTA AUTONÓMICA (CRAIG 2002)
EL NÚCLEO DEL TRACTO SOLITARIO ENVÍA INFORMACIÓN AL LOCUS CERULEUS (QUE CONDICIONA LA RESPUESTA AL ESTRÉS Y LAS EMOCIONES).



TOMADO DE LUIS GONZAGA. D.O CIOST.2020 Central Autonomic Network

Interocepción
I
Ínsula
I
NTS :

_ Locus Ceruleus ---------- Estrés
Emociones

_ Núcleo ---------- Respuesta
Paraventricular Automática
del Hipotálamo (PVH)

La información que llega al NTS influye no solo en la actividad motora parasimpática, sino que en todos los procesos reguladores que tienen su origen en el nivel central, incluyendo la respuesta simpática y los mecanismos reguladores del procesamiento del dolor y de la via inhibitoria descendente.

MECANOSENSIBILIDAD INTESTINAL+ RESPUESTA A LA SEROTONINA: VER NOTAS

16 Jun 30;166(1):209-21. doi: 10.1016/j.cell.2016.05.011. Epub 2016 May 26.

ory Neurons that Detect Stretch and Nutrients in the Digestive System.

EK[1], Chang RB[1], Strochlic DE[1], Umans BD[1], Lowell BB[2], Liberles SD[3].

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inputs from internal organs are essential for normal autonomic function. The vagus nerve is a key body-brain connection th
rs the digestive, cardiovascular, and respiratory systems. Within the gastrointestinal tract, vagal sensory neurons detect gut
nes and organ distension. Here, we investigate the molecular diversity of vagal sensory neurons and their roles in sensing
ntestinal inputs. Genetic approaches allowed targeted investigation of gut-to-brain afferents involved in homeostatic respor
d nutrients (GPR65 neurons) and mechanical distension of the stomach and intestine (GLP1R neurons). Optogenetics, in
n imaging, and genetically guided anatomical mapping provide direct links between neuron identity, peripheral anatomy, ce
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ts in mediating particular gut hormone responses. Moreover, genetic control over gut-to-brain neurons provides a molecula
/ork for understanding neural control of gastrointestinal physiology.

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En el tracto gastrointestinal los aferentes vagales monitorizan los eventos mecánicos y químicos en el tracto gastrointestinal.
Las terminaciones intramurales consisten son laminares intragangliónicas en el plexo mientérico con características de receptors de tension-estiramiento.

Las respuestas a los glúcidos están mediadas por las células enterocromafines que liberan 5-hidroxitriptamina y por los refeptores para esta en las aferentes vagales.

Las respuestas a lípidos de cadena larga mediadas por células enteroendocrinas que liberan colecistoquinina y su receptor en las terminals de las aferentes vagales.(Richards et al. 1996; Lal et al. 2001; Beyak and Grundy 2005). Las neuronas aferentes vagales están asociadas con el

GALT y excitadas por procesos tóxicos e inflamatorios, mediados por las células enterocromafines que libreran serotonina (5-HT) , las enteroendocrinas (que liberan CCK) y los mastocitos que liberan histamina

MECANOSENSIBILIDAD INTESTINAL+ RESPUESTA A LA SEROTONINA: VER NOTAS

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Cosensitivity of vagal mucosal afferents to histamine and 5-HT in the rat jejunum.

Kreis ME[1], Jiang W, Kirkup AJ, Grundy D.

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1 Department of General Surgery, University Hospital Tübingen, D-72076 Tübingen, Germany.

Abstract

A complex sensitivity of afferent nerves in the mesentery of the rat jejunum to systemic administration of histamine has recently been demonstrated. In the present study, we aimed to characterize subpopulations of mesenteric afferents that mediate this afferent nerve response. Multiunit afferent discharge was recorded from mesenteric nerves supplying the proximal jejunum in anesthetized rats. The majority of mesenteric bundles (84%) exhibited biphasic responses to histamine (8 micromol/kg), and these bundles also responded to 2-methyl-5-HT (2m5HT). In contrast, monophasic responses lacked a short-latency component, and these bundles failed to respond to 2m5HT. Single-unit analysis revealed a population of afferents that possessed cosensitivity for 2m5HT and histamine. This population of afferents was absent in chronically vagotomized animals, whereas mucosal anesthesia with luminal lidocaine reversibly converted the biphasic profile to a monophasic one. Ondansetron (500 microg/kg) blocked the response to 2m5HT with no effect on the profile of the histamine response, whereas pyrilamine (5 mg/kg) blocked the histamine response without affecting the response to 2m5HT. We conclude that histamine-sensitive afferents exist in the rat proximal jejunum that also respond to 5-HT via the 5-HT3 receptor. These fibers appear to be vagal afferents originating in the intestinal mucosa and may be involved in the organization of mast cell-mediated responses.

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J Physiol. 2001 Feb 1; 530(Pt 3): 431–442.
doi: 10.1111/j.1469-7793.2001.0431k.x

PMCID: PMC2278417
PMID: 11158274

Intestinal serotonin acts as a paracrine substance to mediate vagal signal transmission evoked by luminal factors in the rat

J X Zhu, X Y Wu, C Owyang, and Y Li

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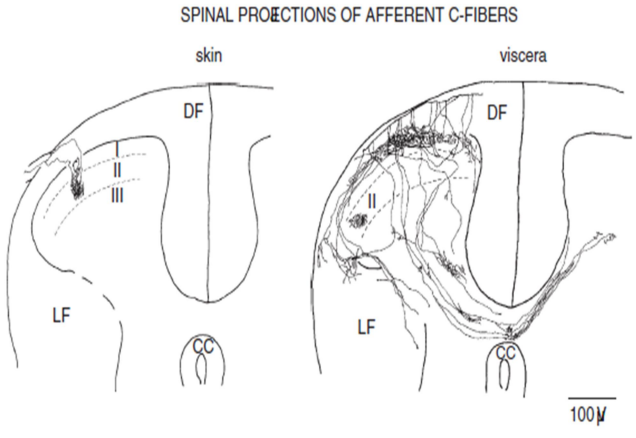
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Abstract Go to:

1. The vagus nerve conveys primary afferent information produced by a meal to the brainstem. Serotonin (5-HT), which abounds in intestinal enterochromaffin cells, is released in response to various stimuli. We have recently demonstrated that 5-HT released from intestinal enterochromaffin cells activates 5-HT_3 receptors on vagal afferent fibres to mediate luminal non-cholecystokinin-stimulated pancreatic secretion. The present study was designed to evaluate the responses of vagal sensory neurons to intraluminal osmotic stimulation and luminal infusion of maltose, glucose or 5-HT. We investigated the role of endogenous 5-HT in signal transmission evoked by luminal stimuli to activate vagal sensory neurons.

PREDOMINANCIA DE LOS REFLEJOS VISCERO-SOMATICOS SOBRE LOS SOMATO VISCERALES.

Dibujos mediante cámara lúcida de los patrones de terminación central de fibras aferentes amielínicas que inervan los tejidos somáticos
(izqda) y viscerales (derecho).



Las neuronas aferentes fueron identificadas como somáticas o viscerales por sus respuestas a la estimulación eléctrica de un nervio somático(subcostal) o visceral (estimulación del ganglio celiaco)y los campos de receptor fueron estimulados por estimulos noxa(pinchar, calor, frio).

TOMADO DE W. JANIN. SISTEMA DE ESPEJOS QUE, ORIENTADOS A 45º REFELJAN LA IMAGEN DE RESONANCIA SOBRE UN PAPEL Y NOS PERMITEN DIBUJAR LO QUE SE VE A NIVEL FUNCIONAL TRAS LA ESTIMULACIÓN ELECTRICA NEURAL.

