

# Systematic Literature Review of First-Line Treatments of Patients With Advanced or Metastatic HER2-Positive Gastroesophageal Adenocarcinoma

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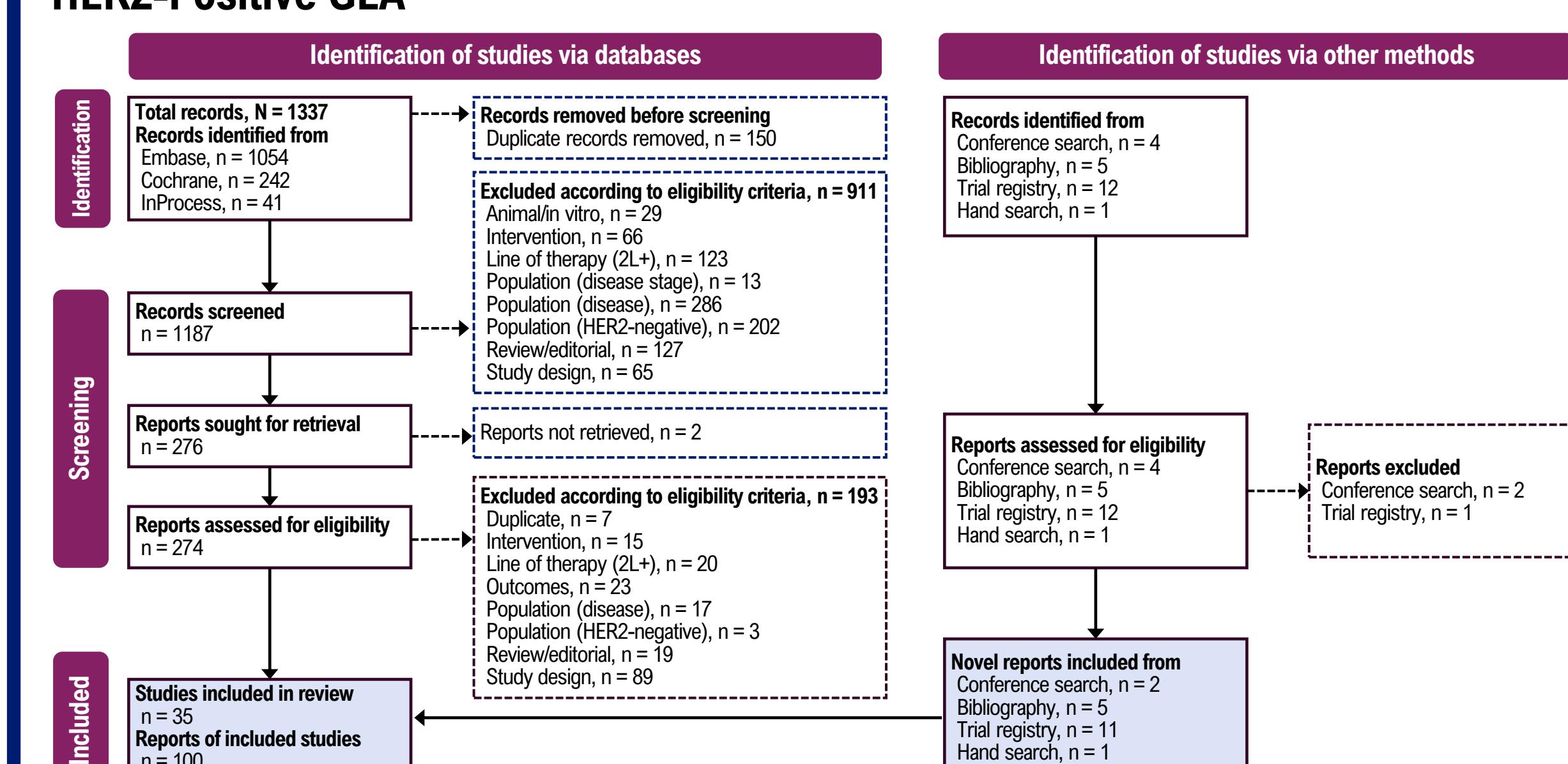
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## Background

- Gastroesophageal adenocarcinoma (GEA) is a subset of gastroesophageal carcinoma (GEC) that comprises adenocarcinomas arising in the stomach (gastric), esophagus, and gastroesophageal junction (GEJ). By anatomical subtype, an estimated 95% of gastric cancers and 65% of esophageal/GEJ cancers are adenocarcinomas.<sup>1,2</sup>
- At an advanced or metastatic stage, they are considered sufficiently similar to be grouped together for treatment recommendations in clinical guidelines.<sup>3</sup>
- Approximately 20% of patients with GEA have human epidermal growth factor receptor 2 (HER2)-positive tumors. Since 2010, the first-line treatment of choice for HER2-positive GEA has been a combination of platinum-based chemotherapy and trastuzumab/pembrolizumab.
- The increasing incidence of GEA over time, along with recent developments in HER2-positive GEA, makes it pertinent to assess the clinical evidence and inform future comparative effectiveness research for innovative treatments in patients with this disease.

## Results

**Figure 1. PRISMA Flow Diagram for Clinical Studies of Patients With HER2-Positive GEA**



- Database searches identified 1337 potentially relevant records. Additionally, 19 records were included from bibliographic searching, hand-searching of conference proceedings, and registry searches. After screening, 100 publications reporting data from 35 studies in patients with HER2-positive GEA were included in the SLR.
- Among the 35 included studies, only 2 studies included patients with programmed death-ligand 1 (PD-L1) overexpression.<sup>5,6</sup>
- A total of 10 randomized controlled trials (RCTs), 22 single-arm studies, and 3 non-RCTs (nRCTs) were included, with most being phase 2 trials (26 studies).
- The median age of study participants ranged from 57 years<sup>7,8</sup> to 68 years.<sup>9</sup> The study participants were predominantly male in all reported studies, with the percentage of male participants varying from 66%<sup>10</sup> to 100%.<sup>11</sup>

**Table 1. OS and PFS Data for Patients With HER2-Positive GEA in RCTs**

Study	Study Setting	Intervention	Median Follow-Up, Months	Evaluable N	OS Estimates		PFS Estimates	
					Median OS (95% CI) Months	HR (95% CI)	Median PFS (95% CI) Months	HR (95% CI)
Li 2024 <sup>8</sup>	Phase 2, double-blind, multicenter	HLX22 25 mg/m <sup>2</sup> + HLX02 4 mg/m <sup>2</sup> + CAPOX	14.3	18	NR	0.50 (0.13-0.45)	NR	NR
		HLX22 15 mg/m <sup>2</sup> + HLX02 + CAPOX	14.3	17	NR	0.3 (0.09-0.26)	NR	NR
		Placebo + HLX02 + CAPOX	14.3	18	NR	0.3 (0.64-0.64)	Reference	0.50 (0.17-1.27)
Janjigian 2023 (KEYNOTE-811) <sup>5</sup>	Phase 3, double-blind, multicenter international	Pembrolizumab + trastuzumab + chemo	56	350	20 (17.8-22.1)	0.80 (0.67-0.94)	10 (8.6-12.2)	0.73 (0.61-0.87)
		Placebo + trastuzumab + chemo	56	348	16.8 (14.9-18.7)	NR	8.1 (7.0-8.5)	NR
Tabernero 2023 (JACOB) <sup>12</sup>	Phase 3, double-blind, multicenter international	Pertuzumab + trastuzumab + chemo	OS: 46.1	388	18.1 (16.2-19.5)	0.85 (0.72-0.99)	8.5 (3.3-9.7)	0.73 (0.62-0.85)
		Placebo + trastuzumab + chemo	OS: 44.4	392	14.2 (12.9-15.7)	NR	7.2 (6.4-8.2)	NR
		PFS: 47.4	388	NR	NR	NR	NR	NR
Stein 2022 (INTEGA) <sup>6</sup>	Phase 2, open-label, multicenter	Trastuzumab + nivolumab + nivolumab + FOLFOX	18.8	44	23.3	NR	3.2	NR
		Trastuzumab + nivolumab + nivolumab + FOLFOX	18.8	44	22.1	NR	10.7	NR
Zhao 2022 (SYLT/FNF-004) <sup>13</sup>	Phase 2, open-label, multicenter	ivPOF	41	3	NR	0.50 (0.11-0.23)	NR	0.50 (0.11-0.23)
		ipPOF	41	4	NR	0.17 (0.03-0.16)	NR	0.10 (0.02-0.66)
		mFOLFOX6P	41	3	NR	Reference	NR	Reference
Shah 2017 (HELOISE) <sup>14</sup>	Phase 2, double-blind, multicenter international	High-dose trastuzumab + capecitabine + cisplatin	NR	124	10.61 (9.4-12.42)	1.24 (0.86-1.78)	5.6 (4.8-6.6)	1.04 (0.76-1.40)
Hecht 2016 (TRIO-013/LOGIC) <sup>15</sup>	Phase 3, double-blind, multicenter	CAPOX + lapatinib	23	272	11.9 (10.4-13.8)	0.91 (0.74-1.10)	6.7 (5.6-7.0)	0.82 (0.68-1.00)
		CAPOX + lapatinib	23	273	10.4 (9.1-11.3)	NR	5.4 (4.4-5.7)	NR
Bang 2010 (ToGA) <sup>16</sup>	Phase 3, open-label, multicenter international	Trastuzumab + fluoropyrimidine + cisplatin	18.6	294	13.8 (12-16)	0.74 (0.60-0.91)	6.7 (5.5-8)	0.71 (0.59-0.85)
		Chemo	18.6	290	11.1 (10-13)	NR	5.5 (5-6)	NR

- A summary of overall survival (OS) and progression-free survival (PFS) data was reported in 8 of the 10 included RCTs.
- Since the pivotal trastuzumab trial (ToGA), only 1 RCT has met its primary endpoint, for the combination of pembrolizumab, trastuzumab, and chemotherapy compared to placebo, trastuzumab, and chemotherapy.<sup>5</sup>
- Among the included single-arm studies or nRCTs, 23 studies reported data for OS evaluating trastuzumab in combination with chemotherapy or other targeted agents
  - A study of chemotherapy-only regimens reported the median OS of patients receiving modified docetaxel, cisplatin, and 5-fluorouracil (mDCF) to be 24.9 months.<sup>17</sup>
  - Among the studies investigating HER2-targeted therapies without immuno-oncology (IO) products, median OS ranged from 6.3 months with lapatinib + capecitabine<sup>18</sup> to 36.5 months with zanidatamab + standard chemotherapy<sup>19</sup>
    - The OS rates were also particularly high for zanidatamab + standard chemotherapy, reaching 87% at 12 months, 65% at 24 months, and 59% at 30 months.<sup>19</sup>
  - Among 3 studies that assessed IO-containing regimens + HER2-targeted therapy, median OS ranged from 19.3 months (global phase 3)<sup>20</sup> to 27.3 months (phase 1b/2 in Korea)<sup>21</sup> for pembrolizumab + trastuzumab with chemotherapy while the OS was not reached for the third study, as of December 2021, with the combination of nivolumab, trastuzumab, oxaliplatin and the fluoropyrimidine derivative S1 (tegafur, gimeracil, oteracil potassium)/capecitabine<sup>22</sup>
- Among single-arm studies or nRCTs, 24 reported data for PFS evaluating trastuzumab with chemotherapy or other targeted agents
  - A study of chemotherapy-only regimens reported the median PFS of patients receiving mDCF to be 13 months.<sup>17</sup>
  - Among the studies investigating HER2-targeted therapies without an IO product, median PFS ranged from 4.3 months with lapatinib + capecitabine<sup>18</sup> to 14 months with capecitabine and oxaliplatin (CAPOX) + bevacizumab + trastuzumab.<sup>23</sup> A median PFS of 12.5 months was reported for zanidatamab + standard chemotherapy over a median follow-up of 48 months.<sup>19</sup>
  - In IO-containing regimens, often combined with HER2-targeted therapy, median PFS ranged from 8.6 months for pembrolizumab + trastuzumab with capecitabine and cisplatin<sup>20</sup> to 16.7 months with the combination of zanidatamab, tisletuzumab (an anti-programmed cell death protein 1 [PD-1] immune checkpoint inhibitor), and CAPOX<sup>24</sup>
- Overall response rate (ORR) was reported in 9 RCTs and ranged from 34% with trastuzumab + nivolumab + ipilimumab<sup>6</sup> to 82.4% with HLX22 + HLX02 + CAPOX<sup>8</sup>.
- ORR was also reported in 23 single-arm studies and nRCTs, with results varying across different treatment combinations from 13% with lapatinib + capecitabine<sup>18</sup> to 93.8% observed with trastuzumab + docetaxel/oxaliplatin S1<sup>25</sup>.
- Duration of response (DOR) was reported in 6 RCTs and ranged from 5.8 months with trastuzumab + nivolumab + ipilimumab<sup>6</sup> to 12.4 months with 25 mg/kg HLX22 + HLX02 + CAPOX<sup>8</sup>.
- DOR was reported in 10 single-arm studies and nRCTs, with results varying across different treatment combinations
  - Among the studies investigating HER2-targeted therapies without IO, DOR ranged from 7.3 months with trastuzumab + S1 + cisplatin<sup>26</sup> to 20.4 months with zanidatamab + CAPOX<sup>19</sup>
  - Among the IO-containing regimens, combined with HER2-targeted therapy, the DOR ranged from 9.4 months with pembrolizumab + trastuzumab + chemotherapy<sup>21</sup> to 22.8 months for zanidatamab combined with tisletuzumab and CAPOX<sup>4</sup>

## Objective

- To summarize the available evidence on clinical efficacy and safety among treatment-naïve patients with unresectable/inoperable advanced or metastatic HER2-positive GEA to inform future pharmacoeconomic research

## Methods

- The systematic literature review (SLR) followed the Cochrane and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards.<sup>4</sup>
- A systematic literature search was conducted from the start of the database to the cutoff date of August 16, 2024, covering Embase, MEDLINE, MEDLINE In-Process, and the Cochrane Library. Additionally, bibliographic searching, hand searching of conference proceedings (2022-2024), and registry searches were also conducted
- The literature search results were screened according to the predefined inclusion criteria, first by title and abstract, and then by full text
- Screening (both title/abstract and full text) was performed by two independent reviewers, and any discrepancies were resolved by a third independent reviewer
- Studies included from the full-text screening were extracted into predefined extraction grids by a single reviewer, and all extractions were verified against the original sources by a second reviewer

**Table 2. OS and PFS Data in Patients With HER2-Positive GEA and PD-L1 Overexpression**

Study	Population	Intervention	Median Follow-Up, Months	Evaluable N	OS Estimates		PFS Estimates			
					Median OS (95% CI) Months	n (%)	HR (95% CI)	Median PFS (95% CI) Months	n (%)	HR (95% CI)
Janjigian 2023 (KEYNOTE-811) <sup>5</sup>	PD-L1 CPS ≥1	Pembrolizumab + trastuzumab + chemo	56	298	20.1 (17.9-22.9)	NR	0.79 (0.66-0.95)	10.9 (8.5-12.5)	NR	0.72 (0.60-0.87)
		Placebo + trastuzumab + chemo	56	296	15.7 (13.5-18.5)	NR	NR	7.3 (6.8-8.4)	NR	NR
		Pembrolizumab + trastuzumab + chemo	NR	186	20.8 (18.1-24.5)	NR	0.76 (0.59-0.96)	10.9 (8.3-13.0)	NR	0.72 (0.57-0.92)
Stein 2022 (INTEGA) <sup>6</sup>	HER2-positive and PD-L1 CPS ≥1	Placebo + trastuzumab + chemo	NR	171	16.0 (13.7-19.9)	NR	NR	8.1 (6.8-9.7)	NR	NR
		Trastuzumab + nivolumab + ipilimumab	14.3	31	16.4 (15.4-17.4)	17 (54)	2.2 (1.4-3.4)	NR	4 (14)	NR
		Trastuzumab + nivolumab + FOLFOX	14.3	28	21.6 (19.8-23.4)	20 (71)	10.7 (9.3-13.0)	NR	9 (33)	NR
Stein 2022 (INTEGA) <sup>6</sup>	HER2-positive and PD-L1 CPS ≥3	Trastuzumab + nivolumab + ipilimumab	14.3	24	12.6 (7.7-NE)	NR	NR	NR	NR	NR
		Trastuzumab + nivolumab + FOLFOX	14.3	22	21.9 (12.9-NE)	NR	NR	NR	NR	NR
		Trastuzumab + nivolumab + FOLFOX	14.3	33	32.2 (21.9-NE)	NR	NR	NR	NR	NR

Chemo, chemotherapy; CPS, combined positive score; FOLFOX, folinic acid, 5-fluorouracil, and oxaliplatin; GEA, gastroesophageal adenocarcinoma; HER2, human epidermal growth factor receptor 2; HR, hazard ratio; NE, not estimable; NR, not reported; OS, overall survival; PD-L1, programmed death-ligand 1; PFS, progression-free survival.

- Only 2 RCTs (and no other studies) reported subgroup data in patients with HER2-positive GEA and PD-L1 overexpression.<sup>5,6</sup>
- A phase 3 RCT demonstrated that the anti-PD-1 antibody pembrolizumab + trastuzumab and chemotherapy significantly improved OS and PFS vs trastuzumab and chemotherapy alone in the subset of patients with HER2-positive gastric/GEJ cancer and a