

Supporting Information for publication

Development of sodium polyacrylate-based high-performance submucosal injection material with pseudoplastic fluid characteristics

Ryohei Hirose,^{1,2} Naohisa Yoshida,¹ Yuji Naito,¹ Takuma Yoshida,¹ Risa Bandou,² Tomo Daidoji,²
Ken Inoue,¹ Osamu Dohi,¹ Hideyuki Konishi,¹ Takaaki Nakaya,² Yoshito Itoh¹*

¹Department of Molecular Gastroenterology and Hepatology, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kyoto, Japan

²Department of Infectious Diseases, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kyoto, Japan

*Corresponding author: Ryohei Hirose (e-mail: ryo-hiro@koto.kpu-m.ac.jp)

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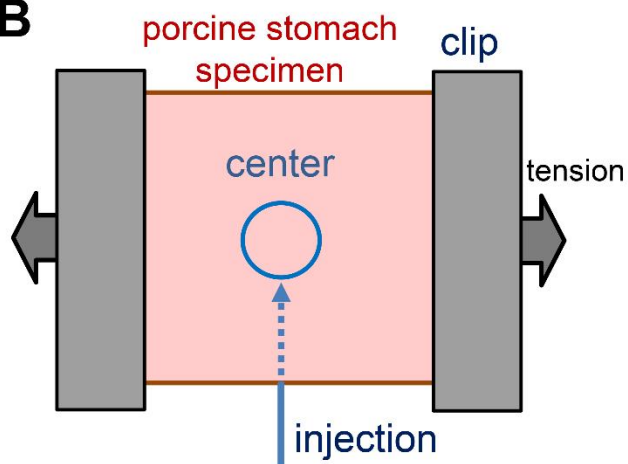
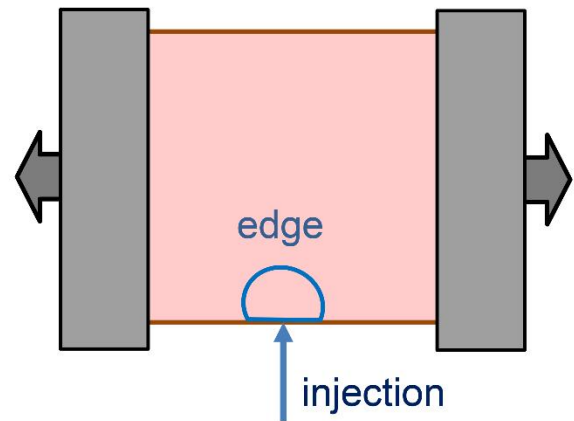
A**B****C**

Figure S1. Overview of our new porcine stomach *ex vivo* model. Submucosal elevation height (SEH) was measured by the new *ex vivo* model that applies a constant tension to the tested specimen (A). SIM is injected into the submucosa at the center (B) or edge (C) of the specimen, leading to submucosal elevation. The SIM performance is evaluated by measuring the value of SEH.

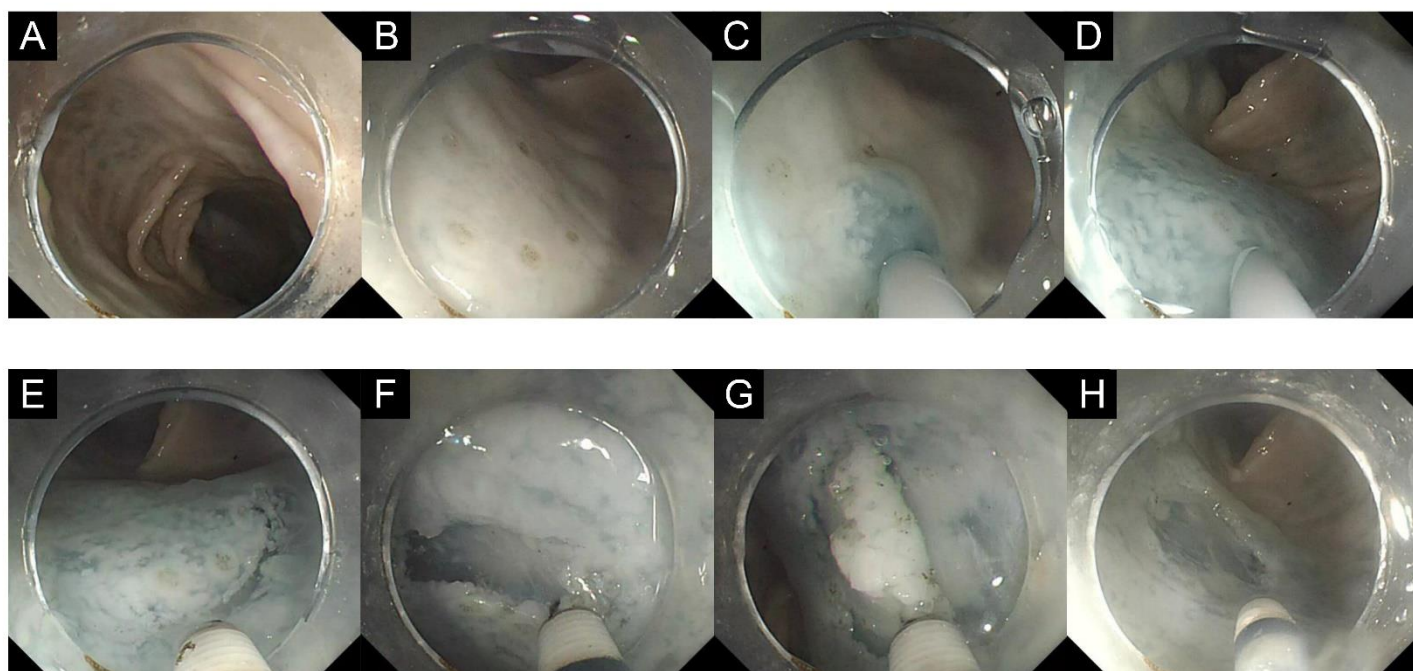


Figure S2. Procedure of ESD in *ex vivo* porcine colon ESD model. A gastrointestinal endoscope with a transparent hood is used for this study (A). Pseudo-lesions are shaped on the mucosa of the colon model by a Flush Knife BTS (B). Subsequently, an appropriate amount of SIM is injected into the submucosal layer using a 25-gauge endoscopic injection needle to generate a safe submucosal elevation (C and D). Afterwards, the mucosa around the pseudo-lesion is circumferentially incised with the Flush Knife BTS and an electrosurgical generator (E and F). Finally, the connective tissue of the submucosal layer is dissected with a Flush knife at swift coagulation current of 60 W (G and H).

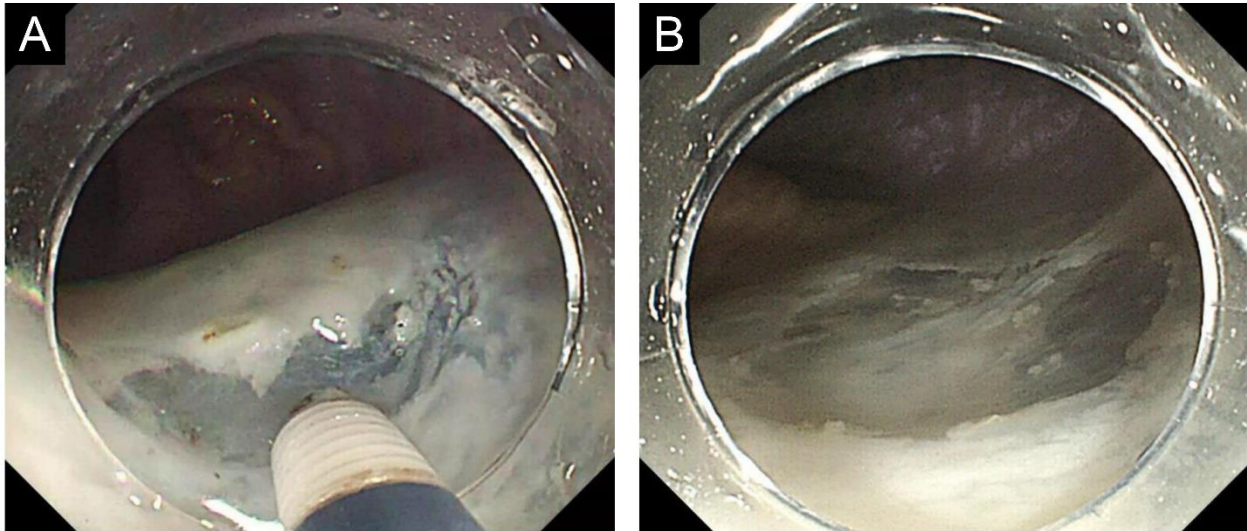


Figure S3. Submucosal tissue during ESD and an ulcer after ESD. As the sodium polyacrylate aqueous solution is colorless and transparent, the visibility of the submucosal layer is notable even at the time of submucosal dissection. SIMs are colored light blue by indigo carmine (A). In similarity to the human colon, porcine colon has thin muscle layer and is easily perforated by inappropriate submucosal dissection. No serious incidents such as perforation were encountered during ESD using SPA (B).

Table S1. Comparison of mean SEH (center) between 0.4% HA and 0.07% SPA

	Post injection time, min												
	0	1	2.5	5	7.5	10	12.5	15	17.5	20	30	45	60
0.4% HA	5.73	4.84	4.51	4.13	3.86	3.66	3.43	3.24	3.10	2.97	2.83	2.72	2.61
0.07% SPA	6.47	6.02	5.53	5.30	5.12	4.98	4.76	4.62	4.50	4.39	4.23	4.10	4.02
<i>P</i>-value	< 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001												

The values of SEH were evaluated with t-test. HA, sodium hyaluronate; SPA, sodium polyacrylate.

Table S2. Comparison of mean SEH (edge) between 0.4% HA and 0.07% SPA

	Post injection time, min												
	0	1	2.5	5	7.5	10	12.5	15	17.5	20	30	45	60
0.4% HA	4.92	3.73	3.38	3.00	2.71	2.46	2.18	1.96	1.70	1.42	1.20	1.05	0.86
0.07% SPA	5.35	4.79	4.53	4.27	4.09	3.92	3.73	3.62	3.48	3.37	3.16	3.02	2.83
P-value	0.0006 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0001												

The values of SEH were evaluated with t-test. HA, sodium hyaluronate; SPA, sodium polyacrylate.