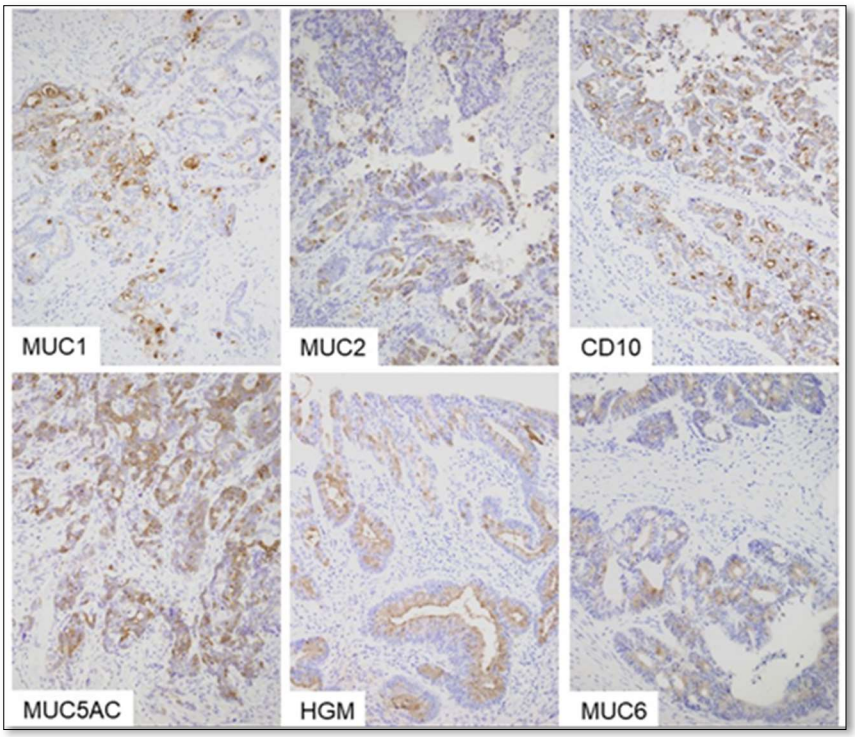

Figure 1. Expression of mucins and CD10 in colorectal adenocarcinoma. Colorectal adenocarcinoma tissues expressed MUC1 (top, left), MUC5AC (top, middle), HGM (top, right), MUC6 (bottom, left), MUC2 (bottom, middle) and CD10 (bottom, right) immunohistochemically (streptavidin biotin-peroxidase method).

Table 1. Mucin/CD10 expression of colorectal adenocarcinoma.

		MUC1		MUC2		CD10		MUC5AC		HGM		MUC6	
		–	+	–	+	–	+	–	+	–	+	–	+
Histology	wel	16	4	5	15	15	5	16	4	16	4	20	0
	mod	51	20	37	34	38	33	64	7	60	11	69	2
	por, muc	4	2	0	6	5	1	2	4	2	4	6	0
Depth of invasion	T1, T2	18	4	9	13	16	6	18	4	16	6	22	0
	T3	31	9	15	25	21	19	35	5	33	7	39	1
	T4	22	13	18	17	21	14	29	6	29	6	34	1
Venous invasion	–	33	7	17	23	26	14	30	10	30	10	39	1
	+	38	19	25	32	32	25	52	5	48	9**	56	1
Lymphatic invasion	–	7	0	2	5	6	1	3	4	3	4	7	0
	+	64	26	40	50	52	38	79	11*	75	15**	88	2
Lymph node metastasis	–	41	7	20	28	25	23	44	4	42	6	48	0
	+	30	19*	22	27	33	16	38	11	36	13	47	2

**p<0.05, **p<0.001 (Chi square test)*

Histology wel: tubular adenocarcinoma, well differentiated type; mod: tubular adenocarcinoma, moderately differentiated type; por: poorly differentiated adenocarcinoma; muc: mucinous adenocarcinoma

There are two structurally and functionally distinct classes, i.e., secreted gel-forming mucins (MUC2, MUC5AC, MUC5B and MUC6) and transmembrane mucins (MUC1, MUC3A, MUC3B, MUC4, MUC12 and MUC17), while some mucins (MUC7, MUC8, MUC9, MUC13, MUC15 and MUC16) do not categorized into either class. MUC1 has been shown to inhibit E-selectin-associated cell adhesion [19]. MUC1 includes cytokine receptor-like sequences in the extracellular region, and has been shown to function in signal transduction [20]. These observations suggested that MUC1 may function in tumor growth and metastasis of human carcinoma *in vivo*. Our present results demonstrated frequent lymph node metastasis in MUC1-positive cancer, and were supported by previous studies indicating that MUC1-mediated interactions may play important roles in tumor invasion [21-24]. More lymph node metastases in MUC1-positive cases suggested that MUC1-mediated mechanisms may cause carcinoma cells to reach lymph nodes through stromal lymphatic channels. On the other hand, the secreted gel-forming mucins (MUC2, MUC5AC, MUC5B and MUC6) are main mucin of normal gastrointestinal epithelia, and have been thought to play a role in the neoplastic progression and metastasis of gastrointestinal cancer [25-27]. HGM is the immunohistochemical marker for gastric foveolar/surface epithelium, and is encoded by MUC5AC core protein [28,29].

CD10 was originally used as a marker for common acute lymphoblastic leukemia antigen, but was shown to react with brush border of small intestine as well as germinal center of lymphoid follicles and microvilli of kidney [30-33]. According to the expression pattern of the aforementioned mucins (MUC2, MIC5AC, MUC6 and HGM), as well as CD10 expression, phenotypes of gastrointestinal epithelia are classified into the three groups; small intestinal type (CD10+, MUC2+, HGM/MUC5AC/MUC6+), large intestinal type (CD10-, MUC2+, HGM/MUC5AC/MUC6+), gastric type (CD10-, MUC2-, HGM/MUC5AC/MUC6+) and mixed type [(CD10+/-, MUC2+, HGM/MUC5AC/MUC6+) or (CD10-, MUC2+, HGM/MUC5AC/MUC6+)] [9,34]. Our present results demonstrated frequent lymphatic and/or venous invasions in MUC5AC-negative and HGM-negative colorectal cancers, i.e., intestinal type cancers, supported by previous studies [35]. Detailed mechanisms of vascular invasion in the MUC5AC/HGM-negative cancers have not yet clarified and should be analyzed in the future. However, no immunoreactivities of MUC5AC/HGM are thought to become an indicator of vascular invasion.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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