To estimate the **Potential Peak Sales** for carfilzomib (Kyprolis) in the indication of relapsed or refractory multiple myeloma (RRMM) 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 specific data such as exact patient numbers, pricing, or market penetration rates are not provided, I will outline the methodology and make reasonable assumptions based on publicly available information and typical market dynamics for oncology drugs. The calculations will be illustrative, and actual figures may vary based on real-world data.

Step 1: Define the Target Population

Carfilzomib is approved for adult patients with relapsed or refractory multiple myeloma (RRMM) who have received 1-3 prior lines of therapy. We need to estimate the number of eligible patients in each geography.

Incidence and Prevalence of Multiple Myeloma (MM):

- **US**: Approximately 34,000 new cases of MM are diagnosed annually (American Cancer Society, 2023 estimate). About 50-60% of patients relapse or become refractory after first-line treatment, and a significant portion of these fall into the 1-3 prior lines of therapy category. Let's assume ~15,000-20,000 eligible RRMM patients annually for 1-3 lines of therapy.

- **EU5**: The incidence of MM in Europe is ~4.5-6 per 100,000 people, leading to ~40,000 new cases annually across EU5. Assuming a similar relapse rate, ~20,000-25,000 patients may be eligible.

- **Japan**: Incidence is lower, at ~2-3 per 100,000, with ~5,000-6,000 new cases annually. Eligible RRMM patients may be ~2,500-3,000.

- **China**: Incidence is ~1-2 per 100,000, but with a large population, new cases are ~20,000-25,000 annually. Eligible RRMM patients may be ~10,000-15,000, though access to advanced therapies may be lower due to cost and healthcare system constraints.

Treated Patient Share:

The question assumes a 20-30% share of treated patients for carfilzomib. This accounts for competition from other therapies (e.g., daratumumab, lenalidomide, bortezomib) and market access barriers.

Estimated Treated Patients (20-30% Share):

- **US**: 15,000-20,000 eligible patients × 20-30% = **3,000-6,000 treated patients**.

- **EU5**: 20,000-25,000 eligible patients × 20-30% = **4,000-7,500 treated patients**.

- **Japan**: 2,500-3,000 eligible patients × 20-30% = **500-900 treated patients**.

- **China**: 10,000-15,000 eligible patients × 20-30% (assuming lower penetration due to cost) = **2,000-4,500 treated patients**.

Step 2: Estimate Annual Treatment Cost per Patient

Carfilzomib is an expensive oncology drug administered intravenously, typically in combination with other agents like dexamethasone or daratumumab. The cost varies by region due to pricing differences, healthcare systems, and reimbursement policies.

- **US**: The annual cost of carfilzomib is estimated at ~$100,000-150,000 per patient (based on historical data and typical pricing for proteasome inhibitors in MM).

- **EU5**: Pricing is typically 30-50% lower than the US due to negotiated pricing. Assume ~$50,000-75,000 per patient annually.

- **Japan**: Pricing is similar to EU5, ~$50,000-75,000 per patient annually.

- **China**: Pricing is significantly lower due to generics, biosimilars, and cost constraints. Assume ~$20,000-30,000 per patient annually.

Step 3: Calculate Potential Peak Sales

Peak sales are calculated as the number of treated patients multiplied by the annual cost per patient. We'll use the midpoint of the ranges for simplicity.

Peak Sales Calculation (20-30% Share):

- **US**: 4,500 treated patients (midpoint of 3,000-6,000) × $125,000 (midpoint cost) = **$562.5 million**.

- **EU5**: 5,750 treated patients (midpoint of 4,000-7,500) × $62,500 (midpoint cost) = **$359.4 million**.

- **Japan**: 700 treated patients (midpoint of 500-900) × $62,500 (midpoint cost) = **$43.8 million**.

- **China**: 3,250 treated patients (midpoint of 2,000-4,500) × $25,000 (midpoint cost) = **$81.3 million**.

Total Peak Sales (Midpoint Estimate): $562.5M (US) + $359.4M (EU5) + $43.8M (Japan) + $81.3M (China) = **~$1,047 million (~$1.05 billion)**.

Range of Peak Sales:

- **Low End (20% Share, Lower Cost)**: ~$700-800 million.

- **High End (30% Share, Higher Cost)**: ~$1.3-1.5 billion.

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

A 1% share of treated patients corresponds to 1% of the eligible patient population being treated with carfilzomib. Using the midpoint of eligible patients:

- **US**: 17,500 eligible patients (midpoint of 15,000-20,000) × 1% = 175 patients × $125,000 = **$21.9 million**.

- **EU5**: 22,500 eligible patients (midpoint of 20,000-25,000) × 1% = 225 patients × $62,500 = **$14.1 million**.

- **Japan**: 2,750 eligible patients (midpoint of 2,500-3,000) × 1% = 27.5 patients × $62,500 = **$1.7 million**.

- **China**: 12,500 eligible patients (midpoint of 10,000-15,000) × 1% = 125 patients × $25,000 = **$3.1 million**.

Total $ Value of 1% Share: $21.9M (US) + $14.1M (EU5) + $1.7M (Japan) + $3.1M (China) = **~$40.8 million**.

Final Answer:

1. **Potential Peak Sales for Carfilzomib in RRMM (20-30% Share)**:

- US: ~$562.5 million (range: $375M-$750M)

- EU5: ~$359.4 million (range: $200M-$470M)

- China: ~$81.3 million (range: $40M-$135M)

- Japan: ~$43.8 million (range: $25M-$67.5M)

- **Total**: ~**$1.05 billion** (range: $700M-$1.5B)

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

- US: ~$21.9 million

- EU5: ~$14.1 million

- China: ~$3.1 million

- Japan: ~$1.7 million

- **Total**: ~**$40.8 million**

Notes:

- These estimates are based on assumptions about patient numbers, market share, and pricing. Real-world data may differ due to competition, reimbursement, generic entry, or changes in treatment paradigms.

- Carfilzomib is often used in combination, so sales may be influenced by the cost of companion drugs (e.g., daratumumab, dexamethasone).

- China's market potential may be lower due to access barriers, but growth in healthcare spending could increase uptake over time.