To estimate the **Potential Peak Sales** for afamitresgene autoleucel (TECELRA) in the indication of unresectable or metastatic synovial sarcoma 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. This involves estimating the eligible patient population, market penetration (20%-30% share of treated patients), pricing assumptions, and calculating peak sales. Since exact data on patient numbers, pricing, and market dynamics for this specific drug and indication may not be publicly available, I will use reasonable assumptions based on available information about synovial sarcoma, CAR-T therapies, and market trends for rare cancers.

Step 1: Indication and Patient Population

Afamitresgene autoleucel is approved for adults with unresectable or metastatic synovial sarcoma who have received prior chemotherapy, are HLA-A*02:01P, -A*02:02P, -A*02:03P, or -A*02:06P positive, and whose tumors express the MAGE-A4 antigen. Synovial sarcoma is a rare soft tissue sarcoma, and the eligible population is further restricted by HLA type and MAGE-A4 expression.

- **Incidence of Synovial Sarcoma**: Synovial sarcoma accounts for approximately 5-10% of all soft tissue sarcomas, with an incidence of ~1-2 cases per million people annually. It primarily affects younger adults.

- **Unresectable/Metastatic Cases**: About 30-50% of synovial sarcoma cases are metastatic or unresectable at diagnosis or relapse after initial treatment.

- **HLA Eligibility**: The HLA-A*02 alleles specified (HLA-A*02:01, -A*02:02, -A*02:03, -A*02:06) are present in approximately 40-50% of the population in Western countries (US and EU) and a lower percentage in Asian populations (Japan and China, ~20-30%).

- **MAGE-A4 Expression**: MAGE-A4 is expressed in ~50-60% of synovial sarcoma tumors (based on literature for similar therapies).

- **Prior Chemotherapy**: Most patients with advanced synovial sarcoma will have received prior chemotherapy, so we assume 80-90% of unresectable/metastatic patients meet this criterion.

Estimated Annual Eligible Patient Population (New Cases):

1. **US**:

- Population: ~330 million

- Synovial sarcoma incidence: ~1.5 per million → ~500 new cases/year

- Unresectable/metastatic: ~40% → 200 patients

- HLA-A*02 eligible: ~45% → 90 patients

- MAGE-A4 expression: ~55% → ~50 patients

- Prior chemotherapy: ~85% → ~42 eligible patients/year

2. **EU5** (combined population ~260 million):

- Synovial sarcoma incidence: ~1.5 per million → ~390 new cases/year

- Unresectable/metastatic: ~40% → 156 patients

- HLA-A*02 eligible: ~45% → 70 patients

- MAGE-A4 expression: ~55% → ~38 patients

- Prior chemotherapy: ~85% → ~32 eligible patients/year

3. **Japan** (population ~125 million):

- Synovial sarcoma incidence: ~1.5 per million → ~190 new cases/year

- Unresectable/metastatic: ~40% → 76 patients

- HLA-A*02 eligible: ~25% → 19 patients

- MAGE-A4 expression: ~55% → ~10 patients

- Prior chemotherapy: ~85% → ~9 eligible patients/year

4. **China** (population ~1.4 billion):

- Synovial sarcoma incidence: ~1.5 per million → ~2,100 new cases/year

- Unresectable/metastatic: ~40% → 840 patients

- HLA-A*02 eligible: ~20% → 168 patients

- MAGE-A4 expression: ~55% → ~92 patients

- Prior chemotherapy: ~80% → ~74 eligible patients/year

Total Eligible Patients (Annual New Cases):

- US: ~42

- EU5: ~32

- Japan: ~9

- China: ~74

- **Total**: ~157 patients/year

Prevalent Population Consideration:

Since synovial sarcoma is a chronic condition in advanced stages with a median survival of 1-2 years for metastatic cases, we can estimate a prevalent population (existing patients eligible for treatment) as roughly 1.5-2x the annual incidence. For simplicity, let's assume a prevalent pool of **2x the annual new cases**:

- US: ~84 prevalent eligible patients

- EU5: ~64 prevalent eligible patients

- Japan: ~18 prevalent eligible patients

- China: ~148 prevalent eligible patients

- **Total Prevalent Eligible**: ~314 patients

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

Given the rarity of the disease, the specificity of the therapy (HLA and antigen restrictions), and the high unmet need in advanced synovial sarcoma, afamitresgene autoleucel could achieve significant market penetration among eligible patients. The assumption of 20%-30% share of treated patients is reasonable for a novel, targeted therapy in a rare cancer with limited treatment options.

- At **20% penetration**: ~63 patients treated annually (based on prevalent pool, assuming peak sales reflect steady-state treatment after initial uptake).

- At **30% penetration**: ~94 patients treated annually.

Step 3: Pricing Assumptions

Afamitresgene autoleucel is a genetically modified autologous T-cell immunotherapy (CAR-T-like therapy). Pricing for similar therapies (e.g., Kymriah, Yescarta) is in the range of $373,000 to $475,000 per treatment in the US. Pricing in other markets is typically lower due to healthcare system negotiations:

- **US**: $400,000 per treatment

- **EU5**: $300,000 per treatment (average across countries)

- **Japan**: $350,000 per treatment

- **China**: $200,000 per treatment (lower due to market access challenges and pricing controls)

Step 4: Potential Peak Sales Calculation

Peak sales are calculated as the number of treated patients (at 20% and 30% penetration) multiplied by the price per treatment in each geography. We assume peak sales are based on the prevalent pool with steady-state treatment (i.e., patients treated annually after initial uptake of the prevalent population over 2-3 years).

At 20% Penetration (63 patients treated annually):

- **US**: 20% of 84 = 17 patients x $400,000 = $6.8 million

- **EU5**: 20% of 64 = 13 patients x $300,000 = $3.9 million

- **Japan**: 20% of 18 = 4 patients x $350,000 = $1.4 million

- **China**: 20% of 148 = 30 patients x $200,000 = $6.0 million

- **Total Peak Sales (20%)**: $18.1 million annually

At 30% Penetration (94 patients treated annually):

- **US**: 30% of 84 = 25 patients x $400,000 = $10.0 million

- **EU5**: 30% of 64 = 19 patients x $300,000 = $5.7 million

- **Japan**: 30% of 18 = 5 patients x $350,000 = $1.75 million

- **China**: 30% of 148 = 44 patients x $200,000 = $8.8 million

- **Total Peak Sales (30%)**: $26.25 million annually

Potential Peak Sales Range: **$18.1 million to $26.25 million annually** across the US, EU5, Japan, and China.

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

A 1% share of treated patients corresponds to 1% of the prevalent eligible population (~314 patients), which is ~3.14 patients treated annually.

- **US**: 1% of 84 = 0.84 patients x $400,000 = $336,000

- **EU5**: 1% of 64 = 0.64 patients x $300,000 = $192,000

- **Japan**: 1% of 18 = 0.18 patients x $350,000 = $63,000

- **China**: 1% of 148 = 1.48 patients x $200,000 = $296,000

- **Total $ Value of 1% Share**: $887,000 annually

Summary

1. **Potential Peak Sales for Afamitresgene Autoleucel** (20%-30% share of treated patients):

- **Range**: $18.1 million to $26.25 million annually across the US, EU5, Japan, and China.

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

- **Total**: $887,000 annually across the specified geographies.

Caveats and Assumptions

- Patient population estimates are based on general incidence data for synovial sarcoma and assumptions about HLA eligibility and MAGE-A4 expression. Real-world data may vary.

- Pricing is assumed based on comparable CAR-T therapies; actual pricing for afamitresgene autoleucel may differ.

- Market penetration of 20%-30% assumes high uptake due to unmet need, but access barriers (e.g., reimbursement, manufacturing capacity) could lower this.

- Peak sales assume steady-state treatment of prevalent and incident patients annually after initial uptake.

If more specific data on pricing, patient numbers, or market access becomes available, these estimates can be refined.