***Suppl 1.* Detection of SAα2,3Gal (α2,3SA) and SAα2,6Gal (α2,6SA) in respiratory tissues, mammary gland tissues, conjunctival tissues obtained from human, dairy cow, Lion as big feline animal:**

Paraffin-embedded, surgically removed normal human upper-to-lower respiratory tract tissues, normal human mammary gland tissues, normal human conjunctive tissues, normal dairy cow upper-to-lower respiratory tract tissues, normal dairy cow mammary gland tissues, normal dairy cow mammary gland, normal lion (bronchial and lung, eight patients; tracheal, nasal, and pharyngeal; three patients), normal dairy cow mammary gland, mammy were cut into 5-µm thick sections with a microtome, mounted on 3-aminopropyltrethoxy-silane (APS)-coated slides (Catalogue no. SCRE-01, Matsunami Glass Ind., Ltd., Tokyo), deparaffinized in xylene (Catalogue no. 241-00091, FUJIFILM Wako Chemicals, OOSAKA, OOSAKA, Japan) and rehydrated by ethyl alcohol (Catalogue no. 241-00096, FUJIFILM Wako Chemicals, OOSAKA, OOSAKA, Japan). For detection of sialyloligosaccharides reactive with SAα2,3Gal-specific lectins (MAL-II, MAL-I), SAα2,6Gal-specific lectins (SMA), the tissue sections were incubated with 250 µl of FITC-labeled Sambucus nigra (SMA) lectin (Catalogue no. FL-1301-2, Vector Laboratories, Burlingame, CA, USA), biotinylated Maackia amurensis I (MAA/MAL-I) lectin (Catalogue no. B-1315-2, Vector Laboratories), or biotinylated Maackia amurensis II (MAH/MAL-II) lectin (Catalogue no. B-1365-1, Vector Laboratories) overnight at 4oC. After three washes with Tris-buffered saline (TBS, pH 7.6, Catalogue no. 206-19131, FUJIFILM Wako Chemicals), the sections were incubated with Alexa Fluor 594-conjugated streptavidin, (Catalogue no. 98036S, Molecular Probes, Inc., Eugene, OR, USA) for 2 hours at room temperature. The sections were counterstained with 4’,6-diamino-2phenylindole, dihydrochloride (DAPI; Catalogue no. 349-91331, Dojindo Molecular Technologies, Inc., Kumamoto, Kumamoto, Japan). After three washes with TBS pH 7.6, the sections were mounted on cover glass and observed with a fluorescence microscope (ECLIPSE TE300 with a fluorescence equipment mercury set, Nikon Co. Ltd, Shinagawa, Tokyo, Japan). Photos were taken with a digital microscope camera (Olympus DP70, Olympus Optical Co., Ltd., Hachioji, Tokyo, Japan). Human research ethics approval for all human specimens was obtained from National Hospital Organization Headquarter Office of Research Ethics. Double-immunohistochemical/lectin staining of human lung sections. To determine the types of cells reactive with MAA/MAL-I lectin, we double-stained sections for surfactant protein-A (SP-A), a marker for type II alveolar cells, in conjunction with MAA/MAL-I lectin. Briefly, deparaffinized sections were incubated with anti-human SP-A mouse antibody (Catalogue no. 10375, Immuno-Biological Laboratories Co,Ltd., Fujioka-shi, Gunma, Japan) and biotinylated MAA/MAL-I lectin overnight at 4oC. The sections were next incubated with FITC conjugated anti-mouse IgG (Catalogue no. 31569, Molecular Probes, Inc., Waltham, MA, USA) and Alexa Fluor 594-conjugated streptavidin (Catalogue no. 98036S, Molecular Probes, Inc., Waltham, MA, USA) for 2 hours at room temperature. They were then counterstained with DAPI (Catalogue no. 349-91331, Dojindo Molecular Technologies, Inc., Kumamoto, Kumamoto, Japan). After three washes with TBS pH 7.6, the sections were mounted on cover glass. Immunostaining samples were visualized under a confocal microscope (Leica TCS SP8, Wetzlar, Germany) according to the manufacturer’s procedure. The expression levels of host receptor SAα2,3Gal or SAα2,6Gal indicated in visualized files were quantified using an image analysis and measurement system (WinROOF2023, Mitani Corporation, Visual System, Fukui-shi, Fukui, Japan). The quantified expression levels of host receptor SAα2,3Gal- or SAα2,6Gal were then plotted on a graph.

The expression levels of host receptor SAα2,3Gal or SAα2,6Gal were quantified by the analysis algorithm of the color program. Therefore, the expression levels of host receptor SAα2,3Gal or SAα2,6Gal shown in Figure 3 and Figure 5B are numbers expressed by a measurement system (WinROOF2023, Mitani Corporation, Visual System, Fukui-shi, Fukui, Japan).

Analysis algorithm of the color program 1. Binarization of positive cells: Binarize positive cells using RGB or HLS numerical settings (color extraction). 2. Calculation of average brightness: Calculate the average brightness for each binarized area. (For example, if one cell has 100 pixels, calculate the average brightness of 100 pixels.) 3. Creation of frequency distribution table: Create a frequency distribution table based on the average brightness. Color-code the cells based on the calculated values. (The range of which areas to separate the colors can be selected arbitrarily.)

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