



# Comprehensive registry of esophageal cancer in Japan, 2012

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## Preface 2012

We deeply appreciate the great contributions of many physicians in the registry of esophageal cancer cases. The Comprehensive Registry of Esophageal Cancer in Japan, 2012, was published here, despite some delay. The registry complies with the Act for the Protection of Personal Information. The encryption with a HASH function is used for anonymity in an unlinkable fashion.

We briefly summarized the Comprehensive Registry of Esophageal Cancer in Japan, 2012. Japanese Classification of Esophageal Cancer 10th [1] and UICC TNM Classification 7th [2] were used for cancer staging according to the subjected year. A total of 8003 cases were registered from 316 institutions in Japan. Tumor locations were cervical: 4.6%, upper thoracic: 12.8%, middle thoracic: 47.9%, lower thoracic: 26.1% and EG junction: 7.6%. Superficial carcinomas (Tis, T1a, T1b) were 38.2%. As for the histologic

type of biopsy specimens, squamous cell carcinoma and adenocarcinoma accounted for 89.5% and 6.0%, respectively. Regarding clinical results, the 5-year survival rates of patients treated using endoscopic resection, concurrent chemoradiotherapy, radiotherapy alone, or esophagectomy were 84.4, 32.4, 24.9, and 55.6%, respectively. The endoscopic submucosal dissection accounted for 84.9% of endoscopic resection. Esophagectomy was performed in 4722 cases. Concerning the approach used for esophagectomy, 36.0% of the cases were treated thoracoscopically. The operative mortality (within 30 days after surgery) was 0.52% and the hospital mortality was 2.35%. The 5-year survival rate of patients with pStage IV in UICC classification (including patients with supraclavicular node metastasis) was better than that of patients with pStage IVb in JES classification (not including patients with supraclavicular node metastasis).

We hope that this Comprehensive Registry of Esophageal Cancer in Japan for 2012 will help to improve all aspects of the diagnosis and treatment of esophageal cancer in Japan.

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These data were first made available on March 2019, as the Comprehensive Registry of Esophageal Cancer in Japan, 2012.

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The authors were members of the Registration Committee for Esophageal Cancer, the Japan Esophageal Society, and made great contributions to the preparation of this material.

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## I. Clinical factors of esophageal cancer patients treated in 2012

### Institution-registered cases in 2012

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#### Institution

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Ageo Central General Hospital  
 Aichi Cancer Center  
 Aichi Medical University Hospital  
 Aizawa Hospital  
 Akaishi Hospital  
 Akita Kouseiren Hiraga Hospital  
 Akita University Hospital  
 Aomori City Hospital  
 Arao Municipal Hospital  
 Asahikawa Medical College Hospital  
 Cancer Institute Hospital of JFCR  
 Chiba Cancer Center  
 Chiba Medical Center  
 Chiba University Hospital  
 Chibaken Saiseikai Narashino Hospital  
 Chigasaki Municipal Hospital  
 Dokkyo Medical University Hospital  
 Dokkyo Medical University Saitama Medical Center  
 Ehime University Hospital  
 Eiju General Hospital  
 Foundation for Detection of Early Gastric Carcinoma  
 Fuchu Hospital  
 Fujioka General Hospital  
 Fujisawa Shounandai Hospital  
 Fujita Health University Hospital  
 Fukui Prefectural Hospital  
 Fukui University Hospital  
 Fukui-ken Saiseikai Hospital  
 Fukuoka Dental College and Dental Hospital  
 Fukuoka Saiseikai General Hospital  
 Fukuoka University Chikushi Hospital  
 Fukuoka University Hospital  
 Fukuoka Wajiro Hospital  
 Fukushima Medical University Hospital  
 Fukuyama City Hospital  
 Fussa Hospital  
 Gifu Prefectural General Medical Center  
 Gifu University Hospital  
 Gunma Central General Hospital  
 Gunma Prefectural Cancer Center  
 Gunma University Hospital  
 Gunmaken Saiseikai Maebashi Hospital  
 Hachinohe City Hospital  
 Hakodate Goryokaku Hospital

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#### Institution

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Hakodate National Hospital  
 Hamamatsu University School of Medicine, University Hospital  
 Heartlife Hospital  
 Higashiosaka City Medical Center  
 Hino Memorial Hospital  
 Hino Municipal Hospital  
 Hiratsuka City Hospital  
 Hiratsuka Kyosai Hospital  
 Hirosaki University Hospital  
 Hiroshima City Asa Hospital  
 Hiroshima City Hiroshima Citizens Hospital  
 Hiroshima Red Cross Hospital & Atomic-bomb Survivors Hospital  
 Hiroshima University Hospital  
 Hitachi General Hospital  
 Hokkaido University Hospital  
 Hyogo Cancer Center  
 Hyogo Prefectural Nishinomiya Hospital  
 Ibaraki Prefectural Central Hospital  
 Iizuka Hospital  
 Imazu Surgical Clinic  
 Inazawa City Hospital  
 International University of Health and Welfare Hospital  
 International Goodwill Hospital  
 International University of Health and Welfare Mita Hospital  
 Isehara Kyodo Hospital  
 Ishikawa Prefectural Central Hospital  
 Iwate Medical University Hospital  
 Iwate Prefectural Central Hospital  
 Iwate Prefectural Chubu Hospital  
 Iwate Prefectural Isawa Hospital  
 Japanese Red Cross Fukui Hospital  
 Japanese Red Cross Ishinomaki Hospital  
 Japanese Red Cross Kyoto Daini Hospital  
 Japanese Red Cross Nagaoka Hospital  
 Japanese Red Cross Okayama Hospital  
 Japanese Red Cross Society Kyoto Daiichi Hospital  
 Japanese Red Cross Tottori Hospital  
 JCHO Kurume General Hospital  
 JCHO Kyushu Hospital  
 JCHO Miyazaki Konan Hospital  
 JCHO Osaka Hospital  
 JCHO Saitama Medical Center  
 JCHO Tokuyama Central Hospital  
 JCHO Yokohama Chuo Hospital  
 Jichi Medical University Hospital  
 Jichi Medical University Saitama Medical Center  
 Juntendo University Hospital  
 Juntendo University Shizuoka Hospital  
 Junwakai Memorial Hospital  
 Kagawa Prefectural Central Hospital

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Institution
Kagawa Rosai Hospital
Kagawa University Hospital
Kagoshima Kenritsu Satsunan Hospital
Kagoshima University Hospital
Kaizuka City Hospital
Kameda General Hospital
Kanagawa Cancer Center
Kanazawa University Hospital
Kansai Medical University Hospital
Kansai Medical University Medical Center
Kansai Rosai Hospital
Kasamatsu Hospital
Kashiwa Kousei General Hospital
Kawakita General Hospital
Kawasaki Medical School Hospital
Kawasaki Medical School Kawasaki Hospital
Kawasaki Municipal Ida Hospital
Keio University Hospital
Keiyukai Sapporo Hospital
Kikuna Memorial Hospital
Kin-ikyo Chuo Hospital
Kinki Central Hospital
Kinki University Hospital
Kiryu Kosei General Hospital
Kishiwada City Hospital
Kitaakita Municipal Hospital
Kitakyushu Municipal Medical Center
Kitano Hospital
Kitasato Institute Hospital
Kitasato University Hospital
Kobe City Medical Center General Hospital
Kobe City Nishi-Kobe Medical Center
Kobe University Hospital
Kochi Health Sciences Center
Kochi University Hospital
Kokura Memorial Hospital
Kumagaya General Hospital
Kumamoto City Hospital
Kumamoto University Hospital
Kurashiki Central Hospital
Kurume University Hospital
Kusatsu General Hospital
Kyorin University Hospital
Kyoto University Hospital
Kyushu Central Hospital of the Mutual Aid Association of Public School Teachers
Kyushu Medical Center
Kyushu University Beppu Hospital
Kyushu University Hospital
Machida Municipal Hospital

continued

Institution
Matsuda Hospital
Matsudo City Hospital
Matsushita Memorial Hospital
Matsuyama Red Cross Hospital
Mie University Hospital
Minamiosaka Hospital
Minamiyamato Hospital
Mino City Hospital
Mito Red Cross Hospital
Mitsui Memorial Hospital
Moriguchi Keijinkai Hospital
Murakami General Hospital
Musashino Red Cross Hospital
Nagahama City Hospital
Nagano Red Cross Hospital
Nagaoka Chuo General Hospital
Nagasaki University Hospital
Nagoya City East Medical Center
Nagoya City University Hospital
Nagoya City West Medical Center
Nagoya Daiichi Red Cross Hospital
Nagoya University Hospital
Nanpuh Hospital
Nara City Hospital
Nara Medical University Hospital
National Cancer Center Hospital
National Cancer Center Hospital East
National Defense Medical College Hospital
National Institute of Radiological Sciences Hospital
Nerima Hikarigaoka Hospital
NHO Beppu Medical Center
NHO Chiba Medical Center
NHO Chiba-East-Hospital
NHO Fukuoka-higashi Medical Center
NHO Himeji Medical Center
NHO Hokkaido Cancer Center
NHO Kanmon Medical Center
NHO Kure Medical Center
NHO Kyoto Medical Center
NHO Kyushu Cancer Center
NHO Matsumoto Medical Center
NHO Nagasaki Medical Center.
NHO Nagoya Medical Center
NHO Okayama Medical Center
NHO Osaka National Hospital
NHO Tokyo Medical Center
Nihonkai General Hospital
Niigata Cancer Center Hospital
Niigata City General Hospital

continued

Institution
Niigata Prefectural Shibata Hospital
Niigata University Medical and Dental Hospital
Nikko Memorial Hospital
Nippon Medical School Chiba Hokusoh Hospital
Nippon Medical School Hospital
Nippon Medical School Musashi Kosugi Hospital
Nippon Medical School Tama Nagayama Hospital
Nishinomiya Municipal Central Hospital
NTT Medical Center Tokyo
NTT WEST Osaka Hospital
Numazu City Hospital
Obihiro Kousei Hospital
Ogachi Central Hospital
Ogaki Municipal Hospital
Ohta Nishinouchi Hospital
Oita Red Cross Hospital
Oita University Hospital
Okayama Saiseikai General Hospital
Okayama University Hospital
Omuta Tenryo Hospital
Osaka City General Hospital
Osaka City University Hospital
Osaka Ekisaikai Hospital
Osaka General Medical Center
Osaka International Cancer Institute
Osaka Medical College Hospital
Osaka Police Hospital
Osaka Red Cross Hospital
Osaka University Hospital
Otsu City Hospital
Rinku General Medical Center
Ryukyu University Hospital
Saga University Hospital
Saga-ken Medical Center Koseikan
Saiseikai Fukushima General Hospital
Saiseikai Kyoto Hospital
Saiseikai Utsunomiya Hospital
Saiseikai Yahata General Hospital
Saiseikai Yokohamashi Tobu Hospital
Saitama Cancer Center
Saitama City Hospital
Saitama Medical University Hospital
Saitama Medical University International Medical Center
Saitama Medical University Saitama Medical Center
Sakai City Medical Center
Saku Central Hospital
Sanin Rosai Hospital
Sendai City Hospital
Sendai Medical Center

continued

Institution
Shiga General Hospital
Shiga University of Medical Science Hospital
Shikoku Cancer Center
Shimane University Hospital
Shimizu Welfare Hospital
Shinko Hospital
Shizuoka Cancer Center
Shizuoka City Shizuoka Hospital
Shizuoka General Hospital
Showa University Hospital
Showa University Koto-Toyosu Hospital
Sonoda Daiichi Hospital
Southern Tohoku General Hospital
St. Luke's International Hospital
St. Marianna University School of Medical Hospital
Steel Memorial Hirohata Hospital
Sugita Genpaku Memorial Obama Municipal Hospital
Suita Municipal Hospital
Tachikawa Hospital
Takasago Municipal Hospital
Teikyo University Chiba Medical Center
Teikyo University Hospital
Teine Keijinkai Hospital
Tenri Hospital
The Jikei University Daisan Hospital
The Jikei University Hospital
Tochigi Cancer Center
Toho University Ohashi Medical Center
Toho University Omori Medical Center
Toho University Sakura Medical Center
Tohoku University Hospital
Tokai University Hachioji Hospital
Tokai University Hospital
Tokai University Tokyo Hospital
Tokushima Red Cross Hospital
Tokushima University Hospital
Tokyo Dental College Ichikawa General Hospital
Tokyo Medical and Dental University Hospital
Tokyo Medical University Hachioji Medical Center
Tokyo Medical University Hospital
Tokyo Medical University Ibaraki Medical Center
Tokyo Metropolitan Cancer and Infectious Diseases Center Komagome Hospital
Tokyo Metropolitan Tama Medical Center
Tokyo Saiseikai Central Hospital
Tokyo University Hospital
Tokyo Women's Medical University Hospital
Tokyo Women's Medical University Medical Center East
Tokyo Women's Medical University Yachiyo Medical Center
Tonan Hospital

continued

Institution
Toranomon Hospital
Toshima Hospital
Tottori Prefectural Central Hospital
Tottori University Hospital
Toyama Prefectural Central Hospital
Toyama University Hospital
Toyonaka Municipal Hospital
Tsuchiura Kyodo Hospital
Tsukuba University Hospital
Tsuruoka Municipal Shonai Hospital
University Hospital, Kyoto Prefectural University of Medicine
University of Miyazaki Hospital
Urasoe General Hospital
Wakayama Medical University Hospital
Yamagata Prefectural Central Hospital
Yamagata Prefectural Shinjo Hospital
Yamagata University Hospital
Yamaguchi University Hospital
Yamaguchi-ken Saiseikai Shimonoseki General Hospital
Yamanashi Prefectural Central Hospital
Yamanashi University Hospital
Yao Municipal Hospital
Yokohama City Municipal Hospital
Yokohama City University Medical Center
Yokohama Rosai Hospital
Yuri Kumiai General Hospital

(Total 316 institutions)

**Table 1** Age and gender

Age	Male	Female	Cases (%)
≤ 29	3	1	4 (0.0%)
30-39	16	14	30 (0.4%)
40-49	163	58	221 (2.8%)
50-59	1028	188	1216 (15.2%)
60-69	2814	453	3267 (40.8%)
70-79	2274	371	2645 (33.1%)
80-89	476	118	594 (7.4%)
90≤	18	8	26 (0.3%)
Total	6792	1211	8003

**Table 2** Primary treatment

Treatments	Cases (%)
Surgery	4798 (60.0%)
Esophagectomy	4722 (59.0%)
Palliative surgery	76 (1.0%)
Chemotherapy/radiotherapy	1794 (22.4%)
Endoscopic treatment	1407 (17.6%)
Total	7999

## Patient Background

Tables 1, 2, 3, 4, 5, 6, 7, 8.

**Table 3** Tumor location

Location of tumor	Endoscopic treatment (%)	Surgery		Chemotherapy and/or radiotherapy (%)	Total (%)
		Esophagectomy (%)	Palliative surgery (%)		
Cervical	41 (2.9%)	152 (3.2%)	3 (3.9%)	174 (9.7%)	370 (4.6%)
Upper thoracic	122 (8.7%)	581 (12.3%)	18 (23.7%)	302 (16.8%)	1023 (12.8%)
Middle thoracic	819 (58.2%)	2151 (45.6%)	37 (48.7%)	825 (46.0%)	3832 (47.9%)
Lower thoracic	335 (23.8%)	1344 (28.5%)	14 (18.4%)	392 (21.9%)	2085 (26.1%)
EG	58 (4.1%)	356 (7.5%)	2 (2.6%)	39 (2.2%)	455 (5.7%)
E=G	14 (1.0%)	56 (1.2%)	1 (1.3%)	10 (0.6%)	81 (1.0%)
GE	4 (0.3%)	59 (1.2%)	1 (1.3%)	7 (0.4%)	71 (0.9%)
Unknown	14 (1.0%)	23 (0.5%)		45 (2.5%)	82 (1.0%)
Total	1407	4722	76	1794	7999

E esophageal, G gastric

**Table 4** Histologic types of biopsy specimens

Histologic types	Cases (%)
Squamous cell carcinoma	7162 (89.5%)
Squamous cell carcinoma	5130 (64.1%)
Well differentiated	440 (5.5%)
Moderately differentiated	1177 (14.7%)
Poorly differentiated	415 (5.2%)
Adenocarcinoma	358 (4.5%)
Barrett’s adenocarcinoma	119 (1.5%)
Adenosquamous carcinoma	15 (0.2%)
Mucoepidermoid carcinoma	6 (0.1%)
Basaloid carcinoma	41 (0.5%)
Neuroendocrine cell tumor	24 (0.3%)
Undifferentiated carcinoma	12 (0.2%)
Sarcoma	79 (1.0%)
Malignant melanoma	1 (0.0%)
Carcinosarcoma	19 (0.2%)
GIST	14 (0.2%)
Other tumors	2 (0.0%)
Unknown	147 (1.8%)
Total	7999

**Table 6** Lymph node metastasis, cN (UICC TNM 7th)

cN	Cases (%)
cNX	170 (2.1%)
cN0	3796 (47.5%)
cN1	2020 (25.3%)
cN2	1335 (16.7%)
cN3	519 (6.5%)
Unknown	159 (2.0%)
Total	7999

**Table 7** Distant metastasis, cM (UICC TNM 7th)

cM	Cases (%)
cM0	7214 (90.2%)
cM1	740 (9.3%)
Unknown	45 (0.6%)
Total	7999

**Table 5** Depth of tumor invasion, cT (UICC TNM 7th)

cT	Cases (%)
cTX	100 (1.3%)
cT0	14 (0.2%)
cTis	216 (2.7%)
cT1a	1264 (15.8%)
cT1b	1575 (19.7%)
cT2	1004 (12.6%)
cT3	2843 (35.5%)
cT4a	395 (4.9%)
cT4b	538 (6.7%)
Unknown	50 (0.6%)
Total	7999

**Table 8** Clinical stage (UICC TNM 7th)

Clinical Stage	Endoscopic treatment(%)	Surgery		Chemotherapy and/or radiotherapy (%)	Total (%)
		Esophagectomy (%)	Palliative surgery (%)		
Stage 0	254 (18.1%)	104 (2.2%)	2 (2.6%)	54 (3.0%)	414 (5.2%)
Stage IA	981 (69.7%)	1117 (23.7%)	1 (1.3%)	201 (11.2%)	2300 (28.8%)
Stage IB	6 (0.4%)	393 (8.3%)		50 (2.8%)	449 (5.6%)
Stage IIA	5 (0.4%)	499 (10.6%)	6 (7.9%)	79 (4.4%)	589 (7.4%)
Stage IIB	3 (0.2%)	458 (9.7%)		88 (4.9%)	549 (6.9%)
Stage IIIA	9 (0.6%)	951 (20.1%)	14 (18.4%)	210 (11.7%)	1184 (14.8%)
Stage IIIB	10 (0.7%)	510 (10.8%)	6 (7.9%)	117 (6.5%)	643 (8.0%)
Stage IIIC	20 (1.4%)	384 (8.1%)	26 (34.2%)	418 (23.3%)	848 (10.6%)
Stage IV	36 (2.6%)	183 (3.9%)	16 (21.1%)	505 (28.1%)	740 (9.3%)
Unknown	83 (5.9%)	123 (2.6%)	5 (6.6%)	72 (4.0%)	283 (3.5%)
Total	1407	4722	76	1794	7999

## II. Results of endoscopically treated patients in 2012

Tables 9, 10, 11 and Figs. 1, 2, 3.

**Table 9** Details of endoscopic treatment for curative intent

Treatment details	Cases (%)
EMR	185 (14.2%)
EMR + YAG laser	6 (0.5%)
EMR + MCT/RFA	1 (0.1%)
ESD	1064 (81.9%)
ESD + EMR	2 (0.2%)
ESD + PDT	8 (0.6%)
ESD + YAG laser	8 (0.6%)
PDT	3 (0.2%)
YAG laser	22 (1.7%)
Total	1299

EMR endoscopic mucosal resection, PDT photodynamic therapy, YAG yttrium aluminum garnet, MCT microwave coagulation therapy, ESD endoscopic submucosal dissection

**Table 11** Pathological depth of tumor invasion of EMR/ESD specimens

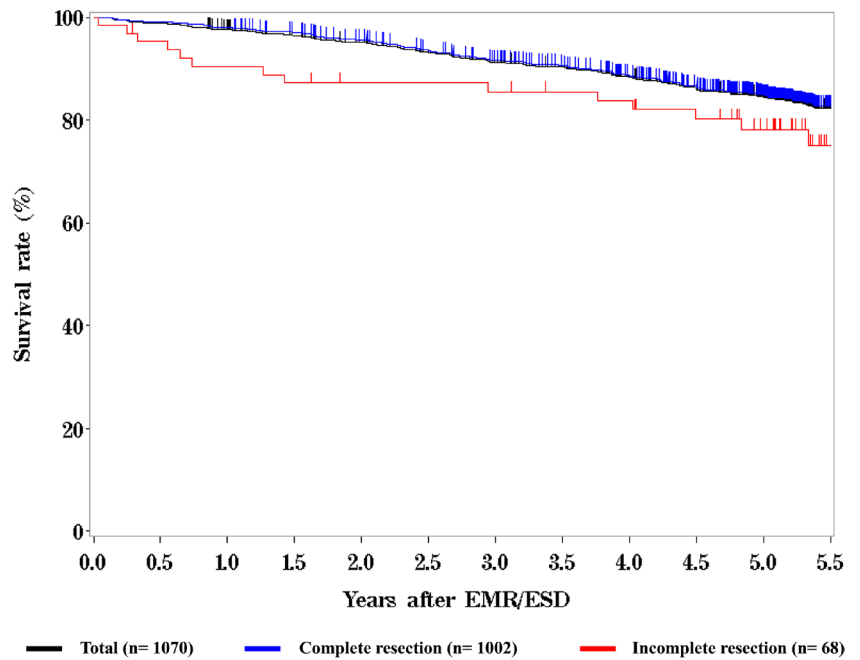
Pathological depth of tumor invasion	Cases (%)
pTX	6 (0.5%)
pT0	10 (0.8%)
pTis	234 (18.4%)
pT1a	873 (68.5%)
pT1b	140 (11.0%)
pT2	2 (0.2%)
Unknown	9 (0.7%)
Total	1274

**Table 10** Complications of EMR/ESD

Complications of EMR/ESD	Cases (%)
None	1206 (94.7%)
Perforation	20 (1.6%)
Bleeding	1 (0.1%)
Stenosis	35 (2.7%)
Others	5 (0.4%)
Unknown	7 (0.5%)
Total	1274

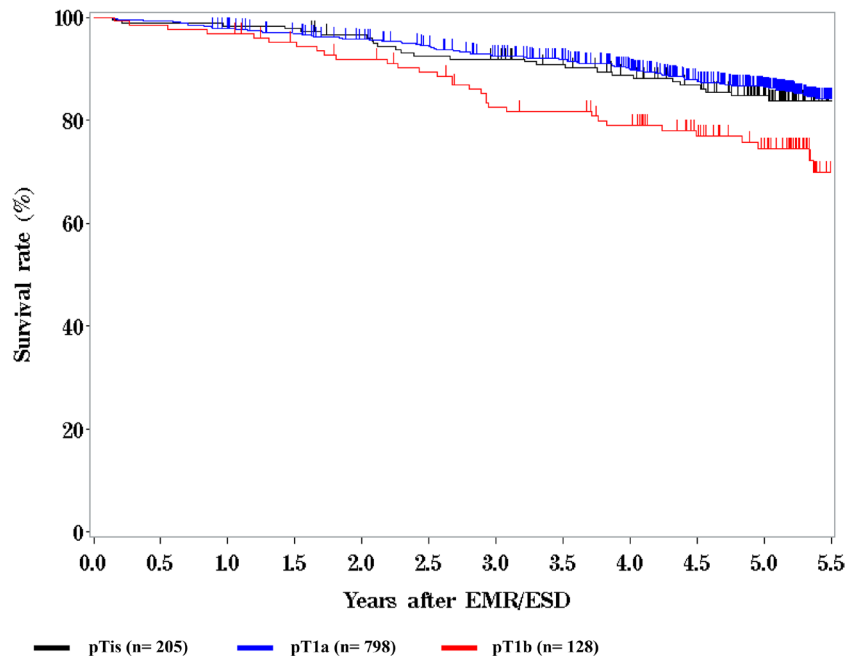


**Fig. 1** Survival of patients treated with EMR/ESD



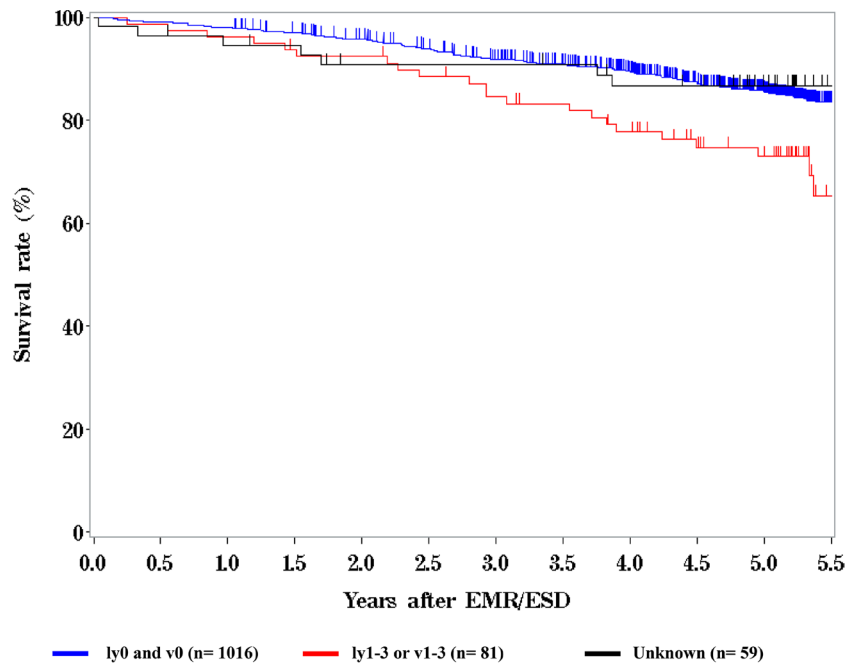
	Years after EMR/ESD				
	1	2	3	4	5
<b>Total</b>	97.6%	95.1%	91.2%	88.3%	84.4%
<b>Complete resection</b>	98.0%	95.6%	91.6%	88.5%	84.8%
<b>Incomplete resection</b>	90.4%	87.2%	85.5%	83.8%	78.2%

**Fig. 2** Survival of patients treated with EMR/ESD according to the pathological depth of tumor invasion, pT (UICC TNM 7th)



	Years after EMR/ESD				
	1	2	3	4	5
<b>pTis</b>	98.4%	96.6%	92.0%	88.8%	84.7%
<b>pT1a</b>	97.9%	95.8%	92.5%	89.9%	86.4%
<b>pT1b</b>	96.8%	91.9%	82.6%	79.0%	74.5%

**Fig. 3** Survival of patients treated with EMR/ESD according to the lymphatic and venous invasion



	Years after EMR/ESD				
	1	2	3	4	5
ly0 and v0	98.0%	95.8%	91.8%	89.4%	85.5%
ly1-3 or v1-3	96.2%	92.4%	84.5%	77.7%	72.9%
Unknown	94.6%	90.8%	90.8%	86.7%	86.7%

**III. Results in patients treated with chemotherapy and/or radiotherapy in 2012**

Tables 12, 13 and Figs. 4, 5, 6.

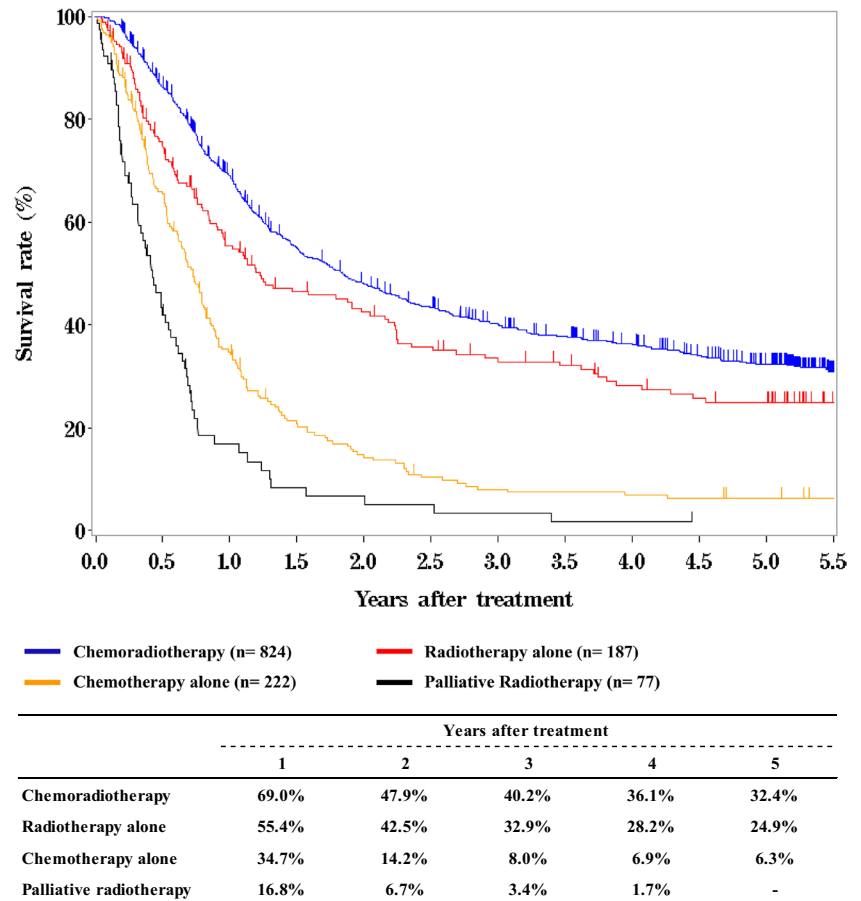
**Table 12** Dose of irradiation (non-surgically treated cases)

Dose of irradiation (Gy)	Definitive		Palliative (%)	Recurrence (%)	Others (%)	Unknown (%)	Total (%)
	Radiation alone (%)	Chemoradiotherapy (%)					
–29	7 (3.2%)	14 (1.5%)	14 (4.5%)		1 (3.3%)		36 (2.4%)
30–39	3 (1.4%)	13 (1.4%)	46 (14.7%)	1 (20.0%)	5 (16.7%)	1 (2.5%)	69 (4.6%)
40–49	4 (1.9%)	36 (4.0%)	63 (20.1%)	1 (20.0%)	7 (23.3%)	1 (2.5%)	112 (7.4%)
50–59	35 (16.2%)	192 (21.2%)	76 (24.3%)		8 (26.7%)	10 (25.0%)	321 (21.3%)
60–69	127 (58.8%)	546 (60.4%)	103 (32.9%)	3 (60.0%)	7 (23.3%)	27 (67.5%)	813 (53.9%)
70–	7 (3.2%)	30 (3.3%)	4 (1.3%)		(0.0%)		41 (2.2%)
Unknown	33 (15.3%)	73 (8.1%)	7 (2.2%)		2 (6.7%)	1 (2.5%)	116 (7.7%)
Total	216	904	313	5	30	40	1508
Median (min–max)	60.0 (2.0–139.0)	60.0 (8.0–104.4)	50.0 (2.0–126.0)	60.0 (30.0–63.0)	50.0 (4.5–63.0)	60.0 (30.0–66.0)	60.0 (2.0–139.0)

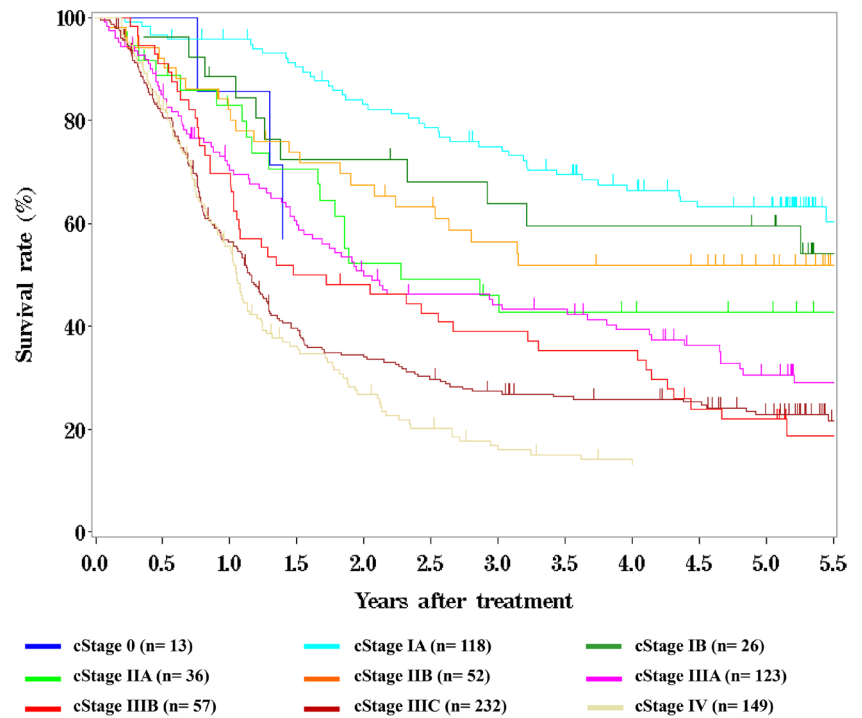
**Table 13** Dose of irradiation (surgically treated cases)

Dose of irradiation (Gy)	Preoperative irradiation (%)	Postoperative irradiation (%)
–29	3 (1.0%)	1 (1.8%)
30–39	86 (28.6%)	3 (5.4%)
40–49	166 (55.1%)	9 (16.1%)
50–59	10 (3.3%)	17 (30.4%)
60–69	23 (7.6%)	23 (41.1%)
70–		
Unknown	13 (4.3%)	3 (5.4%)
Total	301	56
Median (min–max)	40.0 (3.0–66.6)	50.5 (16.0–66.0)

**Fig. 4** Survival of patients treated with chemotherapy and/or radiotherapy

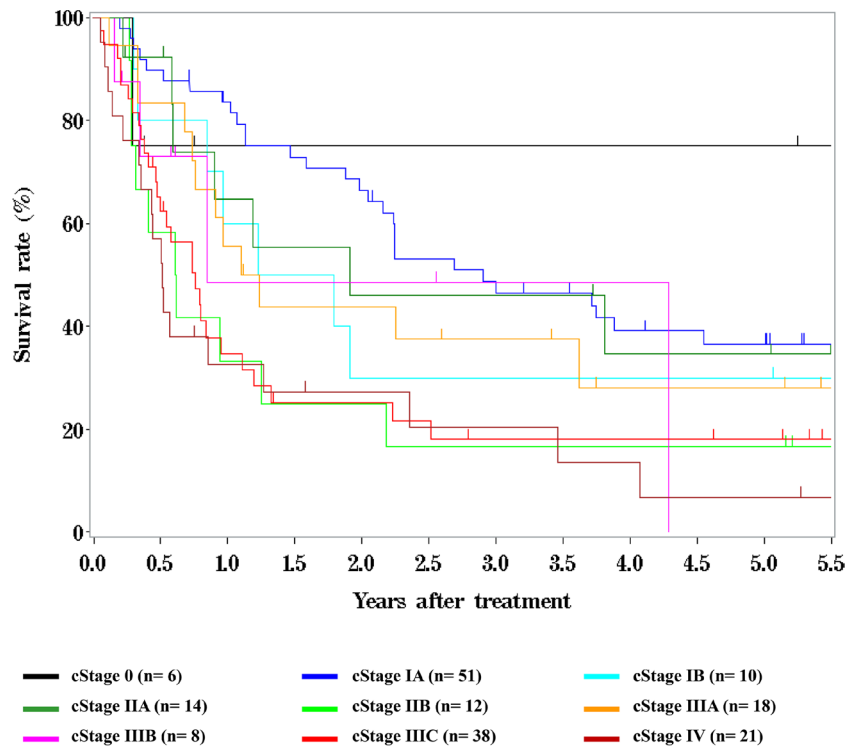


**Fig. 5** Survival of patients treated with definitive chemoradiotherapy according to clinical stage (UICC TNM 7th)



	Years after treatment				
	1	2	3	4	5
cStage 0	85.7%	-	-	-	-
cStage IA	95.7%	83.1%	75.0%	66.4%	63.2%
cStage IB	88.5%	72.4%	63.9%	59.6%	59.6%
cStage IIA	82.9%	52.2%	46.0%	42.8%	42.8%
cStage IIB	82.1%	67.5%	56.4%	51.9%	51.9%
cStage IIIA	70.4%	49.9%	44.3%	39.4%	30.6%
cStage IIIB	69.6%	48.2%	38.9%	35.2%	22.0%
cStage IIIC	56.5%	34.0%	27.4%	25.8%	22.9%
cStage IV	55.7%	26.8%	16.8%	-	-

**Fig. 6** Survival of patients treated with radiotherapy alone according to clinical stage (UICC TNM 7th)



	Years after treatment				
	1	2	3	4	5
cStage 0	75.0%	75.0%	75.0%	75.0%	75.0%
cStage IA	83.6%	66.4%	46.6%	39.2%	36.6%
cStage IB	60.0%	30.0%	30.0%	30.0%	30.0%
cStage IIA	64.6%	46.2%	46.2%	34.6%	34.6%
cStage IIB	33.3%	25.0%	16.7%	16.7%	16.7%
cStage IIIA	55.6%	43.8%	37.5%	28.1%	28.1%
cStage IIIB	48.6%	48.6%	48.6%	48.6%	0.0%
cStage IIIC	34.7%	25.2%	18.0%	18.0%	18.0%
cStage IV	32.7%	27.2%	20.4%	13.6%	6.8%

**IV. Results in patients who underwent esophagectomy in 2012**

Tables 14,15,16,17,18,19,20,21,22 23,24,25,26,27, and Figs. 7, 8, 9, 10, 11, 12, 13, 14, 15.

**Table 14** Treatment modalities of esophagectomy

Treatments	Cases (%)
Esophagectomy	1792 (38.0%)
Esophagectomy + endoscopic treatment	123 (2.6%)
Esophagectomy + chemoradiotherapy	806 (17.1%)
Concurrent chemoradiotherapy	557 (11.8%)
Other	249 (5.3%)
Esophagectomy + chemoradiotherapy + endoscopic treatment	24 (0.5%)
Esophagectomy + chemoradiotherapy + other treatment	1 (0.0%)
Esophagectomy + radiotherapy	67 (1.4%)
Preoperative	15 (0.3%)
Postoperative	23 (0.5%)
Recurrence	4 (0.1%)
Other	25 (0.5%)
Esophagectomy + chemotherapy	1886 (39.9%)
Preoperative	1473 (31.2%)
Postoperative	253 (5.4%)
Recurrence	52 (1.1%)
Other	108 (2.3%)
Esophagectomy + chemotherapy + endoscopic treatment	21 (0.4%)
Esophagectomy + chemotherapy + other treatment	1 (0.0%)
Esophagectomy + other treatment	1 (0.0%)
Total	4722

**Table 15** Tumor location

Locations	Cases (%)
Cervical	152 (3.2%)
Upper thoracic	581 (12.3%)
Middle thoracic	2151 (45.6%)
Lower thoracic	1344 (28.5%)
<i>E &gt; G</i>	356 (7.5%)
<i>E = G</i>	56 (1.2%)
<i>G &gt; E</i>	59 (1.2%)
Unknown	23 (0.5%)
Total lesions	4722

**Table 17** Video-assisted surgery

Video-assisted surgery	Cases (%)
None	2623 (55.5%)
Thoracoscopy	983 (20.8%)
Thoracoscopy + laparoscopy	712 (15.1%)
Thoracoscopy + laparoscopy + mediastinoscopy	3 (0.1%)
Thoracoscopy + laparoscopy + other	1 (0.0%)
Thoracoscopy + mediastinoscopy	3 (0.1%)
Thoracoscopy + other	2 (0.0%)
Laparoscopy	218 (4.6%)
Laparoscopy + mediastinoscopy	11 (0.2%)
Laparoscopy + mediastinoscopy + other	13 (0.3%)
Mediastinoscopy	41 (0.9%)
Others	107 (2.3%)
Unknown	5 (0.1%)
Total	4722

**Table 16** Approaches to tumor resection

Approaches	Cases (%)
Cervical approach	83 (1.8%)
Right thoracic	4070 (86.2%)
Left thoracic	81 (1.7%)
Left thoracoabdominal	80 (1.7%)
Abdominal	173 (3.7%)
Transhiatal thoracic esophagectomy	59 (1.2%)
Transhiatal lower esophagectomy	115 (2.4%)
Sternotomy	9 (0.2%)
Others	25 (0.5%)
Unknown	27 (0.6%)
Total	4722

Thoracic includes thoracotomy and thoracoscopic

Abdominal includes laparotomy and laparoscopic

**Table 18** Fields of lymph node dissection according to the location of the tumor

Field of lymphadenectomy	Cervical	Upper thoracic	Middle thoracic	Lower thoracic	E > G	E = G	G > E	Unknown	Total
None	19 (12.5%)	27 (4.6%)	81 (3.8%)	39 (2.9%)	17 (4.8%)	3 (5.4%)	1	1 (4.3%)	188 (4.0%)
C	40 (26.3%)	8 (1.4%)	8 (0.4%)	5 (0.4%)	0 (0.0%)				61 (1.3%)
C+UM	16 (10.5%)	3 (0.5%)	3 (0.1%)	2 (0.1%)		1 (1.8%)		1	26 (0.6%)
C+UM+MLM	11 (7.2%)	25 (4.3%)	43 (2.0%)	18 (1.3%)	1 (0.3%)				98 (2.1%)
C+UM+MLM+A	45 (29.6%)	369 (63.5%)	1103 (51.3%)	506 (37.6%)	39 (11.0%)	3 (5.4%)	1 (1.7%)	6 (26.1%)	2072 (43.9%)
C+UM+MLM+A+OT	1 (0.1%)								1 (0.0%)
C+UM+A	3 (2.0%)	5 (0.9%)	1 (0.0%)	2 (0.1%)					11 (0.2%)
C+MLM			1 (0.0%)	1 (0.1%)					2 (0.0%)
C+MLM+A		4 (0.3%)	7 (0.3%)	5 (0.4%)	1 (0.3%)				17 (0.4%)
C+A	2 (1.3%)		4 (0.2%)	1 (0.1%)					7 (0.1%)
UM			5 (0.2%)	2 (0.1%)	3 (0.8%)				10 (0.2%)
UM+MLM	1 (0.7%)	11 (1.9%)	33 (1.5%)	14 (1.0%)	4 (1.1%)			2 (8.7%)	65 (1.4%)
UM+MLM+A	10 (6.6%)	110 (18.9%)	768 (35.7%)	595 (44.3%)	115 (32.3%)	11 (19.6%)	7 (11.9%)	8 (34.8%)	1624 (34.4%)
UM+MLM+A+OT			1 (0.1%)						1 (0.0%)
UM+A			7 (0.3%)	3 (0.2%)	1 (0.3%)				11 (0.2%)
MLM		1 (0.2%)	9 (0.4%)	7 (0.5%)	4 (1.1%)				21 (0.4%)
MLM+A		8 (1.4%)	45 (2.1%)	105 (7.8%)	129 (36.2%)	26 (46.4%)	27 (45.8%)	2 (8.7%)	342 (7.2%)
A	1 (0.7%)	3 (0.5%)	21 (1.0%)	29 (2.2%)	40 (11.2%)	9 (16.1%)	23 (39.0%)	1 (4.3%)	127 (2.7%)
A+OT				1 (0.1%)					1 (0.0%)
Unknown	4 (2.6%)	6 (1.0%)	11 (0.5%)	9 (0.7%)	2 (0.6%)	3 (5.4%)		2 (8.7%)	37 (0.8%)
Total	152	581	2151	1344	356	56			4722

C bilateral cervical nodes, UM upper mediastinal nodes, MLM middle-lower mediastinal nodes, A abdominal nodes

**Table 19** Reconstruction route

Route	Cases (%)
None	66 (1.4%)
Subcutaneous	414 (8.8%)
Retrosternal	1799 (38.1%)
Posterior mediastinal	519 (11.0%)
Intrathoracic	1794 (38.0%)
Cervical	46 (1.0%)
Others	49 (1.0%)
Unknown	35 (0.7%)
Total	4722

**Table 20** Organs used for reconstruction

Organs used for reconstruction	Cases (%)
None	62 (1.3%)
Whole stomach	49 (1.0%)
Gastric tube	4057 (85.0%)
Jejunum	286 (6.0%)
Free jejunum	94 (2.0%)
Colon	157 (3.3%)
Free colon	12 (0.3%)
Others	24 (0.5%)
Unknown	33 (0.7%)
Total organs	4774
Total cases	4722

**Table 21** Histological classification

Histological classification	Cases (%)
Squamous cell carcinoma	3990 (84.5%)
Squamous cell carcinoma	973 (20.6%)
Well differentiated	713 (15.1%)
Moderately differentiated	1788 (37.9%)
Poorly differentiated	516 (10.9%)
Adenocarcinoma	239 (5.1%)
Barrett's adenocarcinoma	109 (2.3%)
Adenosquamous carcinoma	30 (0.6%)
Mucoepidermoid carcinoma	5 (0.1%)
Adenoid cystic carcinoma	3 (0.1%)
Basaloid carcinoma	81 (1.7%)
Neuroendocrine cell tumor	21 (0.4%)
Undifferentiated carcinoma	12 (0.3%)
Other carcinoma	6 (0.1%)
Carcinosarcoma	36 (0.8%)
Malignant melanoma	11 (0.2%)
GIST	1 (0.0%)
Other	46 (1.0%)
Unknown	132 (2.8%)
Total	4722

**Table 22** Pathological depth of tumor invasion, pT (JES 10th)

Pathological depth of tumor invasion	Cases (%)
pTX	71 (1.5%)
pT0	156 (3.3%)
pTis	33 (0.7%)
pT1a	503 (10.7%)
pT1b	1256 (26.6%)
pT2	570 (12.1%)
pT3	1824 (38.6%)
pT4	20 (0.4%)
pT4a	147 (3.1%)
pT4b	103 (2.2%)
Unknown	39 (0.8%)
Total	4722

**Table 23** Pathological grading of lymph node metastasis, pN (JES 10th)

Lymph node metastasis	Cases (%)
pN0	2237 (47.4%)
pN1	626 (13.3%)
pN2	1172 (24.8%)
pN3	393 (8.3%)
pN4	226 (4.8%)
Unknown	68 (1.4%)
Total	4722

**Table 24** Pathological findings of lymph node metastasis, pN (UICC 7th)

Lymph node metastasis	Cases (%)
pN0	2164 (45.8%)
pN1 (1-2)	1265 (26.8%)
pN2 (3-6)	790 (16.7%)
pN3 (7-)	392 (8.3%)
Unknown	111 (2.4%)
Total	4722

Regional lymph nodes are different in JES 10th and UICC 7th  
Data for Tables 23 and 24 were analyzed from different variables in the registration application (Tables 25, 26, 27)



**Table 25** Pathological findings of distant organ metastasis, pM (JES 10th)

Distant metastasis	Cases (%)
pMX	172 (3.6%)
pM0	4490 (95.1%)
pM1	60 (1.3%)
Total	4722

**Table 26** Residual tumor

Residual tumor	Cases (%)
RX	156 (3.3%)
R0	4160 (88.1%)
R1	216 (4.6%)
R2	190 (4.0%)
Total	472

**Table 27** Causes of death

Cause of death	Cases (%)
Death due to recurrence	1383 (71.5%)
Death due to other cancer	101 (5.2%)
Death due to other disease (with recurrence)	46 (2.4%)
Death due to other disease (without recurrence)	244 (12.6%)
Death due to other disease (recurrence unknown)	19 (1.0%)
Operative death <sup>a</sup>	25 (1.3%)
Postoperative hospital death <sup>b</sup>	40 (2.1%)
Unknown	77 (4.0%)
Total of death cases	1935

Operative mortality rate: 0.52%

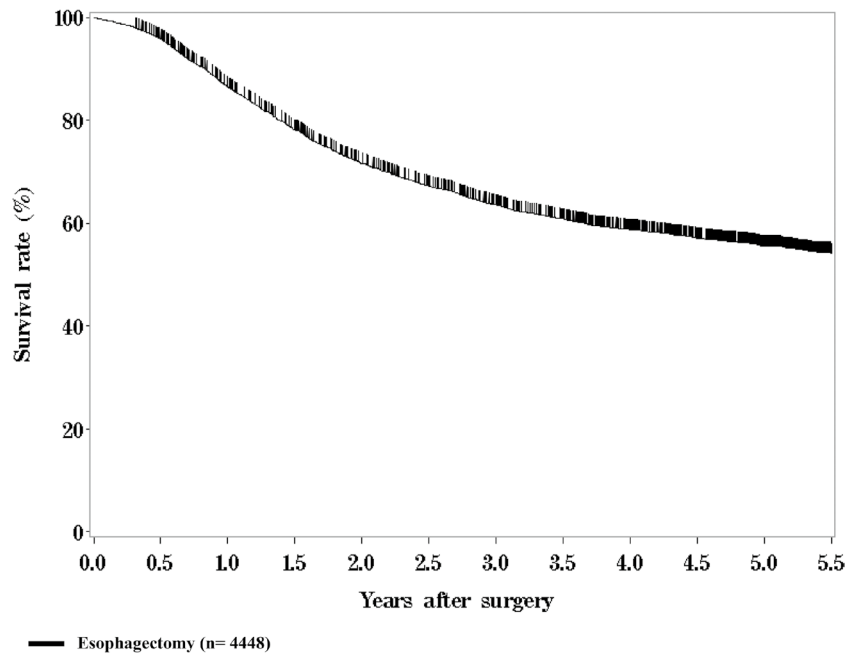
Hospital mortality rate: 2.35%

<sup>a</sup>Operative death means death within 30 days after operation in or out of hospital

<sup>b</sup>Hospital death is defined as death during the same hospitalization, regardless of department at time of death

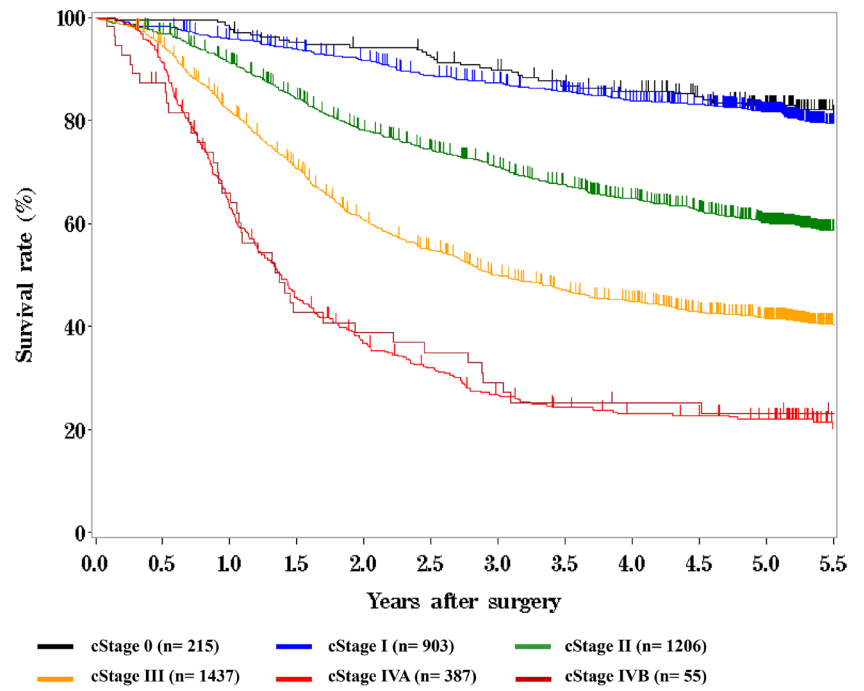
Follow-up period (months)	
Median (min - max)	46.74 (0.03 - 139.79)

**Fig. 7** Survival of patients who underwent esophagectomy



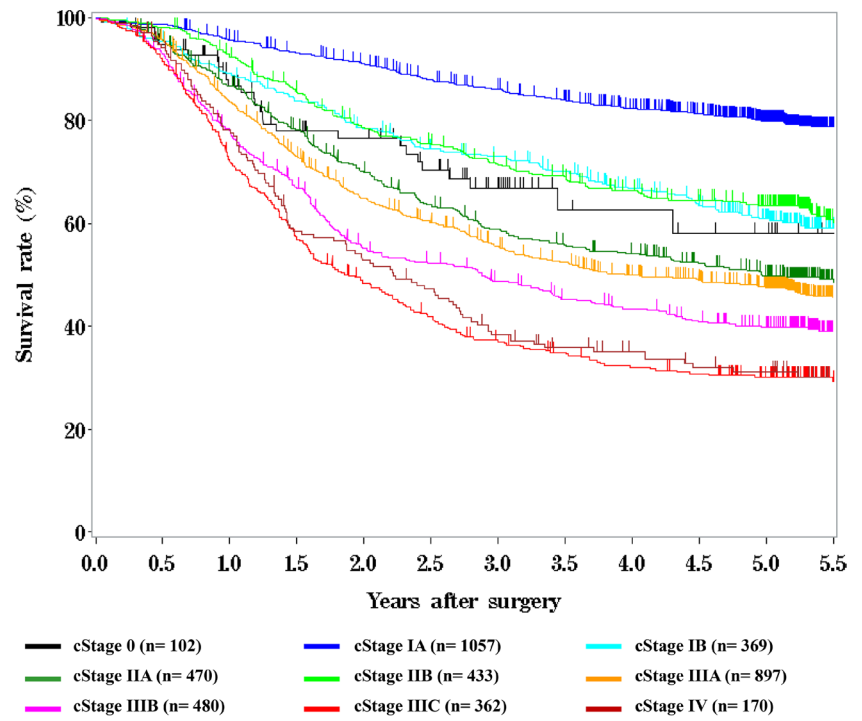
	Years after surgery				
	1	2	3	4	5
Esophagectomy	86.4%	71.6%	63.5%	58.8%	55.6%

**Fig. 8** Survival of patients who underwent esophagectomy according to clinical stage (JES 10th)



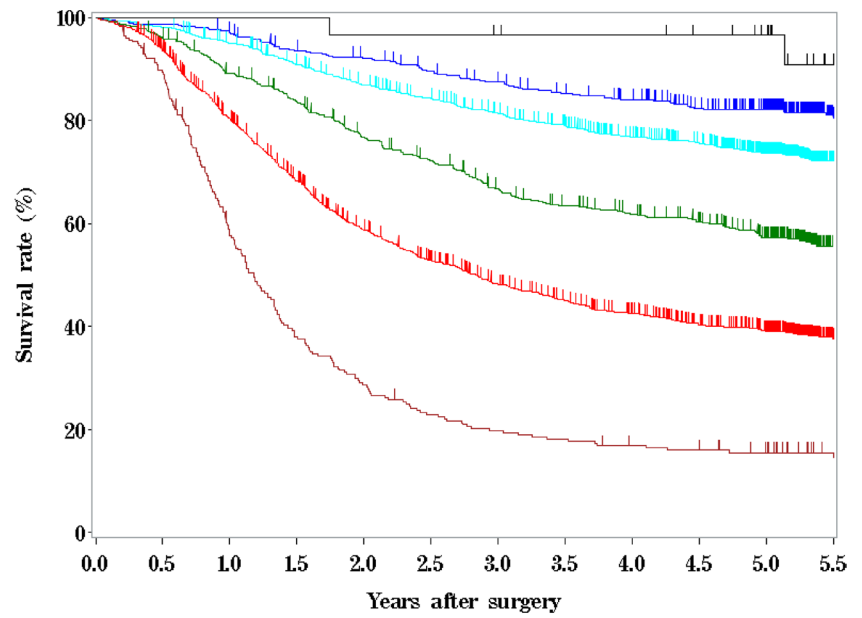
	Years after surgery				
	1	2	3	4	5
cStage 0	98.1%	94.2%	89.8%	85.7%	82.9%
cStage I	95.8%	91.6%	87.3%	83.9%	81.6%
cStage II	91.2%	78.1%	71.0%	64.9%	60.1%
cStage III	81.8%	60.7%	49.9%	44.9%	41.6%
cStage IVA	63.1%	36.8%	26.6%	23.0%	22.0%
cStage IVB	66.0%	38.8%	29.1%	25.2%	23.1%

**Fig. 9** Survival of patients who underwent esophagectomy according to clinical stage (UICC 7th)



	Years after surgery				
	1	2	3	4	5
cStage 0	86.8%	76.5%	66.8%	62.6%	58.1%
cStage IA	95.5%	91.0%	86.0%	82.3%	79.9%
cStage IB	89.1%	78.3%	72.9%	66.7%	60.9%
cStage IIA	86.6%	69.9%	58.9%	54.2%	49.8%
cStage IIB	92.2%	78.7%	71.5%	66.5%	63.5%
cStage IIIA	83.6%	64.9%	55.6%	49.9%	47.5%
cStage IIIB	78.0%	55.1%	48.7%	43.5%	39.9%
cStage IIIC	72.1%	48.7%	37.0%	32.1%	30.1%
cStage IV	78.2%	52.9%	38.4%	35.1%	31.2%

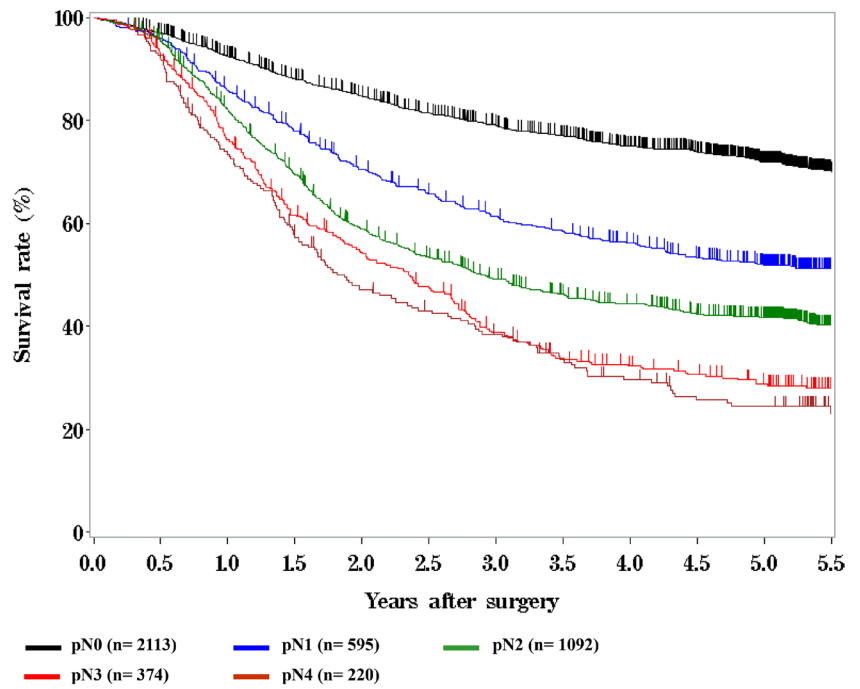
**Fig. 10** Survival of patients who underwent esophagectomy according to the depth of tumor invasion, pT (JES 10th)



— pTis (n= 31)      — pT1a (n= 479)      — pT1b (n= 1189)  
— pT2 (n= 537)      — pT3 (n= 1720)      — pT4 (n= 254)

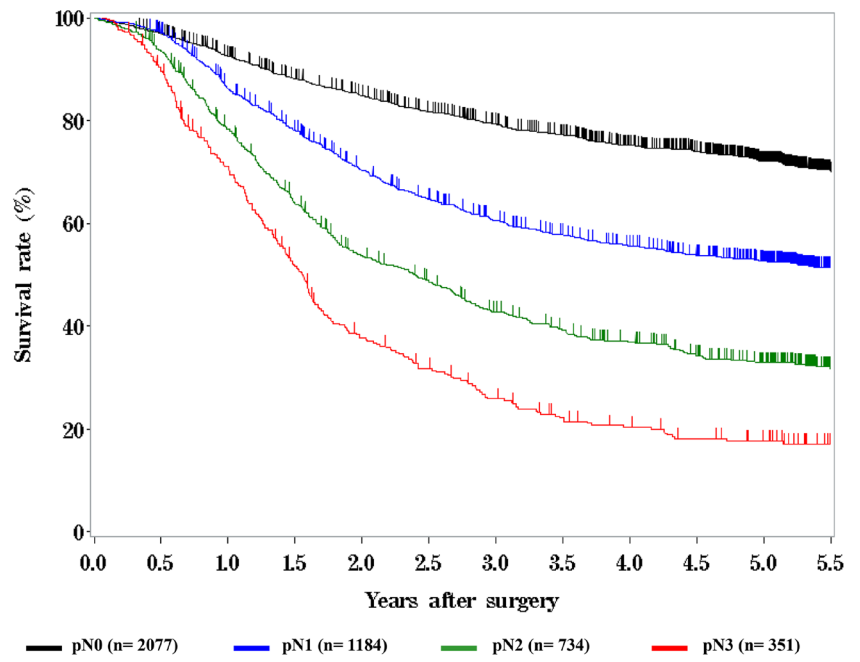
	Years after surgery				
	1	2	3	4	5
pTis	100.0%	96.6%	96.6%	96.6%	96.6%
pT1a	97.0%	92.0%	87.4%	84.0%	82.1%
pT1b	95.0%	86.9%	81.5%	76.8%	73.7%
pT2	89.1%	76.7%	66.8%	61.8%	57.3%
pT3	80.3%	58.8%	48.2%	42.6%	39.1%
pT4	57.7%	28.7%	19.7%	16.8%	15.5%

**Fig. 11** Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (JES 10th)



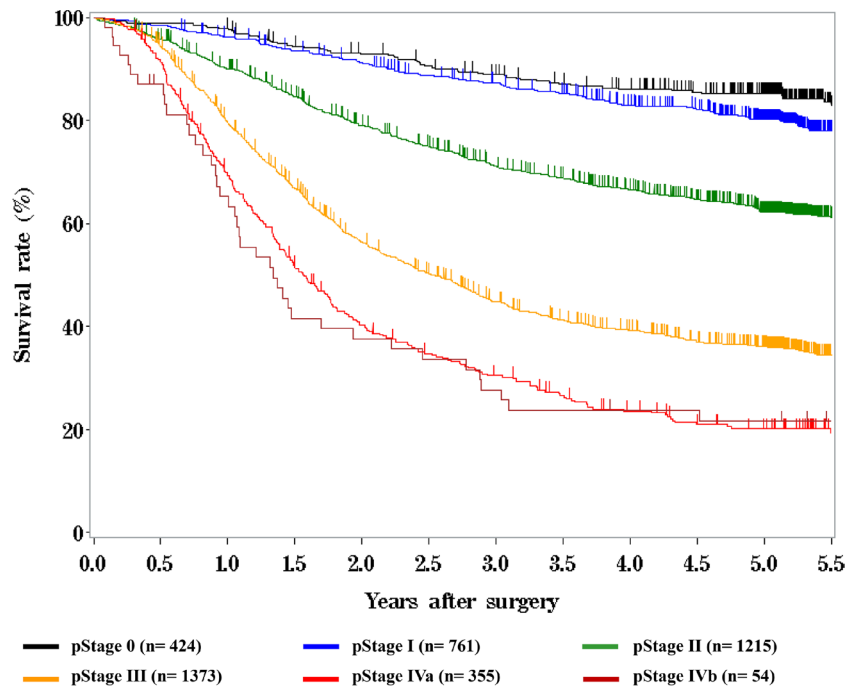
	Years after surgery				
	1	2	3	4	5
pN0	92.4%	84.7%	79.1%	75.0%	72.0%
pN1	85.8%	70.5%	61.3%	56.1%	52.0%
pN2	82.1%	58.8%	49.2%	44.3%	41.7%
pN3	76.4%	54.3%	38.8%	32.4%	28.9%
pN4	73.5%	47.0%	38.5%	29.7%	24.4%

**Fig. 12** Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (UICC 7th)



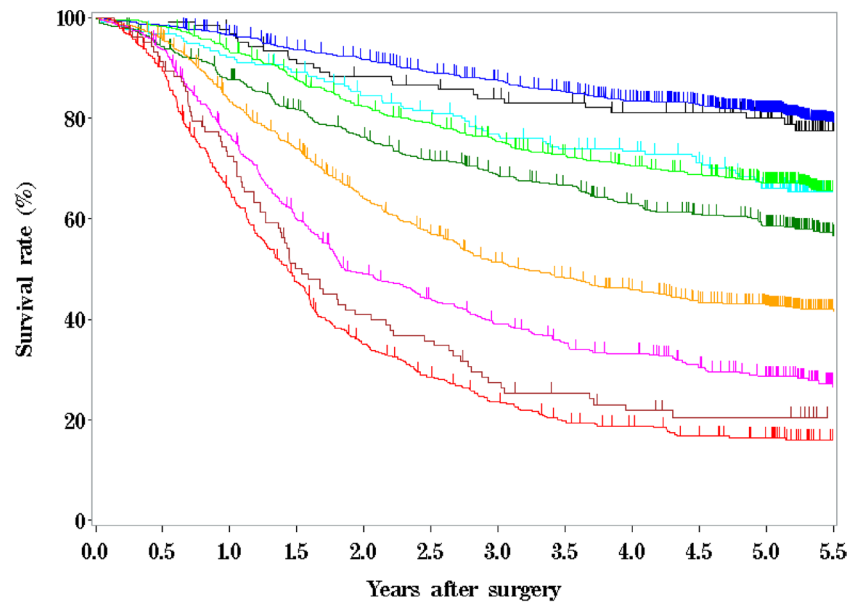
	Years after surgery				
	1	2	3	4	5
pN0	92.4%	84.8%	79.4%	75.2%	72.1%
pN1	86.2%	70.3%	60.6%	55.7%	52.6%
pN2	78.5%	53.7%	42.8%	37.0%	33.0%
pN3	71.0%	37.8%	25.9%	20.4%	17.7%

**Fig. 13** Survival of patients who underwent esophagectomy according to pathological stage (JES 10th)



	Years after surgery				
	1	2	3	4	5
pStage 0	97.8%	92.9%	88.9%	86.1%	85.2%
pStage I	96.1%	91.3%	87.4%	83.0%	80.2%
pStage II	90.0%	79.1%	71.1%	66.6%	62.3%
pStage III	79.5%	56.3%	44.8%	39.3%	36.1%
pStage IVa	69.3%	40.2%	30.5%	23.6%	20.1%
pStage IVb	65.3%	37.6%	27.7%	23.7%	21.6%

**Fig. 14** Survival of patients who underwent esophagectomy according to pathological stage (UICC TNM 7th)

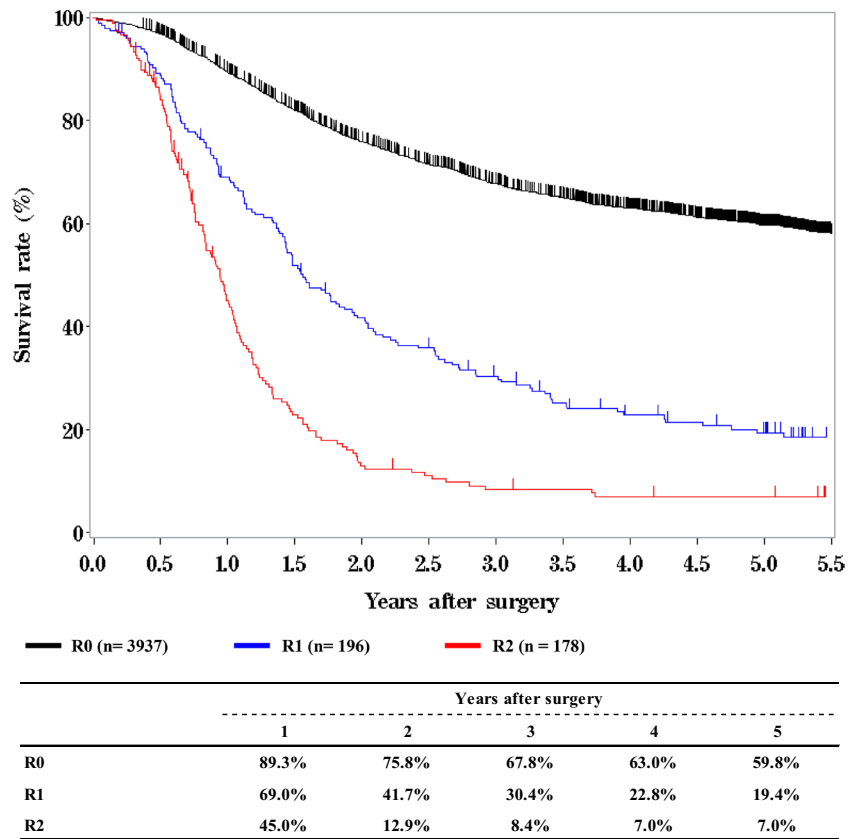


pStage 0 (n= 122)     
  pStage IA (n= 1144)     
  pStage IB (n= 216)  
 pStage IIA (n= 480)     
  pStage IIB (n= 580)     
  pStage IIIA (n= 771)  
 pStage IIIB (n= 453)     
  pStage IIIC (n= 455)     
  pStage IV (n= 104)

	Years after surgery				
	1	2	3	4	5
pStage 0	96.7%	88.2%	83.9%	81.1%	80.0%
pStage IA	96.5%	91.7%	87.6%	83.4%	81.4%
pStage IB	92.1%	84.4%	76.9%	73.3%	66.1%
pStage IIA	87.7%	76.2%	68.5%	63.0%	58.6%
pStage IIB	93.2%	82.3%	75.4%	70.4%	67.2%
pStage IIIA	83.3%	64.1%	51.3%	46.0%	42.9%
pStage IIIB	76.5%	49.0%	39.2%	33.2%	28.7%
pStage IIIC	65.6%	35.0%	23.6%	18.8%	16.5%
pStage IV	72.3%	40.9%	27.5%	21.8%	20.5%



**Fig. 15** Survival of patients who underwent esophagectomy according to residual tumor (R)



**Compliance with ethical standards**

**Ethical Statement** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964 and later versions.

**Informed consent** Informed consent or substitute for it was obtained from all patients for being included in the study.

**Conflict of interest** All authors have nothing to disclose with regard to commercial support.

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