

To estimate the **Potential Peak Sales** for ibrutinib (Imbruvica) in the indication of chronic graft versus host disease (cGVHD) in pediatric patients (≥ 1 year of age) in the US, EU5 (France, Germany, 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 on patient populations, pricing, and market penetration may not be fully available, I will outline the methodology and make reasonable assumptions based on publicly available information and typical market dynamics for rare diseases and oncology drugs. The final numbers will be illustrative and should be refined with more precise data if available.

Step 1: Define the Target Population

- **Indication:** cGVHD in pediatric patients (≥ 1 year) after failure of 1 or more lines of systemic therapy.
- cGVHD is a rare complication following allogeneic hematopoietic stem cell transplantation (HSCT). It occurs in approximately 20-50% of pediatric patients post-HSCT, with a smaller subset failing first-line therapies (e.g., corticosteroids).
- **Prevalence of HSCT and cGVHD:**
 - **US:** ~8,000-10,000 pediatric HSCTs annually; ~30% develop cGVHD (~2,400-3,000 patients); ~50% fail first-line therapy (~1,200-1,500 eligible patients).
 - **EU5:** ~10,000-12,000 pediatric HSCTs annually (proportional to population); ~30% develop cGVHD (~3,000-3,600); ~50% fail first-line (~1,500-1,800 patients).
 - **Japan:** ~1,000-1,500 pediatric HSCTs annually; ~30% develop cGVHD (~300-450); ~50% fail first-line (~150-225 patients).
 - **China:** ~5,000-7,000 pediatric HSCTs annually (growing market); ~30% develop cGVHD (~1,500-2,100); ~50% fail first-line (~750-1,050 patients).
- **Total Eligible Patients:** ~3,600-4,575 across US, EU5, Japan, and China.

Step 2: Market Penetration (20%-30% Share of Treated Patients)

- Given the assumption of a 20%-30% market share among treated patients, we estimate ibrutinib's treated population:
- **US:** $1,200-1,500 \times 20\%-30\% = \sim 240-450$ patients.
- **EU5:** $1,500-1,800 \times 20\%-30\% = \sim 300-540$ patients.
- **Japan:** $150-225 \times 20\%-30\% = \sim 30-68$ patients.
- **China:** $750-1,050 \times 20\%-30\% = \sim 150-315$ patients.
- **Total Treated Patients with Ibrutinib:** ~720-1,373 patients annually at peak.

Step 3: Pricing Assumptions

- Ibrutinib is a high-cost specialty drug. Pricing varies by region due to healthcare systems and purchasing power:
- **US:** ~\$150,000-\$180,000 per patient per year (based on adult pricing for other indications like CLL).

- **EU5:** ~\$80,000-\$100,000 per patient per year (discounts due to negotiations and health technology assessments).
- **Japan:** ~\$100,000-\$120,000 per patient per year (similar to EU5 with slight premium).
- **China:** ~\$40,000-\$60,000 per patient per year (lower due to pricing controls and market access challenges).
- These are annual costs assuming chronic treatment for cGVHD, adjusted for pediatric dosing if applicable.

Step 4: Potential Peak Sales Calculation

Using the mid-point of treated patients and pricing ranges:

- **US:** 345 patients x \$165,000 = ~\$57 million.
- **EU5:** 420 patients x \$90,000 = ~\$38 million.
- **Japan:** 49 patients x \$110,000 = ~\$5 million.
- **China:** 233 patients x \$50,000 = ~\$12 million.
- **Total Peak Sales:** ~\$112 million annually (mid-point estimate).
- Range based on 20%-30% penetration:
- Low end (20%): ~\$75-\$80 million.
- High end (30%): ~\$140-\$150 million.

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

A 1% share of treated patients corresponds to 1% of the eligible patient pool being treated with ibrutinib.

- **US:** 1,200-1,500 patients x 1% = 12-15 patients x \$165,000 = ~\$2.0-\$2.5 million.
- **EU5:** 1,500-1,800 patients x 1% = 15-18 patients x \$90,000 = ~\$1.4-\$1.6 million.
- **Japan:** 150-225 patients x 1% = 1.5-2.3 patients x \$110,000 = ~\$0.17-\$0.25 million.
- **China:** 750-1,050 patients x 1% = 7.5-10.5 patients x \$50,000 = ~\$0.38-\$0.53 million.
- **Total \$ Value of 1% Share:** ~\$3.9-\$4.9 million.

Final Answer

- Potential Peak Sales for Ibrutinib in cGVHD (Pediatric):

- US, EU5, China, Japan combined: ~\$75-\$150 million annually (mid-point ~\$112 million) at 20%-30% market share.

- \$ Value of 1% Share of Treated Patients:

- US: ~\$2.0-\$2.5 million.
- EU5: ~\$1.4-\$1.6 million.

- Japan: ~\$0.17-\$0.25 million.
- China: ~\$0.38-\$0.53 million.
- Total: ~\$3.9-\$4.9 million.

Caveats

- These estimates are based on assumptions for patient numbers, pricing, and market penetration. Real-world data on HSCT prevalence, cGVHD incidence, and regional pricing agreements would refine these figures.

- cGVHD is a niche indication, especially in pediatrics, so peak sales are modest compared to ibrutinib's broader indications (e.g., CLL, MCL).

- Market access, reimbursement, and competition (e.g., ruxolitinib in cGVHD) could impact penetration rates and pricing.

- Duration of therapy and adherence rates may also affect annual costs per patient.

If you have access to specific epidemiology data, pricing agreements, or competitor information, these estimates can be adjusted accordingly.