To estimate the **Potential Peak Sales** for relugolix (ORGOVYX) in the indication of advanced prostate cancer across 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 (e.g., exact patient numbers, pricing, or market penetration) isn't provided, I'll use reasonable assumptions based on publicly available information, market research trends, and typical methodologies for such calculations. I'll also assume a 20% to 30% market share of treated patients as given in the query.

Step 1: Define Key Parameters

1. **Target Patient Population**: Advanced prostate cancer patients eligible for GnRH receptor antagonist therapy.

2. **Market Share**: 20% to 30% of treated patients.

3. **Pricing**: Estimated annual cost of therapy for relugolix.

4. **Geographies**: US, EU5, China, Japan.

Step 2: Estimate Patient Population for Advanced Prostate Cancer

Prostate cancer is one of the most common cancers in men. Advanced prostate cancer typically includes metastatic or hormone-sensitive cases requiring systemic therapy like GnRH antagonists. Below are approximate numbers of treated patients (based on incidence, prevalence, and treatment rates):

- **US**:

- Annual incidence of prostate cancer: ~250,000 cases (American Cancer Society, 2023).

- Advanced cases (metastatic or requiring systemic therapy): ~20-25% of cases.

- Treated advanced prostate cancer patients: ~50,000–60,000 annually.

- **EU5**:

- Annual incidence: ~400,000 cases across EU5 (European Cancer Information System).

- Advanced cases: ~20-25%.

- Treated patients: ~80,000–100,000 annually.

- **China**:

- Annual incidence: ~120,000 cases (due to aging population and underdiagnosis; Global Cancer Observatory).

- Advanced cases: ~30% (higher due to late diagnosis).

- Treated patients: ~30,000–40,000 annually (lower treatment access).

- **Japan**:

- Annual incidence: ~90,000 cases (aging population; Global Cancer Observatory).

- Advanced cases: ~20-25%.

- Treated patients: ~18,000–22,000 annually.

Total Treated Patients (approximate):

- US: 55,000

- EU5: 90,000

- China: 35,000

- Japan: 20,000

- **Total across geographies**: ~200,000 treated patients.

Step 3: Estimate Market Share and Treated Patients for Relugolix

Assuming a 20% to 30% market share of treated patients:

- **20% Share**:

- US: 55,000 × 0.2 = 11,000 patients

- EU5: 90,000 × 0.2 = 18,000 patients

- China: 35,000 × 0.2 = 7,000 patients

- Japan: 20,000 × 0.2 = 4,000 patients

- **Total**: 40,000 patients

- **30% Share**:

- US: 55,000 × 0.3 = 16,500 patients

- EU5: 90,000 × 0.3 = 27,000 patients

- China: 35,000 × 0.3 = 10,500 patients

- Japan: 20,000 × 0.3 = 6,000 patients

- **Total**: 60,000 patients

Step 4: Estimate Annual Pricing for Relugolix

Relugolix is a premium-priced therapy as a novel oral GnRH antagonist. Based on US pricing and competitor drugs (e.g., degarelix, leuprolide), I'll estimate the annual cost per patient. Adjustments for other regions account for pricing differences:

- **US**: ~$25,000 per patient per year (based on list price of ORGOVYX, ~$2,400/month).

- **EU5**: ~$15,000–$20,000 per patient per year (lower due to healthcare negotiations).

- **China**: ~$10,000 per patient per year (lower due to affordability and market access).

- **Japan**: ~$20,000 per patient per year (similar to EU due to advanced healthcare system).

For simplicity, I'll use midpoint pricing for calculations:

- US: $25,000

- EU5: $17,500

- China: $10,000

- Japan: $20,000

Step 5: Calculate Potential Peak Sales for Relugolix

Peak sales are calculated by multiplying the number of treated patients (at 20% and 30% market share) by the annual cost per patient in each geography.

At 20% Market Share:

- **US**: 11,000 patients × $25,000 = **$275 million**

- **EU5**: 18,000 patients × $17,500 = **$315 million**

- **China**: 7,000 patients × $10,000 = **$70 million**

- **Japan**: 4,000 patients × $20,000 = **$80 million**

- **Total Peak Sales (20% share)**: $275M + $315M + $70M + $80M = **$740 million**

At 30% Market Share:

- **US**: 16,500 patients × $25,000 = **$412.5 million**

- **EU5**: 27,000 patients × $17,500 = **$472.5 million**

- **China**: 10,500 patients × $10,000 = **$105 million**

- **Japan**: 6,000 patients × $20,000 = **$120 million**

- **Total Peak Sales (30% share)**: $412.5M + $472.5M + $105M + $120M = **$1,110 million (or ~$1.11 billion)**

Step 6: Calculate $ Value of 1% Share of Treated Patients

A 1% share of treated patients corresponds to 1% of the total treated patient population in each geography. The value is calculated by multiplying the number of patients (1% of total) by the annual cost per patient.

- **US**: 55,000 × 0.01 = 550 patients × $25,000 = **$13.75 million**

- **EU5**: 90,000 × 0.01 = 900 patients × $17,500 = **$15.75 million**

- **China**: 35,000 × 0.01 = 350 patients × $10,000 = **$3.5 million**

- **Japan**: 20,000 × 0.01 = 200 patients × $20,000 = **$4 million**

- **Total Value of 1% Share**: $13.75M + $15.75M + $3.5M + $4M = **$37 million**

Final Answer:

1. **Potential Peak Sales for Relugolix** in advanced prostate cancer (assuming 20% to 30% market share):

- At 20% share: **$740 million**

- At 30% share: **$1.11 billion**

- Range: **$740 million to $1.11 billion** across the US, EU5, China, and Japan.

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

- US: **$13.75 million**

- EU5: **$15.75 million**

- China: **$3.5 million**

- Japan: **$4 million**

- Total: **$37 million**

Notes:

- These estimates are based on assumptions and publicly available data. Actual figures may vary due to pricing negotiations, market access, competition (e.g., from other GnRH therapies like leuprolide), and patient uptake.

- Peak sales typically occur 5–10 years after launch, depending on market penetration and patent life (relugolix was approved in the US in December 2020).

- China's lower contribution reflects limited access to high-cost therapies, though this may change with healthcare reforms.