

EXPRESSION OF GENE CODING FOR OPIOID PRECURSORS AND RECEPTORS IN MAMILLARY BODIES OF GILTS

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Endogenous opioid peptides and their receptors are found in all classes of vertebrates and numerous invertebrates. They are localized in distinct structures of the brain and this appears to be strictly connected with their physiological function. However, in the available literature there is a lack of data concerning the presence of opioid systems in the mamillary bodies of gilts. Therefore, the aim of this study was to examine the expression of gene coding for three opioid precursors — proopiomelanocortin (POMC), proenkephalin (PENK) and prodynorphin (PDYN) as well as opioid receptors — μ (MOR), δ (DOR) and κ (KOR), in porcine mamillary bodies. The mamillary bodies were collected from sexually mature gilts (approx. 100 kg of body weight) in a local slaughterhouse. Total RNA was isolated and a qualitative RT-PCR assay with primers specific for opioid precursors and receptors was performed. PCR products were sequenced to confirm their specificity.

The presence of PENK, PDYN as well as DOR mRNAs was demonstrated in the mamillary bodies of gilts. The data obtained for the MOR gene are ambiguous as multiple PCR products were noted. Expression of POMC and KOR genes in porcine mamillary bodies was not detected.

The results of this study show that expression of gene coding for PENK, PDYN and DOR take place in porcine mamillary bodies. Possibly, several μ -opioid receptor transcripts are synthesized in these structures as a result of alternative splicing. These results may suggest a physiological role of opioid systems in the mamillary bodies of gilts.

THE ANATOMY OF HUMAN AND ANIMAL VENOUS FORAMINA OF THE SKULL

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In order to investigate if the size of selected human skull foramina with significant venous compartment were significantly correlated with the skull capacity, an anatomical study was undertaken. A total of 100 macerated human skulls, 100 from macaques, 67 from bison, 25 from mongrel dogs, 37 from foxes, 22 from cats, 80 from hares, 14 from rats, 11 from ostriches and 47 from chickens were examined to determine the diameter of the foramina and the skull capacity. Measurements of the surface area of the foramina were made using a computerized digital analysis system.

In animals, many correlations between skull capacity and area of foramina have been proven. In humans, only the size of the hypoglossal canal and jugular foramen were found to correlate significantly with the capacity of the skull. This correlation, together with the considerable size of the hypoglossal canal, indicated its important role in the venous drainage of the brain.

In humans, there was considerable centralization of venous outflow from the brain with 60% of the area of all venous foramina of the skull occupied by jugular foramina. In animals, this concentration varied from 16% in bison to 45% in foxes.

An asymmetry between the right and left jugular foramen was identified, with an average ratio of 1.6 (range between 1 and 3.47); however, in animals, the ratio was less than 1.3. In the case of right-sided domination, the correlation between the skull capacity and the size of both jugular foramina was negative (the larger the cavity of the skull, the less the asymmetry), and in the case of left-sided domination, it was positive. Perhaps the left-sided domination is less advantageous for the haemodynamics of blood outflow as the left brachiocephalic vein is longer and is often compressed by the sternum and aortic arch.

PROPORTIONS OF HUMAN AND ANIMAL LARYNXES IN IMMATURE AND MATURE INDIVIDUALS

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The aim of the present study was to investigate the anticipated changes in structure and proportions of the larynx between immature and mature individuals of humans and animals. It was of special interest to obtain an answer for the question: in sexual dimorphism, are the characteristics of the human larynx observed before sexual maturation, and are they observed in other mammals.

Human material selected for the study was obtained from the Forensic Medicine Department, University Medical School, Warsaw. Animal material was obtained from slaughterhouses, where cows and pigs were routinely sacrificed, so there was no need to obtain permission from the bioethics committee. Twenty-five larynges of infants and adolescents were studied and 20 adult human larynges (10 female and 10 male), 31 larynges of pigs (17 piglets and 14 sows and boars) and 27 larynges of cattle (13 heifers and calves and 14 heeves and bulls). Infants and adolescents were less than twelve years old. The age of the mature humans was: 17–48. The piglets were from 12 to 18 weeks of life. The heifers and calves were from 12 to 16 weeks. The sows and boars as well as the cows and bulls were old breeding animals.

The methods used in the study were based on anatomical preparation, anatomical description and measurements performed with use of a digital camera and computer-aided system MULTISCAN. In statistics Tukey's test and Pearson's linear correlation coefficient were calculated.

It was proved that the dependence of proportions of the larynx on the age of the individual is observed in several of them in humans and pigs but not in cattle. Statistically important differences in proportions of the larynx between sexes were observed in some of them in pigs and in one in cattle. In humans, the proportions of the larynx are not dependent on gender and are almost the same in both genders of one age group. Nevertheless, the basic measured parameters were greater in female specimens. The child's larynx, before maturation, is characterised by greater slenderness in comparison with the adult's larynx, which is due to the overweight of axial dimensions over the horizontal ones.

TOPOGRAPHY AND CONTENT OF THE TYMPANIC CAVITY OF RABBITS

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In accessible literature, there is no comprehensive topographic description of the tympanic cavity and temporal bone of the rabbit. This paper is an attempt to fill this gap in the literature.

Twenty-four rabbit (12 rabbits of both genders) temporal bones underwent anatomical preparation in a stereoscopic microscope. Soft material was preserved in 10% acetic formaldehyde. Statistical assessment of the results was performed.

Observations revealed that the tympanic cavity is divided into a few smaller parts, making hollows, among them the epitympanic recess and tympanic sinus.

The epitympanic recess makes a cavity of 3.5 mm in diameter. It is closed by the epiphysis of the jugular process and medial wall of the external auditory canal. From the medial site, it is closed by the prominence of the anterior semicircular canal, and in this region it is adjacent to the subarcuate fossa.

From the inferior site, the recess lies directly over the facial nerve, and there is a prominence of the horizontal semicircular canal in its bottom. The tympanic sinus is limited by the colliculus in the frontal part, the facial nerve canal from upper part and is adjacent to the jugular foramen with the internal cervical vein and IX, X, XI cranial nerves in the inferior and medial parts.

However, the colliculus is a special orientation point in the tympanic cavity in the rabbit temporal bone, and it is visible only after opening the tympanic cavity wide.

From the colliculus, the internal carotid artery, placed in the bony canal, goes to the front part. Mean minimum distance between the cochlear window and the carotid artery canal is 4.34 mm. The easiest way to open the middle ear part in this species is to open the tympanic cavity or to get there from the epitympanic recess side. The malleus has a thin rostralis process and shorter and wicker muscular and horizontal processes. The average malleus length is 5.13 mm. The incus consists of a body and long (average length is 2.54 mm) and short (average length is 1.38 mm) crus. The stapes is very delicate. The average height of the stapes is 1.45 mm.

DISTRIBUTION OF SP-IMMUNOREACTIVE NEURONAL ELEMENTS IN THE PANCREAS OF SHEEP

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The pancreas is known to be controlled by a multisignaling system in which both hormones and autonomic nerves are of key importance. The goal of the present study was to map out the distribution pattern of the ovine pancreatic nerve fibres expressing SP. In order to elucidate the possible involvement of neuropeptides in the small ruminant pancreas activity, the co-expression of CGRP, VIP, GRP and SP was studied with double immunocytochemistry.

Interacinar spaces and interlobular connective tissue were richly innervated by SP-positive, mainly varicose, nerve terminals. Numerous, mainly large, pancreatic arteries and veins were supplied with abundant SP-positive nerve terminals which mostly co-expressed CGRP. Immunoreactivity to SP was also detected in single nerve fibres of the duct system, in scarce nerve terminals reaching the islet border and only exceptionally in those penetrating inside the islet. In small populations of nerve fibres located amongst the acini, around small blood vessels and in several neurons of intrapancreatic ganglia, the co-localization of VIP with SP was observed. None of the GRP-positive nerve terminals showed the presence of SP.

In conclusion, the results of the present study clearly documented that the pancreas of the sheep is supplied with peptidergic nerve fibres in a species-dependent manner. On the basis of the occurrence and frequency of SP, VIP and CGRP (alone or in combination) in pancreatic neuronal elements, it is suggested that SP may act as an important regulator of ovine pancreatic functions (both endocrine and exocrine).

ORGANIZATION OF ACETYLCHOLINE CONTAINING STRUCTURES IN THE CRANIAL MOTOR NUCLEI OF THE RHOMBENCEPHALON OF PIGS

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We explored the immunoreactivity of choline acetyltransferase (ChAT) in the cranial nerve motor nuclei of pig rhombencephalon to reveal the cholinergic nature of these regions.

Three sexually immature gilts of the Large White Polish race were used for the study. In our experiment we applied ChAT-immunohistochemistry for the visualization of all acetylcholine containing structures. The slides were analyzed under a Zeiss fluorescent microscope.

All studied motor nuclei contained ChAT-positive cell bodies and fibres, but the intensity of staining differed between the nuclei. Furthermore, characteristic ChAT-immunoreactive bouton-like structures, which are known to be synaptic terminals of the cholinergic system, were observed in the borders of all studied regions. The localization of ChAT-positive "boutons" in the neuropil of the examined nuclei and their proximity to stained perikarya allowed us to differentiate two groups of motor nuclei in the rhombencephalon of the pig:

- Nuclei containing ChAT-positive bouton-like structures dispersed in the neuropil, often establishing contact with the stained cell bodies — motor trigeminal, abducent, facial, ambiguous and hypoglossal nuclei.
- Nuclei in which characteristic boutons were dispersed between the ChAT-positive cells but were devoid of any contact with perikarya — dorsal motor nucleus of the vagus nerve.

These results provide new data concerning the central nervous system of swine and could be useful in further experiments on amyotrophic lateral sclerosis (ALS) — the disease that results in progressive degeneration of motoneurons in the brain and spinal cord.

VASCULAR AND NONVASCULAR CONNECTION OF THE PROXIMAL A2 SEGMENTS OF THE ANTERIOR CEREBRAL ARTERIES

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The anterior cerebral arteries of both sides are connected by the anterior communicating artery complex. This configuration of the arterial system presents many different variants. During dissection of the anterior cerebral arteries in the proximal A2 segments, several additional connections, nonvascular (fibrous-like bands) as well as vascular, were observed.

The aim of study was to analyze the number frequency and variability of such vascular and nonvascular connections as elements of junctions between both anterior cerebral arteries.

The study was conducted on 100 specimens by means of microanatomical dissection with the use of a surgical microscope.

Connections of the proximal A2 segments other than anterior communicating arteries were observed in about 30% of cases. In about 20% of cases, it was nonvascular single or multiple connections. In about 10% of the dissected brains, it was accessory thin vascular connections in front of the anterior communicating artery.

These connections of the proximal A2 segments of the anterior cerebral arteries play an important role during execution of different types of the interhemispheric approach to the sellar/suprasellar region and ventricular system of the brain.