To estimate the **Potential Peak Sales** for nivolumab (Opdivo) in the indication of relapsed or progressed classical Hodgkin lymphoma (cHL) after autologous HSCT and brentuximab vedotin treatment in the US, EU5 (France, Germany, Italy, Spain, UK), China, and Japan, as well as the **$ value of a 1% share of treated patients**, we need to make several assumptions and follow a structured approach. Since exact patient numbers, pricing, and market penetration data are not provided, I will use reasonable estimates based on available epidemiology data, drug pricing trends, and market dynamics for oncology drugs like nivolumab, a PD-1 inhibitor.

Step 1: Define the Target Patient Population

Classical Hodgkin lymphoma (cHL) is a rare cancer, and the specific indication here is for relapsed or refractory cHL after autologous HSCT and brentuximab vedotin. This is a niche subset of cHL patients.

1. **Epidemiology of cHL**:

- Incidence of cHL in the US is approximately 8,500 new cases per year.

- In EU5, the incidence is around 12,000-15,000 new cases per year (based on population size and similar incidence rates).

- In China, with a much larger population, incidence is estimated at around 10,000-12,000 cases per year (lower incidence rate due to demographic and genetic factors).

- In Japan, incidence is around 2,000-3,000 cases per year.

2. **Relapsed/Refractory cHL Post-HSCT and Brentuximab Vedotin**:

- Approximately 20-30% of cHL patients relapse after initial treatment.

- Of these, a smaller subset undergoes autologous HSCT, and an even smaller subset progresses after HSCT and brentuximab vedotin.

- It is estimated that only 5-10% of cHL patients reach this specific indication (relapsed post-HSCT and brentuximab vedotin).

Using rough estimates:

- US: ~8,500 total cHL cases × 5-10% = **425-850 eligible patients** per year.

- EU5: ~13,500 total cHL cases × 5-10% = **675-1,350 eligible patients** per year.

- China: ~11,000 total cHL cases × 5-10% = **550-1,100 eligible patients** per year.

- Japan: ~2,500 total cHL cases × 5-10% = **125-250 eligible patients** per year.

Total eligible patients across all regions: **1,775-3,550 patients per year**.

3. **Prevalent Population**:

Since cHL patients in this indication may survive for several years with treatment, we can assume a prevalent population 2-3 times the annual incident cases (accounting for patients treated over multiple years). Thus:

- Total prevalent eligible patients: **3,550-10,650 patients** across all regions.

Step 2: Treatment Rate and Market Share

- **Treatment Rate**: Not all eligible patients will receive nivolumab due to factors like access, physician preference, or alternative therapies. Let's assume 70-80% of eligible patients are treated with a PD-1 inhibitor like nivolumab.

- **Market Share**: The query assumes a 20-30% share of treated patients for nivolumab. We will use this range for peak sales estimation.

- **Competition**: Nivolumab competes with other therapies, including pembrolizumab (another PD-1 inhibitor approved for cHL in similar settings), chemotherapy, and emerging therapies. A 20-30% share seems reasonable given competition.

Step 3: Pricing of Nivolumab

Nivolumab is a high-cost immunotherapy. Pricing varies by region due to healthcare systems and negotiations:

- **US**: Annual cost of nivolumab is approximately $150,000-$200,000 per patient (based on standard dosing for oncology indications).

- **EU5**: Pricing is lower due to negotiations; assume $80,000-$120,000 per patient per year.

- **Japan**: Pricing is similar to EU5, around $80,000-$120,000 per patient per year.

- **China**: Pricing is significantly lower due to market access programs and generics; assume $30,000-$50,000 per patient per year.

For simplicity, we will use the midpoint of these ranges:

- US: $175,000 per patient/year

- EU5: $100,000 per patient/year

- Japan: $100,000 per patient/year

- China: $40,000 per patient/year

Step 4: Calculate Potential Peak Sales (20-30% Market Share)

First, calculate the number of treated patients with nivolumab using the prevalent population (midpoint of 3,550-10,650, i.e., ~7,100 patients) and a treatment rate of 75%. Then apply the 20-30% market share.

- **Total eligible prevalent patients**: ~7,100

- **Treated patients**: 7,100 × 75% = ~5,325

- **Nivolumab-treated patients (20-30% share)**: 5,325 × 20% = 1,065; 5,325 × 30% = 1,598

Now, distribute these patients by region based on the proportion of eligible patients:

- US: ~30% of total patients (2,130/7,100)

- EU5: ~40% of total patients (2,840/7,100)

- China: ~20% of total patients (1,420/7,100)

- Japan: ~10% of total patients (710/7,100)

Peak Sales at 20% Market Share:

- US: 1,065 × 30% = 320 patients × $175,000 = **$56 million**
- EU5: 1,065 × 40% = 426 patients × $100,000 = **$43 million**
- China: 1,065 × 20% = 213 patients × $40,000 = **$9 million**
- Japan: 1,065 × 10% = 107 patients × $100,000 = **$11 million**
- **Total Peak Sales (20% share)**: $56M + $43M + $9M + $11M = **$119 million**

Peak Sales at 30% Market Share:

- US: 1,598 × 30% = 479 patients × $175,000 = **$84 million**
- EU5: 1,598 × 40% = 639 patients × $100,000 = **$64 million**
- China: 1,598 × 20% = 320 patients × $40,000 = **$13 million**
- Japan: 1,598 × 10% = 160 patients × $100,000 = **$16 million**
- **Total Peak Sales (30% share)**: $84M + $64M + $13M + $16M = **$177 million**

Thus, **Potential Peak Sales** for nivolumab in this indication across the US, EU5, China, and Japan range from **$119 million to $177 million annually** at 20-30% market share.

Step 5: Calculate $ Value of 1% Share of Treated Patients

- Total treated patients: ~5,325
- 1% of treated patients: 5,325 × 1% = 53 patients

Distribute by region:

- US: 53 × 30% = 16 patients × $175,000 = **$2.8 million**
- EU5: 53 × 40% = 21 patients × $100,000 = **$2.1 million**
- China: 53 × 20% = 11 patients × $40,000 = **$0.44 million**
- Japan: 53 × 10% = 5 patients × $100,000 = **$0.5 million**
- **Total $ Value of 1% Share**: $2.8M + $2.1M + $0.44M + $0.5M = **$5.84 million**

Final Answer:

1. **Potential Peak Sales for nivolumab** in the specified cHL indication (relapsed post-HSCT and brentuximab vedotin) across the US, EU5, China, and Japan, assuming a 20-30% market share: **$119 million to $177 million annually**.

2. **$ Value of 1% share of treated patients** across these geographies: **$5.84 million**.

Notes:

- These estimates are based on assumptions and rough epidemiology data. Real-world numbers may vary due to differences in pricing, market access, competition, and patient uptake.

- Peak sales could be influenced by duration of therapy (nivolumab may not be used indefinitely), label expansions, or biosimilar competition.

- For more precise calculations, detailed market research or proprietary data on patient numbers and pricing would be required.