Department of Dentistry

Katsuhiko Hayashi, *Professor*
Shigeru Suzuki, *Associate Professor*
Akihiro Ikai, *Professor*

General Summary

1. Changes in condylar heights in the temporomandibular joint with anterior disc displacement without reduction using panoramic radiographs
2. Tumor necrosis factor (TNF) α receptor (R)–P2X3R mechanisms in trigeminal ganglion neurons are involved in orofacial neuralgia associated with macrophage infiltration in a rat model of trigeminal nerve compression (TNC)
3. CD57 immunoreactivity seen in thin arteries in the human fetal lung
4. Morphological study of the fibula in Japanese: Basic anatomical study for maxillofacial reconstruction

Research Activities

Changes in condylar heights in the temporomandibular joint with anterior disc displacement without reduction using panoramic radiographs

The aim of the study was to measure condylar heights and to quantitatively assess the changes in condylar heights in patients with anterior disc displacement without reduction by measuring condylar heights on panoramic radiographs. The subjects of this study were selected from among patients who had no anterior disc displacement or had anterior disc displacement with or without reduction. These diagnoses were confirmed with magnetic resonance imaging. We compared, via quantitative and statistical examination, differences of right and left condylar heights among these 3 groups. In the groups with anterior disc displacement with or without reduction, condylar heights were significantly lower on the affected side than on the unaffected side. However, age, condylar height, and the difference between affected and unaffected sides did not differ significantly between these 2 groups. In the group with anterior disc displacement without reduction, we used receiver operating characteristic curves to compared condylar heights of affected sides and of unaffected sides and how condylar heights differed between the sides. According to the study, the most appropriate way for estimates of the changes in condylar heights in patients with anterior disc displacement without reduction is to assess differences between both condylar heights.

TNFαR–P2X3R mechanisms in trigeminal ganglion neurons are involved in orofacial neuralgia associated with macrophage infiltration in a rat model of TNC

We developed a model of trigeminal nerve compression by placing a glass rod on the trigeminal root of male Sprague–Dawley rats (180–200 g). We then studied the expression of TNFα, TNFαR, and P2X3R and macrophage infiltration immunohistochemically in the trigeminal ganglion and also studied the head-withdrawal threshold (HWT) to mechani-

cal stimulation of the whisker pad skin. After decompression of the trigeminal nerve, the mechanical HWT was significantly lower in TNC rats than in sham rats. The numbers of P2X3R-immunoreactive (IR) and TNFαR-IR neurons innervating whisker pad skin and of neurons encircled with cells positive for ionized calcium-binding adapter molecule 1 (Iba1) were significantly higher in TNC rats than in sham rats. In addition, TNFα was expressed in iba1-IR cells. Furthermore, the decreased HWT was significantly recovered following local injection of a P2X3R antagonist. Trigeminal nerve decompression might be a reliable model of trigeminal neuralgia, and the present results suggest that TNFαR-P2X3R signaling associated with TNFα release from activated macrophages is involved in trigeminal neuralgia.

CD57 immunoreactivity seen in thin arteries in the human fetal lung

In lung specimens from 12 human fetuses at 10 to 34 weeks of gestation, we have incidentally found that segmental, subsegmental, and more-peripheral arteries strongly expressed CD57. The CD57-positive tissue elements within intrapulmonary arteries seemed to be the endothelium, internal elastic lamina, and smooth muscle layer, which corresponded to tissue positive for an antibody reactive with smooth muscle actin. However, the lobar artery, pulmonary arterial trunk, and bronchial arteries were negative for CD57. Likewise, arteries in and along any abdominal viscera, such as the heart, thymus, and thyroid, did not express CD57. Thus, the lung-specific CD57 reactivity was not connected with an endodermal origin or a branchial arch origin. The CD57 antigen is a sugar chain characterized by a sulfated glucuronic acid residue that is likely to exist in some glycosphingolipids. Therefore, a chemical affinity or an interaction might exist between CD57-positive arterioles and glycosphingolipids originating from alveoli, resulting in acceleration of capillary budding to make contact with the alveolar wall. We conclude that CD57 might therefore be a functional marker of the developing air-blood interface that characterizes the fetal lung at the canalicular stage.

Morphological study of the fibula in Japanese: Basic anatomical study for maxillofacial reconstruction

In this study, the 3-dimensional morphology of the fibula of Japanese patients was observed, the previously unreported distribution and location of the feeding blood vessels were examined, and the region containing sufficient bone mass for maxillofacial reconstruction was anatomically evaluated. Images of the excised fibula were acquired with computed tomography for medical use and subjected to 3-dimensional reconstruction. Before being measured, the fibula was divided into 6 parts between the apex of the fibular head and the apex of the lateral malleolus. The 4 central regions were set as regions of interest, and the diameters of the fibular cross sections were 3-dimensionally measured. In addition, the distribution of the feeding blood vessels to the fibula was macroscopically observed and classified. On 3-dimensional bone morphology measurement, the width (diameter) of the fibula cross section between the anterior margin and the posterior aspect was the greatest, followed by that between the medial crest and the lateral aspect. In the regions of interest, the mean width between the anterior margin and the posterior aspect, which corresponded to the grafted bone height, exceeded 10 mm, and the mean width

between the medial crest and the lateral aspect and between the posterior margin and the medial aspect, which became the buccolingual width of the grafted bone, exceeded 6 mm, confirming that the graft thickness is sufficient for grafting. Furthermore, the blood vessels feeding the fibula entered the bone in the central one-third region in all preparations. Inclusion of the central one-third region was suggested to be effective for vascularized fibular grafting.

Publications

Ishizuka S*[1]*, Jin Z-W*[2]*, Yamamoto M*[1]*, Murakami G*[1]*, Takayama T, Hayashi K, Abe S*[1] *(*[1]Tokyo Dental College,*** [2]***Jiangnan Univ).*** CD57 (Leu-7, HNK-1) immunoreactivity seen in thin arteries in the human fetal lung. *Anat Cell Biol.* 2018; **51:** 105-12.

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