To estimate the **Potential Peak Sales** for pembrolizumab (Keytruda) in the indication of first-line treatment of locally advanced unresectable or metastatic HER2-positive gastric or gastroesophageal junction (GEJ) adenocarcinoma with PD-L1 expression (CPS ≥1) in the US, EU5 (Germany, France, Italy, Spain, UK), China, and Japan, as well as the **$ value of a 1% share of treated patients** in these geographies, we need to follow a structured approach. Since exact data on patient populations, pricing, and market dynamics may not be fully available, I will make reasonable assumptions based on publicly available information, epidemiology data, and market trends for oncology drugs. The analysis will be broken into steps.

Step 1: Define the Target Patient Population

The indication is for first-line treatment of HER2-positive gastric or GEJ adenocarcinoma with PD-L1 expression (CPS ≥1). We need to estimate the number of eligible patients in each geography.

Epidemiology of Gastric and GEJ Cancer:

- **Incidence of gastric cancer** (including GEJ) varies by region:

- **US**: ~27,000 new cases annually (SEER data).

- **EU5**: ~60,000 new cases annually (combined estimate based on GLOBOCAN).

- **China**: ~400,000 new cases annually (highest incidence globally, GLOBOCAN).

- **Japan**: ~130,000 new cases annually (GLOBOCAN).

- **HER2-positive subset**: Approximately 15-20% of gastric/GEJ cancers are HER2-positive.

- **PD-L1 expression (CPS ≥1)**: Around 40-60% of gastric/GEJ cancers express PD-L1 at CPS ≥1 (based on clinical trial data for pembrolizumab).

- **Locally advanced unresectable or metastatic**: About 50-60% of gastric/GEJ cancer patients present with advanced or metastatic disease at diagnosis.

Eligible Patient Population (First-Line Treatment):

Assuming:

- 17.5% of cases are HER2-positive (midpoint of 15-20%).

- 50% of cases have PD-L1 CPS ≥1 (midpoint of 40-60%).

- 55% of cases are advanced/metastatic (midpoint of 50-60%).

We calculate the eligible population as a percentage of total incidence:

- Eligible % = 17.5% (HER2+) × 50% (PD-L1+) × 55% (advanced/metastatic) = ~4.8% of total gastric/GEJ cancer incidence.

Now, estimate the number of eligible patients:

- **US**: 27,000 × 4.8% = ~1,300 patients.

- **EU5**: 60,000 × 4.8% = ~2,900 patients.

- **China**: 400,000 × 4.8% = ~19,200 patients.

- **Japan**: 130,000 × 4.8% = ~6,200 patients.

- **Total**: ~29,600 patients across these geographies.

Share of Treated Patients (20-30%):

Assuming pembrolizumab captures 20-30% of the eligible treated population:

- **Midpoint (25%) treated patients**:

- US: 1,300 × 25% = 325 patients.

- EU5: 2,900 × 25% = 725 patients.

- China: 19,200 × 25% = 4,800 patients.

- Japan: 6,200 × 25% = 1,550 patients.

- Total: ~7,400 patients.

Step 2: Estimate Annual Cost of Treatment per Patient

Pembrolizumab pricing varies by region due to differences in healthcare systems, negotiations, and discounts. The drug is typically administered every 3 weeks at a dose of 200 mg (flat dose). Annual cost estimates are based on reported figures and market insights:

- **US**: ~$150,000 per patient per year (based on list price; actual net price may be lower due to rebates).

- **EU5**: ~$80,000-$100,000 per patient per year (varies by country; using $90,000 as average).

- **Japan**: ~$80,000 per patient per year (similar to EU pricing after adjustments).

- **China**: ~$40,000 per patient per year (lower due to price negotiations and inclusion in National Reimbursement Drug List with significant discounts).

Duration of Treatment:

In first-line gastric/GEJ cancer, median progression-free survival (PFS) with pembrolizumab + chemo is around 6-9 months (based on KEYNOTE-590 and KEYNOTE-811 trial data). However, some patients may continue treatment for 1-2 years if they respond well. We assume an **average treatment duration of 1 year** for simplicity.

Step 3: Calculate Potential Peak Sales

Peak sales are calculated as:

Peak Sales = Number of Treated Patients × Annual Cost per Patient

Using the 25% midpoint share of treated patients:

- **US**: 325 patients × $150,000 = **$48.8 million**.

- **EU5**: 725 patients × $90,000 = **$65.3 million**.

- **China**: 4,800 patients × $40,000 = **$192.0 million**.

- **Japan**: 1,550 patients × $80,000 = **$124.0 million**.

- **Total Peak Sales**: $48.8M + $65.3M + $192.0M + $124.0M = **$430.1 million annually**.

Range of Peak Sales (20-30% Share):

- At 20% share: Total treated patients = ~5,920 → Peak Sales = ~**$344 million**.

- At 30% share: Total treated patients = ~8,880 → Peak Sales = ~**$516 million**.

Thus, **Potential Peak Sales** range from **$344 million to $516 million annually**, with a midpoint of **$430 million**.

Step 4: Calculate $ Value of 1% Share of Treated Patients

A 1% share of treated patients corresponds to 1% of the eligible population being treated with pembrolizumab.

Eligible population = ~29,600 patients → 1% = ~296 patients.

Now, calculate revenue for 296 patients using the regional pricing:

- **US**: (1,300 × 1%) = 13 patients × $150,000 = **$1.95 million**.

- **EU5**: (2,900 × 1%) = 29 patients × $90,000 = **$2.61 million**.

- **China**: (19,200 × 1%) = 192 patients × $40,000 = **$7.68 million**.

- **Japan**: (6,200 × 1%) = 62 patients × $80,000 = **$4.96 million**.

- **Total Value of 1% Share**: $1.95M + $2.61M + $7.68M + $4.96M = **$17.2 million**.

Thus, the **$ value of a 1% share of treated patients** across these geographies is approximately **$17.2 million annually**.

Final Answer:

1. **Potential Peak Sales for Pembrolizumab** in this indication (first-line HER2-positive gastric/GEJ adenocarcinoma with PD-L1 CPS ≥1) across the US, EU5, China, and Japan, assuming a 20-30% share of treated patients:

- Range: **$344 million to $516 million annually**.

- Midpoint (25% share): **$430 million annually**.

2. **$ Value of 1% Share of Treated Patients** across these geographies:

- Approximately **$17.2 million annually**.

Caveats and Assumptions:

- Patient population estimates are based on approximate epidemiology data and may vary with more precise local data.

- Pricing is assumed based on public information and may differ due to discounts, reimbursement policies, or biosimilar competition.

- Market share assumptions (20-30%) account for competition from other therapies (e.g., trastuzumab, other IO agents) and potential label expansions or restrictions.

- Treatment duration is approximated as 1 year; actual duration may vary based on real-world outcomes.

- Peak sales assume steady-state market penetration, which may take a few years post-launch to achieve.

If you have access to more specific data (e.g., exact patient numbers, pricing, or trial outcomes), I can refine the calculations further.