Introduction

Chemotherapy, often called chemo, is cancer treatment that uses drugs. Radiation and surgery treat one area of cancer. But chemo usually travels through the bloodstream to treat the whole body. Treating the whole body is called a systemic treatment. The goal of chemo is to either treat cancer or ease its symptoms. Treating cancer can be to cure it, decrease the chance it will return, or stop or slow its growth. Easing cancer symptoms without trying to cure the cancer is called palliative therapy. Chemotherapy drugs can be used in many different ways. Chemo can make a tumor smaller before surgery or radiation, destroy cancer cells that surgery or radiation didn’t treat, help other treatments work better, or kill cancer cells that have come back or spread. Chemotherapy is given in different ways. This includes by mouth (oral), through a vein (intravenous), by a shot (injection), or with a cream rubbed onto the skin (topical). In some cases chemo is injected between the layers of tissue covering the brain and spinal cord (intrathecal), is given into the belly area (intraperitoneal), or is injected into an artery (intra-arterial). This policy gives information about many different types of chemo drugs and the criteria for when they may be medically necessary.

Note: The Introduction section is for your general knowledge and is not to be taken as policy coverage criteria. The rest of the policy uses specific words and concepts familiar to medical professionals. It is intended for providers. A provider can be a person, such as a doctor, nurse, psychologist, or dentist. A provider also can be a place where medical care is given, like a hospital, clinic, or lab. This policy informs them about when a service may be covered.
**Policy Coverage Criteria**

**Note:** Initial approval period for drugs listed below will be 3 months. Continued approval beyond the first 3 months will require documentation of objective response to therapy (depending on the type of malignancy).

<table>
<thead>
<tr>
<th>Drug</th>
<th>Medical Necessity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral Drugs</strong></td>
<td></td>
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<tr>
<td><strong>Hedgehog Pathway Inhibitors</strong></td>
<td></td>
</tr>
<tr>
<td>Erivedge® (vismodegib)</td>
<td>Erivedge® (vismodegib) or Odomzo® (sonidegib) may be considered medically necessary for adult patients with ANY of the following:</td>
</tr>
<tr>
<td>Odomzo® (sonidegib)</td>
<td>• Metastatic basal cell carcinoma (BCC)</td>
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<td>OR</td>
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<tr>
<td></td>
<td>• Locally advanced basal cell carcinoma that has recurred following surgery or radiation therapy</td>
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<td>OR</td>
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<td></td>
<td>• Locally advanced basal cell carcinoma in patients who are not candidates for surgery or radiation therapy</td>
</tr>
<tr>
<td><strong>Drugs Targeting Acute Myeloid Leukemia (AML)</strong></td>
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<tr>
<td>Idhifa® (enasidenib)</td>
<td>Idhifa® (enasidenib) may be considered medically necessary for:</td>
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<tr>
<td></td>
<td>• Treatment of relapsed or refractory acute myeloid leukemia (AML) in adult patients with an isocitrate dehydrogenase-2 (IDH2) mutation</td>
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<tr>
<td>Tibsovo® (ivosidenib)</td>
<td>Tibsovo® (ivosidenib) may be considered medically necessary for:</td>
</tr>
<tr>
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<td>• Treatment of relapsed or refractory acute myeloid leukemia (AML) in adult patients with a susceptible isocitrate dehydrogenase-1 (IDH1) mutation</td>
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<tr>
<td><strong>Poly (ADP-ribose) polymerase (PARP) Inhibitors</strong></td>
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<tr>
<td>Lynparza® (olaparib)</td>
<td>Lynparza® (olaparib) may be considered medically necessary for the maintenance treatment of adult patients with recurrent epithelial ovarian, fallopian tube or primary peritoneal cancer, who are in a complete or partial response to platinum-based chemotherapy.</td>
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<tr>
<td>Drug</td>
<td>Medical Necessity</td>
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<tr>
<td><strong>Oral Drugs</strong></td>
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</table>
| **Lynparza® (olaparib)**  | Lynparza® (olaparib) may be considered medically necessary for the treatment of adult patients with advanced ovarian cancer unresponsive to platinum-based chemotherapy when ALL the following are true:  
   • Patient has **germline** BRCA-mutations (gBRCAm) associated with ovarian cancer (as confirmed by genetic testing, see Related Policies)  
   AND  
   • Patient has been treated with 3+ prior lines of chemotherapy                                                                                                                                 |
| **Lynparza® (olaparib)**  | Lynparza® (olaparib) may be considered medically necessary for the treatment of adult patients with breast cancer when ALL the following are true:  
   • Patient has **germline** BRCA-mutations (gBRCAm) (as confirmed by genetic testing, see Related Policies)  
   AND  
   • Patient has metastatic breast cancer  
   AND  
   • Patient has been treated with chemotherapy in the neoadjuvant, adjuvant or metastatic setting  
   AND  
   • If hormone receptor (HR)-positive, patient should have been treated with a prior endocrine therapy or be considered inappropriate for endocrine therapy |
| **Rubraca® (rucaparib)**  | Rubraca® (rucaparib) may be considered medically necessary for the treatment of adult patients with:  
   • BRCA mutations (germline and/or somatic) associated epithelial ovarian, fallopian tube, or primary peritoneal cancer (as confirmed by genetic testing, see Related Policies)  
   • Who have been treated with two or more chemotherapies  
   • Recurrent epithelial ovarian, fallopian tube, or primary peritoneal cancer who are in a complete or partial response to platinum-based chemotherapy as maintenance treatment |
| **Talazenna™ (talazoparib)** | Talazenna™ (talazoparib) may be considered medically necessary for the treatment of adult patients with:  
   • BRCA mutations (germline and/or somatic) associated epithelial ovarian, fallopian tube, or primary peritoneal cancer (as confirmed by genetic testing, see Related Policies)  
   • Who have been treated with two or more chemotherapies  
   • Recurrent epithelial ovarian, fallopian tube, or primary peritoneal cancer who are in a complete or partial response to platinum-based chemotherapy as maintenance treatment |
### Drug Medical Necessity

#### Oral Drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Medical Necessity</th>
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<tbody>
<tr>
<td></td>
<td>necessary for the treatment of adult patients with germline BRCA-mutated, HER2-negative locally advanced or metastatic breast cancer (as confirmed by genetic testing, see Related Policies).</td>
</tr>
<tr>
<td><strong>Zejula® (niraparib)</strong></td>
<td><strong>Zejula® (niraparib)</strong> may be considered medically necessary for the treatment of adult patients with recurrent epithelial ovarian, fallopian tube, or primary peritoneal cancer who are in a complete or partial response to platinum-based chemotherapy.</td>
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<tr>
<td></td>
<td>• Patient must be considered to have platinum sensitive disease, defined as having a complete or partial response and disease progression more than 6 months after completion of the last round of platinum therapy</td>
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</tbody>
</table>

#### Cyclin-dependent kinases 4 and 6 (CDK4/6) Inhibitors

<table>
<thead>
<tr>
<th>Drug</th>
<th>Medical Necessity</th>
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</thead>
<tbody>
<tr>
<td><strong>Ibrance® (palbociclib)</strong></td>
<td><strong>Ibrance® (palbociclib)</strong> may be considered medically necessary for the treatment of hormone receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative advanced or metastatic breast cancer in combination with:</td>
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<tr>
<td></td>
<td>• An aromatase inhibitor as initial endocrine based therapy in postmenopausal women</td>
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<td></td>
<td>OR</td>
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<tr>
<td></td>
<td>• Faslodex® (fulvestrant) in women with disease progression following endocrine therapy</td>
</tr>
<tr>
<td><strong>Kisqali® (ribociclib)</strong></td>
<td><strong>Kisqali® (ribociclib)</strong> may be considered medically necessary in patients 18 years and older when:</td>
</tr>
<tr>
<td></td>
<td>• Used in combination with an aromatase inhibitor as initial endocrine-based therapy for the treatment of premenopausal or postmenopausal women with hormone receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative advanced or metastatic breast cancer</td>
</tr>
<tr>
<td></td>
<td>OR</td>
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<tr>
<td></td>
<td>• Used for initial treatment or following disease progression on endocrine therapy, for postmenopausal with HR+, HER2-advanced or metastatic breast cancer, in combination with Faslodex® (fulvestrant)</td>
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<tr>
<td>Drug</td>
<td>Medical Necessity</td>
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<tr>
<td><strong>Oral Drugs</strong></td>
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<tr>
<td><strong>Verzenio™ (abemaciclib)</strong></td>
<td>Use as maintenance therapy following response to chemotherapy regimens is considered not medically necessary.</td>
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<td></td>
<td>Verzenio™ (abemaciclib) may be considered clinically necessary for the treatment of postmenopausal women, or pre/perimenopausal women who’s estrogen levels are suppressed on GnRH (gonadotrophin releasing hormone) therapy, who meet ONE of the following indications:</td>
</tr>
<tr>
<td></td>
<td>• In combination with an aromatase inhibitor as initial endocrine-based therapy for the treatment of hormone receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative advanced or metastatic breast cancer</td>
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<td>OR</td>
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<tr>
<td></td>
<td>• In combination with Faslodex® (fulvestrant) for the treatment of hormone receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative advanced or metastatic breast cancer in women with disease progression following endocrine therapy</td>
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<tr>
<td></td>
<td>OR</td>
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<tr>
<td></td>
<td>• As monotherapy for the treatment of HR-positive, HER2 – negative advanced or metastatic breast cancer in patients with disease progression following endocrine therapy and prior chemotherapy in the metastatic setting</td>
</tr>
<tr>
<td><strong>Miscellaneous Oral Agents</strong></td>
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<tr>
<td><strong>Lonsurf® (trifluridine and tipiracil)</strong></td>
<td>Lonsurf® (trifluridine and tipiracil) may be considered medically necessary for treatment of patients with metastatic colorectal cancer who have been:</td>
</tr>
<tr>
<td></td>
<td>• Previously treated with fluoropyrimidine, oxaliplatin, and irinotecan-based chemotherapy</td>
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<td></td>
<td>AND</td>
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<tr>
<td></td>
<td>• Previously treated with an anti-VEGF biological therapy</td>
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<td></td>
<td>AND</td>
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<tr>
<td></td>
<td>• Previously treated with an anti-EGFR therapy</td>
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<td></td>
<td>AND</td>
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<tr>
<td></td>
<td>• The tumor is RAS wild-type</td>
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<tr>
<td>Drug</td>
<td>Medical Necessity</td>
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<tr>
<td><strong>Oral Drugs</strong></td>
<td></td>
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<tr>
<td>Ninlaro® (ixazomib)</td>
<td>Ninlaro® (ixazomib) may be considered medically necessary when used in combination with Revlimid® (lenalidomide) and dexamethasone for the treatment of patients with multiple myeloma who have received at least one prior therapy.</td>
</tr>
</tbody>
</table>
| Rydapt® (midostaurin) | Rydapt® (midostaurin) may be considered medically necessary for the treatment of adult patients with:  
  - Newly diagnosed acute myeloid leukemia (AML) that is FLT3 mutation-positive as detected by an FDA-approved test, in combination with standard cytarabine and daunorubicin induction and cytarabine consolidation  
    - Documentation of genetic testing is required for coverage consideration  
  - Aggressive systemic mastocytosis (ASM), systemic mastocytosis with associated hematological neoplasm (SM-AHN), or mast cell leukemia (MCL)  

**Note:** Rydapt® is not indicated as a single-agent induction therapy for the treatment of patients with AML |

| **Miscellaneous Injectable Agents** | |
| Aliqopa™ (copanlisib) | Aliqopa™ (copanlisib) may be considered medically necessary for the treatment of:  
  - Adult patients with relapsed/refractory follicular lymphoma who:  
    - Have received at least two prior systemic therapies (ie, bendamustine + rituximab, RCHOP (rituximab, cyclophosphamide, doxorubicin, prednisone), RCVP (rituximab, cyclophosphamide, vincristine, prednisone))  

**Note:** Examples of systemic therapies listed above are not all inclusive of potential systemic therapies. |
| Bavencio® (avelumab) | Bavencio® (avelumab) may be considered medically necessary for the treatment of: |
### Drug Medical Necessity

#### Miscellaneous Injectable Agents

- Adults and pediatric patients 12 years and older with metastatic Merkel Cell Carcinoma (MCC)
- Patients with locally advanced or metastatic urothelial carcinoma who:
  - Have disease progression during or following platinum-containing chemotherapy
  - Have disease progression within 12 months of neoadjuvant or adjuvant treatment with platinum-containing chemotherapy

**Gazyva® (obinutuzumab)**

**Gazyva® (obinutuzumab) may be considered medically necessary:**

- In combination with chlorambucil, for previously untreated chronic lymphocytic leukemia (CLL)
- In combination with bendamustine followed by Gazyva® monotherapy, for relapsed or refractory follicular lymphoma, following a rituximab-containing regimen
- In combination with chemotherapy followed by GAZYVA monotherapy in patients achieving at least a partial remission, for the treatment of adult patients with previously untreated stage II bulky, III or IV follicular lymphoma

**Lartruvo® (olaratumab)**

**Lartruvo® (olaratumab) may be considered medically necessary when:**

- Used in combination with doxorubicin, for the treatment of adult patients with soft tissue sarcoma (STS) with a histologic subtype* for which an anthracycline-containing regimen (eg, doxorubicin, doxorubicin + ifosfamide, liposomal doxorubicin) is appropriate, and which is not amenable to curative treatment with radiotherapy or surgery

*Note: Subtype: undifferentiated pleomorphic sarcoma, liposarcoma, leiomyosarcoma, synovial sarcoma, and malignant peripheral nerve sheath tumors

**Lartruvo® is considered not medically necessary in the setting of:**

- Osteosarcoma
### Drug | Medical Necessity
---|---
**Miscellaneous Injectable Agents**

- Kaposi sarcoma
- Gastrointestinal stromal tumor (GIST)

### Length of Approval

<table>
<thead>
<tr>
<th>Approval</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Approval: All oral oncology drugs, unless otherwise specified</td>
<td>Initial approval for three months, according to the medical necessity criteria specified for each drug.</td>
</tr>
<tr>
<td>Reauthorization</td>
<td>Continued therapy will be approved for periods of one year as long as the drug-specific conditions are met, and the patient has shown and continues to show clinical benefit.</td>
</tr>
</tbody>
</table>

### Documentation

| Initial: | Chart notes demonstrating that the patient meets the stated criteria for medical necessity. |
| Reauthorization: | Chart notes demonstrating that the patient continues to show clinical benefit. |

### Investigational

All other uses of Aliqopa™, Bavencio®, Erivedge®, Gazyva®, Ibrance®, Idhifa®, Imfinzi®, Keytruda®, Kisqali®, Lartruvo®, Lonsurf®, Lynparza®, Ninlaro®, Odomzo®, Opdivo®, Rubraca®, Rydapt®, Tecentriq®, Tibsovo™, Verzenio™, Yervoy®, and Zejula® not listed in this policy are considered investigational.

### Coding

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>HCPCS</strong></td>
<td></td>
</tr>
<tr>
<td>J3490</td>
<td>Unclassified drugs</td>
</tr>
<tr>
<td>J9023</td>
<td>Injection, avelumab (Bavencio®), 10 mg (new code effective 1/1/18)</td>
</tr>
</tbody>
</table>
**Related Information**

**Lynparza™ (olaparib)**

Ovarian cancer (OC) is the leading cause of death in women with gynecological cancer and is the 5th most common cause of cancer mortality in women. Most patients are diagnosed at advanced stage (stage III or above) with a median age of diagnosis at 63. Epithelial ovarian cancer accounts for the majority (90%) of OC cases. The incidence rate for ovarian cancer between 2006 and 2010 was 12.5 cases per 100,000 women. Women with a family history of ovarian cancer, such as first-degree family members with ovarian cancer and BRCA1 or BRCA2 mutation, are at increased risk of developing advanced OC. Other risk factors for ovarian cancer include nulliparity, older age at pregnancy and first birth, hormone therapy, pelvic inflammatory disease, etc.

Possible causes of OC include incessant ovulation, increasing age and hormonal exposure. Epithelial OC comprises the majority of primary OC. Histologically, serous tumors account for the majority and are typically associated with a poorer prognosis. Due to deleterious mutations of a tumor suppressor BRCA genes, about 10-15% of epithelial OC and up to 50% of high-grade serous tumors are affected by homologous DNA repair defects. The enzymes poly (ADP-ribose) polymerase (PARP) are required for efficient DNA repair. Inhibition of PARP ensures that DNA breaks cannot be repaired and thus results in cell death. Lynparza™ (olaparib) is an inhibitor of PARP enzymes, including PARP1, PARP2, and PARP3. PARP enzymes are involved in normal cellular homeostasis, such as DNA transcription, cell cycle regulation, and most notably DNA repair. Olaparib disrupts cellular homeostasis and induces cell death by inhibiting PARP enzymatic activity. In the presence of deleterious BRCA mutation, DNA single strand breaks occur which would require PARP enzymes for repair. PARP inhibitors disable this repair pathway rendering cell death.

Current standard treatment for advanced OC include cytoreductive surgery followed by chemotherapy with platinum and taxane based agents. However, there is a high risk for
recurrence and developing drug resistance. Patients who relapse within 6 months after initial chemotherapy are termed platinum-resistant. Platinum resistance is associated with lower subsequent response rate to subsequent regimens and lower survival.

**Zejula® (niraparib)**

Zejula® (niraparib) offers a significant increase in PFS in patients with platinum sensitive recurrent epithelial ovarian cancer. This is also the first PARPi to demonstrate efficacy in this population irrespective of BRCA mutation status. This is useful in that the patient will not be required to undergo expensive genetic testing prior to therapy.

The evidence supporting Zejula’s efficacy is sufficient and was demonstrated in the multi-center, randomized, double-blind, placebo-controlled ENGOT-OV16/NOVA trial that included 553 patients. The once-daily dosing and oral dosage form are also aspects which increase ease of use. Zejula has an extremely diverse adverse effect profile including an increased risk in MDS/AML and a warning for fetal toxicity. Post-marketing surveillance and patient reporting will be critical.

**Erivedge® (vismodegib)**

Erivedge® (vismodegib) is a Hedgehog pathway inhibitor. It binds to and inhibits Smoothened, a trans-membrane protein involved in Hedgehog signal transduction. It is indicated for treatment of advanced or metastatic basal cell carcinoma. While this cancer is most frequently cured by simple resection of the skin lesion, patients occasionally present with tumors that have remained untreated for a long period of time and as a result are either metastatic or have spread locally so as to be unresectable. Vismodegib was approved to provide a nonsurgical alternative for these patients.

**Odomzo® (sonidegib)**

The safety of ODOMZO was evaluated in Study 1, a randomized, double-blind, multiple cohort trial in which 229 patients received ODOMZO at either 200 mg (n=79) or 800 mg (n=150) daily. The frequency of common adverse reactions including muscle spasms, alopecia, dysgeusia, fatigue, nausea, decreased weight, decreased appetite, myalgia, pain, and vomiting was greater in patients treated with ODOMZO 800 mg as compared to 200 mg. The data described below
reflect exposure to ODOMZO 200 mg daily in 79 patients with locally advanced BCC (laBCC; n=66) or metastatic BCC (mBCC; n=13) enrolled in Study 1. Patients were followed for at least 18 months unless discontinued earlier. The median duration of treatment with ODOMZO was 11.0 months (range 1.3 to 33.5 months). The study population characteristics were: median age of 67 years (range 25 to 92; 59% were ≥65 years), 61% male, and 90% white. The majority of patients had prior surgery (75%), radiotherapy (24%), systemic chemotherapy (4%), or topical or photodynamic therapies (18%) for treatment of BCC. No patient had prior exposure to a hedgehog pathway inhibitor. ODOMZO was permanently discontinued in 34% of patients or temporarily interrupted in 20% of patients for adverse reactions. Adverse reactions reported in at least two patients that led to discontinuation of the drug were: muscle spasms and dysgeusia (each 5%), asthenia, increased lipase, and nausea (each 4%), fatigue, decreased appetite, alopecia, and decreased weight (each 3%). Serious adverse reactions occurred in 18% of patients. The most common adverse reactions occurring in ≥10% of patients treated with ODOMZO 200 mg were muscle spasms, alopecia, dysgeusia, fatigue, nausea, musculoskeletal pain, diarrhea, decreased weight, decreased appetite, myalgia, abdominal pain, headache, pain, vomiting, and pruritus.

**Ibrance® (palbociclib)**

Ibrance® (palbociclib) is an orally active selective and reversible inhibitor of CDK 4/6. The agent halts the progression of the cell cycle at G1 via its selective inhibition of CDK 4/6, thereby preventing cellular proliferation. Palbociclib is indicated in combination with letrozole for the treatment of postmenopausal women with ER+/HER2- advanced breast cancer as initial endocrine-based therapy for metastatic disease.

This indication was approved under accelerated approval based on PFS and continued approval may be contingent upon verification and description of clinical benefit in a confirmatory trial. The current approval was based on data from an international, randomized, double-blind, placebo-controlled, clinical trial (PALOMA-2) that randomized 666 postmenopausal women (2:1) to palbociclib plus letrozole or placebo plus letrozole. Palbociclib 125 mg or placebo was administered orally once daily for 21 consecutive days, followed by 7 days off. Letrozole 2.5 mg was administered orally once daily. Treatment continued until disease progression or unacceptable toxicity. The median progression-free survival (PFS) was 24.8 months in the palbociclib plus letrozole arm and 14.5 months in the placebo plus letrozole arm (HR=0.576, 95% CI: 0.463, 0.718, p<0.0001). Overall survival data are immature.

Safety data was evaluated in 444 patients who received palbociclib plus letrozole. Neutropenia was the most frequently reported adverse reaction in PALOMA-2 with an incidence of 80%. The
most common adverse reactions observed in 10% or more of patients taking palbociclib were neutropenia, infections, leukopenia, fatigue, nausea, alopecia, stomatitis, diarrhea, anemia, rash, asthenia, thrombocytopenia, vomiting, decreased appetite, dry skin, pyrexia, and dysgeusia. The most frequently reported grade 3 or greater adverse reactions in patients receiving palbociclib plus letrozole were neutropenia, leukopenia, infections, and anemia.

**Kisqali® (ribociclib)**

Kisqali® (ribociclib) offers a favorable overall response rate of 52.7% versus 37.1% in the ribociclib plus letrozole versus the placebo plus letrozole, respectively, and a median duration of response hazard ratio of 0.59 (95% CI: 0.41,0.85, P=.002). The evidence supporting efficacy are limited to the completed placebo-controlled and ongoing dose expansion-crossover Phase 3 trials, it does however present in favor of ribociclib when used in combination with letrozole. This drug is conveniently dosed in an oral, film-coated tablet has a diverse adverse effect profile with an increased risk of QT prolongation, hepatobiliary toxicity, neutropenia, embryo-fetal toxicity, and a warning for avoidance of the use in pregnancy. Post-marketing surveillance and close-monitoring will be critical.

**Rydapt® (midostaurin)**

Rydapt® (midostaurin) is approved for the first-line treatment of adults with FMS-like tyrosine kinase 3 mutation-positive (FLT3+) acute myeloid leukemia (AML) as detected by an FDA-approved test, in combination with chemotherapy. It is also approved to treat adults with aggressive systemic mastocytosis (ASM), systemic mastocytosis with associated hematological neoplasm (SM-AHN) or mast cell leukemia (MCL). The recommended dose for AML is 50mg twice daily with food. For ASM, SM-AHN and MCL, the recommended dose is 100mg twice daily with food. It will be available through open distribution.

This is the first significant advance in treatment of a subset of AML patients. AML is difficult to treat, with one year survival rates less than 50%.

The safety and efficacy of Rydapt for patients with AML were studied in a randomized trial of 717 patients who had not been treated previously for AML. In the trial, patients who received Rydapt in combination with chemotherapy lived longer than patients who received chemotherapy alone, although a specific median survival rate could not be reliably estimated. In addition, patients who received Rydapt in combination with chemotherapy in the trial went longer (median 8.2 months) without certain complications (failure to achieve complete remission.
within 60 days of starting treatment, progression of leukemia or death) than patients who received chemotherapy alone (median three months).

Common side effects of Rydapt in patients with AML include low levels of white blood cells with fever (febrile neutropenia), nausea, inflammation of the mucous membranes (mucositis), vomiting, headache, spots on the skin due to bleeding (petechiae), musculoskeletal pain, nosebleeds (epistaxis), device-related infection, high blood sugar (hyperglycemia) and upper respiratory tract infection. Rydapt should not be used in patients with hypersensitivity to midostaurin or other ingredients in Rydapt. Women who are pregnant or breastfeeding should not take Rydapt because it may cause harm to a developing fetus or a newborn baby. Patients who experience signs or symptoms of lung damage (pulmonary toxicity) should stop using Rydapt.

Rydapt was also approved today for adults with certain types of rare blood disorders (aggressive systemic mastocytosis, systemic mastocytosis with associated hematological neoplasm or mast cell leukemia). Common side effects of Rydapt in these patients include nausea, vomiting, diarrhea, swelling (edema), musculoskeletal pain, abdominal pain, fatigue, upper respiratory tract infection, constipation, fever, headache and shortness of breath.

**Gazyva® (obinutuzumab)**

Gazyva® (obinutuzumab) targets the CD20 antigen expressed on the surfaces of pre-B and mature B-lymphocytes. After binding, obinutuzumab mediates B-cell lysis by engaging immune effector cells, directly activating direct cell death pathways, and/or activating the complement cascade. The immune effector cell mechanisms include antibody-dependent cellular cytotoxicity (ADCC) and antibody-dependent cellular phagocytosis.

**Bavencio® (avelumab)**

Bavencio® (avelumab) is the first FDA approved pharmacotherapy for Merkel cell carcinoma. avelumab offers a significant increase in ORR and median DOR in patients with histologically confirmed stage IV Merkel cell carcinoma refractory to chemotherapy. Efficacy was demonstrated irrespective of PD-L1 status, eliminating the need for expensive genetic testing prior to therapy administration.

To the evidence supporting avelumab’s efficacy was demonstrated in the JAVELIN Merkel 200 trial. The multi-center, open-label, non-randomized trial included 88 patients with stage IV
Merkel cell carcinoma. The efficacy results yielded an ORR of 33.0% (95% CI, 23.3-34.8) with a complete response rate of 11.4% (95% CI, 6.6-19.8) and a partial response rate of 21.6% (95% CI, 13.5-31.7). At the time of the data cutoff the median duration of response had not been reached and response duration had ranged from 2.8 months to 23.3+ months.

**Imfinzi® (durvalumab)**

Imfinzi® (durvalumab) received accelerated FDA approval. It is a programmed death ligand 1 (PD-L1) inhibitor approved for use in patients whose locally advanced or metastatic urothelial carcinoma (bladder, ureter and/or urethra cancer) progresses during or following platinum-containing chemotherapy. Durvalumab also is indicated for patients who have disease progression within 12 months of neoadjuvant or adjuvant treatment with platinum-containing chemotherapy. It is administered once every two weeks as a one-hour IV infusion.

**Lonsurf® (trifluridine and tipiracil)**

Lonsurf® is a combination of trifluridine, a nucleoside metabolic inhibitor, and tipiracil, a thymidine phosphorylase inhibitor. Inclusion of tipiracil increases trifluridine exposure by inhibiting its metabolism by thymidine phosphorylase. Following uptake into cancer cells, trifluridine is incorporated into DNA, interferes with DNA synthesis and inhibits cell proliferation. Trifluridine/tipiracil demonstrated anti-tumor activity against KRAS wild-type and mutant human colorectal cancer xenografts in mice.

**Ninlaro® (ixazomib)**

Ninlaro® (ixazomib) is a reversible proteasome inhibitor. It preferentially binds and inhibits the chymotrypsin-like activity of the beta 5 subunit of the 20S proteasome. Ixazomib induced apoptosis of multiple myeloma cell lines in vitro. It demonstrated in vitro cytotoxicity against myeloma cells from patients who had relapsed after multiple prior therapies, including bortezomib, lenalidomide, and dexamethasone. The combination of ixazomib and lenalidomide demonstrated synergistic cytotoxic effects in multiple myeloma cell lines. In vivo, ixazomib demonstrated antitumor activity in a mouse multiple myeloma tumor xenograft model.
**Lartruvo® (olaratumab)**

Lartruvo® (olaratumab) is a human IgG1 antibody that binds platelet-derived growth factor receptor alpha (PDGFR-α). PDGFR-α is a receptor tyrosine kinase expressed on cells of mesenchymal origin. Signaling through this receptor plays a role in cell growth, chemotaxis, and mesenchymal stem cell differentiation. The receptor has also been detected on some tumor and stromal cells, including sarcomas, where signaling can contribute to cancer cell proliferation, metastasis, and maintenance of the tumor microenvironment. The interaction between olaratumab and PDGFR-α prevents binding of the receptor by the PDGF-AA and –BB ligands as well as PDGF-AA, -BB, and –CC-induced receptor activation and downstream PDGFR-α pathway signaling. Olaratumab exhibits in vitro and in vivo anti-tumor activity against selected sarcoma cell lines and disrupted the PDGFR-α signaling pathway in vivo tumor implant models.

**Rubraca® (rucaparib)**

Rubraca® (rucaparib) is an inhibitor of poly (ADP-ribose) polymerase (PARP) enzymes, including PARP-1, PARP-2, and PARP-3, which play a role in DNA repair. In vitro studies have shown that rucaparib-induced cytotoxicity may involve inhibition of PARP enzymatic activity and increased formation of PARP-DNA complexes resulting in DNA damage, apoptosis, and cell death. Increased rucaparib-induced cytotoxicity was observed in tumor cell lines with deficiencies in BRCA1/2 and other DNA repair genes. Rucaparib has been shown to decrease tumor growth in mouse xenograft models of human cancer with or without deficiencies in BRCA.

**Verzenio™ (abemaciclib)**

Verzenio™ (abemaciclib) selectively inhibits cyclin-dependent kinases (CDK) 4 and 6 (CDK 4/6), It blocks retinoblastoma tumor suppressor protein phosphorylation and prevents progression through the cell cycle, resulting in arrest at the G1 phase.

**Aliqopa™ (copanlisib)**

Aliqopa™ (copanlisib) inhibits phosphatidylinositol-3-kinase (PI3K), with activity primarily against PI3K-α and PI3K-δ isoforms expressed by malignant B cells. It leads to tumor cell death via apoptosis and inhibition of proliferating malignant B cell lines. Copanlisib inhibits several
signaling pathways: b-cell receptor (BCR) signaling, CXCR12 mediated chemotaxis of malignant B cells, and NFκB signaling in lymphoma cell lines.

**Tibsovo™ (ivosidenib)**

Tibsovo™ (ivosidenib) is the first approved oral therapy that targets mutant IDH1 in AML. IDH1 is one of three known driver mutations with poor prognosis in AML. The efficacy of ivosidenib was evaluated in a Phase I, multicenter, open-label, dose-escalation and expansion clinical study of orally administered AG-120 in subjects with advanced hematologic malignancies with an IDH1 mutation. The first portion of the study is a dose-escalation to find the highest tolerable dose of the combination of ivosidenib that can be given to patients with relapsed or refractory AML with IDH1 mutation. The second part of the study or dose expansion found the highest tolerable dose of ivosidenib that can help to control the disease.

In the dose-escalation and expansion clinical trial of ivosidenib, the primary outcome was an objective response rate (ORR) of 41.6%. Ivosidenib induced a complete response (CR) or a CR with a partial hematologic recovery (CPh) in 30.4% of the study population. The secondary outcome was a median duration of response of 9.3 months for patients who achieved a CR, 8.2 months for those who achieved a CR/CRh, and 6.5 months for all responders. The median time to first response was 1.9 months, median time to CR was 2.8 months, and the median time to CR/CRh was 2.7 months.

The safety of ivosidenib was evaluated in the Phase I dose-escalation and dose expansion study mentioned above. The most common adverse events were diarrhea (33.3%), elevated levels of white blood cells (30.2%), nausea (29.5%), fatigue (28.7%), and febrile neutropenia (25.2%); 10 (8%) of 125 patients had grade 3 QT prolongation. Ivosidenib was reduced in one patient and held in five patients (for any grade of QT prolongation), and no cases were Grade 4 or fatal. The prevalence of differentiation syndrome (DS) was observed in 11.2% of patients, but no instances of DS leading to permanent treatment discontinuation or death.
Recurrent or Metastatic Squamous Cell Carcinoma of the Head and Neck (SCCHN)

Trial 9 was a randomized (2:1), active-controlled, open-label study enrolling patients with metastatic or recurrent SCCHN who had experienced disease progression during or within 6 months of receiving platinum-based therapy administered in either the adjuvant, neo-adjuvant, primary (unresectable locally advanced) or metastatic setting.

The trial excluded patients with autoimmune disease, medical conditions requiring immunosuppression, recurrent or metastatic carcinoma of the nasopharynx, squamous cell carcinoma of unknown primary histology, salivary gland or non-squamous histologies (eg, mucosal melanoma), or untreated brain metastasis. Patients with treated brain metastases were eligible if neurologically stable. Patients were randomized to receive OPDIVO administered intravenously (IV) at 3 mg/kg every 2 weeks or investigator’s choice of cetuximab, methotrexate, or docetaxel.

Randomization was stratified by prior cetuximab treatment (yes/no). The first tumor assessments were conducted 9 weeks after randomization and continued every 6 weeks thereafter. The major efficacy outcome measure was OS. Additional efficacy outcome measures were PFS and ORR. In Trial 9, a total of 361 patients were randomized; 240 patients to OPDIVO and 121 patients to investigator’s choice (45% received docetaxel, 43% received methotrexate, and 12% received cetuximab). The median age was 60 years (range: 28 to 83) with 31% ≥65 years of age, 83% were White, 12% Asian, and 4% were Black, and 83% male. Baseline ECOG performance status was 0 (20%) or 1 (78%), 76% were former/ current smokers, and 90% had Stage IV disease. Forty-five percent of patients received only one prior line of systemic therapy, the remaining 55% received two or more prior lines of systemic therapy. Twenty-five percent had HPVp16-positive tumors, 24% had HPV p16-negative tumors, and 51% had unknown status. The trial demonstrated a statistically significant improvement in OS for patients randomized to OPDIVO as compared with investigator’s choice at a pre-specified interim analysis (78% of the planned number of events for final analysis). The survival results are displayed in Table 20 and Figure 11. There were no statistically significant differences between the two arms for PFS (HR=0.89; 95% CI: 0.70, 1.13) or ORR (13.3% [95% CI: 9.3, 18.3] vs 5.8% [95% CI: 2.4, 11.6] for nivolumab and investigator’s choice, respectively).

Urothelial Carcinoma

In Trial 10, 270 patients with locally advanced or metastatic urothelial carcinoma who had disease progression during or following platinum-containing chemotherapy or who had disease
progression within 12 months of treatment with a platinum-containing neoadjuvant or adjuvant chemotherapy regimen were treated with OPDIVO. Patients were excluded for active brain or leptomeningeal metastases, active autoimmune disease, medical conditions requiring systemic immunosuppression, and ECOG performance status >1. Patients received an intravenous infusion of 3 mg/kg of OPDIVO every 2 weeks until unacceptable toxicity or either radiographic or clinical progression. Tumor response assessments were conducted every 8 weeks for the first 48 weeks and every 12 weeks thereafter. Major efficacy outcome measures included confirmed objective response rate (ORR) as assessed by independent radiographic review committee (IRRC) using Response Evaluation Criteria in Solid Tumors (RECIST v1.1) and duration of response (DOR). The median age was 66 years (range 38 to 90), 78% were male, 86% of patients were white. Twenty-seven percent had non-bladder urothelial carcinoma and 84% had visceral metastases. Thirty-four percent of patients had disease progression following prior platinum-containing neoadjuvant or adjuvant therapy. Twenty-nine percent of patients had received ≥2 prior systemic regimens in the metastatic setting. Thirty-six percent of patients received prior cisplatin only, 23% received prior carboplatin only, and 7% were treated with both cisplatin and carboplatin in the metastatic setting. Forty-six percent of patients had an ECOG performance status of 1. Eighteen percent of patients had a hemoglobin <10 g/dL, and 28% of patients had liver metastases at baseline. Patients were included regardless of their PD-L1 status. Tumor specimens were evaluated prospectively using the PD-L1 IHC 28-8 pharmDx assay at a central laboratory and the results were used to define subgroups for pre-specified analyses. Of the 270 patients, 46% were defined as having PD-L1 expression of ≥1% (defined as ≥1% of tumor cells expressing PD-L1). The remaining 54% of patients, were classified as having PD-L1 expression of <1% (defined as <1% of tumor cells expressing PD-L1). Confirmed ORR in all patients and the two PD-L1 subgroups are summarized in Table 23. Median time to response was 1.9 months (range; 1.6-7.2). In 77 patients who received prior systemic therapy only in the neoadjuvant or adjuvant setting, the ORR was 23.4% (95% CI: 14.5%, 34.4%).

**Lynparza™ (olaparib)**

There is limited evidence from a non-randomized open-label study in patients with deleterious or suspected deleterious gBRCAm-associated advanced ovarian cancer. All patients (N=193) were treated with Lynparza™ (olaparib) with an objective response rate of 31% and a median duration of response of 7.4 months. In the subgroup of patients who had 3 or more lines of prior chemotherapy (n=137), ORR was 34%, mostly classified as partial response (CR 2%, PR 32%). Median duration of response was 7.9 months. A separate randomized open-label study showed similar progression free survival (8.8 vs. 7.1 months) and objective response rate (31% vs. 18%, NS) after treatment with olaparib or pegylated liposomal doxorubicin, respectively, in
97 gBRCAm patients. Over half of the patients had received 3 or more prior chemotherapy regimens. The use of olaparib as a maintenance agent following objective response to chemotherapy was not well supported by current evidence and not approved by the FDA. No evidence of real world effectiveness was found at the time of review. An indirect comparison of response rates for olaparib (from the single pivotal trial) to historically reported response rates of other therapeutic agents in heavily pretreated advanced ovarian cancer patients was performed by the FDA. Estimated response rate to 4th-line alternative chemotherapy regimens is 10-20%, but it is expected gBRCAm patients would have a higher response rate. Olaparib appears to provide at least a similar to a more favorable response rate in this heavily pretreated population, with a response rate of 34% from the pivotal trial.

The incidence of myelodysplastic syndrome and/or acute myeloid leukemia (MDS/AML) in olaparib clinical trials is higher than that reported generally in ovarian cancer patients, 0.8% to 3.1% vs. 0.0033% respectively. Seventeen of the 22 cases found in olaparib clinical trials were fatal. Post-marketing surveillance and monthly monitoring of complete blood count is warranted. Other serious concerns include potential development of secondary malignancy and pneumonitis. Common adverse events include mostly gastrointestinal complaints and fatigue. Anemia is the most frequently reported serious adverse event. In the comparative trial against liposomal doxorubicin, olaparib is associated with numerically less serious adverse events than liposomal doxorubicin. The most reported serious adverse events were anemia for olaparib and palmar-plantar erythrodysesthesia syndrome for liposomal doxorubicin.

**Erivedge® (vismodegib)**

Erivedge® (vismodegib) is a Hedgehog pathway inhibitor. It binds to and inhibits Smoothened, a trans-membrane protein involved in Hedgehog signal transduction. The evidence of efficacy was established in the pivotal Phase II open label trial of vismodegib 150mg once daily. This study demonstrated a statistically significant single-agent activity for both locally advanced (42.9% response rate; p<0.0001) and metastatic (30.3% response rate; p=0.0011) basal cell carcinoma (laBCC and mBCC respectively). Overall median duration of treatment for the combined cohorts (n=104) was 9.7 months (range 1.1 to 18.7 months). The median duration of response was 7.6 months and median progression free survival (PFS) was 9.5 months for both groups (independently). This data is pending press in the New England Journal of Medicine and is currently only available from the manufacturer. Published efficacy data is only available from the extension of the open label Phase I study currently ongoing. As of January 2010, there were 2 patients who achieved complete remission and 17 who achieved partial response from the original 33 patients enrolled in the study who had aBCC (overall response of 57%).
**Ibrance® (palbociclib)**

Ibrance® (palbociclib) was approved under accelerated approval based on PFS and continued approval may be contingent upon verification and description of clinical benefit in a confirmatory trial. A single, randomized Phase II trial demonstrated that the addition of palbociclib to letrozole significantly improved PFS compared to letrozole alone for patients with ER+/HER2- advanced breast cancer. The results for PFS were robust and continued to strongly favor palbociclib plus letrozole in a secondary analysis performed by a blinded independent review committee, across multiple sensitivity analyses and in all studied clinical subgroups. The secondary efficacy endpoint results also consistently favored or trended to favor the combination treatment group. The safety profile of palbociclib plus letrozole appeared to be manageable with the majority of AEs mild to moderate and managed by dose delay and modification. There were no cases of febrile neutropenia seen in the registration trial. The rare incidence of PEs that occurred in patients treated with palbociclib was troubling and will need to be further assessed in the larger Phase III trials. There are several ongoing Phase III trials with palbociclib in pre and postmenopausal patients, in advanced and early breast cancer, in combination with other agents. Palbociclib has also been studied in several early phase trials for various off-label indications including HCC, MCL, MM, NSCLC, and Rb+ germ cell tumors.

**Gazyva® (obinutuzumab)**

Clinical trials explored the safety of Gazyva® (obinutuzumab) in previously untreated patients with CLL. Patients were treated with chlorambucil alone, obinutuzumab + chlorambucil, or rituximab + chlorambucil. Adverse reactions included infusion reactions, neutropenia, thrombocytopenia, leukopenia, pyrexia, diarrhea, constipation, nasopharyngitis, and urinary tract infections. These adverse reactions are consistent with those seen comparing obinutuzumab + chlorambucil to chlorambucil alone except back pain (5% vs. 2%), anemia (12% vs. 10%) and cough (10% vs. 7%), which were observed at a higher incidence in the obinutuzumab treated patients. The incidence of Grade 3-4 back pain (<1% vs. 0%), cough (0% vs. <1%) and anemia (5% vs. 4%) was similar in both treatment arms.

Obinutuzumab was approved on the basis of an improvement in progression-free survival (PFS) in a randomized, open-label, multicenter trial in patients with Follicular Lymphoma, which is a type of the Non-Hodgkin Lymphoma, with no response or who have progressed within 6 months of a rituximab-containing regimen. These patients were randomized to bendamustine alone (n = 166) or bendamustine + obinutuzumab (n = 155) for six 28 day cycles. Patients in the
combination arm who had a complete response (CR), partial response (PR), or stable disease (SD) at the end continued obinutuzumab monotherapy for two years. The primary endpoints included PFS. The median PFS in the combination arm was not reported, whereas the bendamustine arm was 13.8 months. The best overall response was 78.7% for obinutuzumab combination and 74.7% for bendamustine alone, which was defined as the best CR/PR within 12 months of initiating therapy. The most common adverse reactions (≥ 10%) were infusion reactions, neutropenia, nausea, fatigue, cough, diarrhea, constipation, pyrexia, thrombocytopenia, vomiting, upper respiratory tract infection, decreased appetite, arthralgia, sinusitis, anemia, asthenia, and urinary tract infections. The most common grade 3-4 reactions (≥ 10%) were neutropenia, thrombocytopenia, and infusion reactions. The safety profile was consistent with the overall indolent non-Hodgkin lymphoma population.

**Lonsurf® (trifluridine and tipiracil)**

The clinical efficacy and safety of Lonsurf® (trifluridine and tipiracil) were evaluated in an international, randomized, double-blind, placebo-controlled study conducted in patients with previously treated metastatic colorectal cancer (CRC).

A total of 800 patients were randomized 2:1 to receive Lonsurf® (N=534) plus best supportive care (BSC) or matching placebo (N=266) plus BSC. Randomization was stratified by KRAS status (wild-type vs. mutant), time since diagnosis of first metastasis (<18 months vs. ≥ 18 months), and region (Japan vs. US, Europe and Australia). Key eligibility criteria included prior treatment with at least 2 lines of standard chemotherapy for metastatic CRC, ECOG 0-1, absence of brain metastasis, and absence of ascites requiring drainage in the past four weeks. Patients received 35 mg/m² Lonsurf® or matching placebo orally twice daily after meals on Days 1 - 5 and 8 – 12 of each 28-day cycle until disease progression or unacceptable toxicity. The major efficacy outcome measure was overall survival (OS) and an additional efficacy outcome measure was progression-free survival (PFS). The median age was 63 years, 61% were male, 58% and 35% were White and Asian respectively, and all patients had baseline ECOG Performance Status (PS) of 0 or 1. The primary site of disease was colon (62%) or rectum (38%). KRAS status was wild-type (49%) or mutant (51%) at study entry. All patients received prior treatment with fluoropyrimidine-, oxaliplatin-, and irinotecan-based chemotherapy. All but one patient received bevacizumab, and all but two patients with KRAS wild-type tumors received panitumumab or cetuximab. A statistically significant improvement in overall survival and progression-free survival were demonstrated in patients in the Lonsurf® plus BSC arm compared to those who received placebo plus BSC.
Ninlaro® (ixazomib)

The efficacy and safety of Ninlaro® in combination with lenalidomide and dexamethasone was evaluated in a randomized, double-blind, placebo-controlled, multicenter study in patients with relapsed and/or refractory multiple myeloma who had received at least one prior line of therapy. Patients who were refractory to lenalidomide or proteasome inhibitors were excluded from the study. A total of 722 patients were randomized in a 1:1 ratio to receive either the combination of Ninlaro®, lenalidomide and dexamethasone (N=360; Ninlaro® regimen) or the combination of placebo, lenalidomide and dexamethasone (N=362; placebo regimen) until disease progression or unacceptable toxicity. Randomization was stratified according to number of prior lines of therapy (1 versus 2 or 3), myeloma International Staging System (ISS) (stage I or II versus III), and previous therapy with a proteasome inhibitor (exposed or naïve). Twenty three percent (N=166) of the patients had light chain disease and 12% (N=87) of patients had free light chain-measurable only disease. Thromboprophylaxis was recommended for all patients in both treatment groups according to the lenalidomide prescribing information. Antiemetics were used in 19% of patients in the Ninlaro® regimen and 12% of patients in the placebo regimen; antivirals in 64% and 60%, respectively, and antihistamines in 27% and 19%, respectively. These medications were given to patients at the physician’s discretion as prophylaxis and/or management of symptoms. Patients received Ninlaro® 4 mg or placebo on Days 1, 8, and 15 plus lenalidomide (25 mg) on Days 1 through 21 and dexamethasone (40 mg) on Days 1, 8, 15, and 22 of a 28-day cycle. Patients with renal impairment received a starting dose of lenalidomide according to its prescribing information. Treatment continued until disease progression or unacceptable toxicities. The efficacy of Ninlaro® was evaluated by progression-free survival (PFS) according to the 2011 International Myeloma Working Group (IMWG) Consensus Uniform Response Criteria as assessed by a blinded independent review committee (IRC) based on central lab results. Response was assessed every four weeks until disease progression.

The approval of Ninlaro® was based upon a statistically significant improvement in PFS of the Ninlaro® regimen compared to the placebo regimen. The median time to response was 1.1 months in the NINLARO regimen and 1.9 months in the placebo regimen. The median duration of response was 20.5 months in the Ninlaro® regimen and 15 months in the placebo regimen for responders in the response evaluable population. A non-inferential PFS analysis was conducted at a median follow up of 23 months with 372 PFS events. Hazard ratio of PFS was 0.82 (95% confidence interval [0.67, 1.0]) for Ninlaro® regimen versus placebo regimen, and estimated median PFS was 20 months in the Ninlaro® regimen and 15.9 months in the placebo regimen. At the same time, a planned interim OS analysis was conducted with 35% of the
required number of deaths for final OS analysis; there were 81 deaths in the Ninlaro® regimen and 90 deaths in the placebo regimen. An OS benefit was not demonstrated.

**Lartruvo® (olaratumab)**

The efficacy of Lartruvo® (olaratumab) was demonstrated in Trial 1, an open-label, randomized, active-controlled study. Eligible patients were required to have soft tissue sarcoma not amenable to curative treatment with surgery or radiotherapy, a histologic type of sarcoma for which an anthracycline-containing regimen was appropriate but had not been administered, ECOG PS of 0-2, and tumor specimen available for assessment of PDGFR-α expression by an investigational use assay. Patients were randomized (1:1) to receive olaratumab in combination with doxorubicin or doxorubicin as a single agent. PDGFR-α expression (positive versus negative), number of previous lines of treatment (0 versus 1 or more), histological tumor type (leiomyosarcoma versus synovial sarcoma versus all others), and ECOG PS (0 or 1 versus 2) were used to allocate patients in the randomization. Olaratumab was administered at 15 mg/kg as an intravenous infusion on Days 1 and 8 of each 21-day cycle until disease progression or unacceptable toxicity. All patients received doxorubicin 75 mg/m2 as an intravenous infusion on Day 1 of each 21-day cycle for a maximum of eight cycles and were permitted to receive dexrazoxane prior to doxorubicin in Cycles 5 to 8. Patients randomized to receive doxorubicin as a single agent were offered olaratumab at the time of disease progression. The efficacy outcome measures were overall survival (OS), and progression-free survival (PFS) and objective response rate (ORR) as assessed by investigator and by independent review according to RECIST v1.1. A total of 133 patients were randomized, 66 patients to the LARTRUVO plus doxorubicin arm and 67 patients to the doxorubicin arm. Baseline demographics and disease characteristics were: median age of 58 years (range 22 to 86); 44% men; 86% White, 8% Black, 3% Asian, and 2% Other; 56% ECOG PS 0 and 39% ECOG PS 1; 65% no prior chemotherapy (excluding adjuvant and neoadjuvant therapy); 38% leiomyosarcoma, 1.5% synovial sarcoma, and 61% other histologies [17% liposarcoma (8% dedifferentiated, 4% myxoid, 3% well-differentiated, 1.5% pleomorphic, 1% liposarcoma not otherwise specified (NOS)), 11% undifferentiated pleomorphic sarcoma, 5% angiosarcoma, 5% undifferentiated sarcoma NOS, 3% extraskeletal myxoid chondrosarcoma, 2% malignant peripheral nerve sheath tumor, 2% myxofibrosarcoma, 2% malignant solitary fibrous tumor, 2% endometrial stromal sarcoma, 1.5% chondrosarcoma, 1.5% epithelioid sarcoma, 1.5% fibrosarcoma, 1.5% low-grade fibromyxoid sarcoma, and 5% other histologies with one patient each]. All patients had metastatic disease and were enrolled at U.S. sites. Among patients randomized to doxorubicin, 30 (45%) patients received LARTRUVO as a single agent at the time of disease progression. Trial 1 demonstrated a significant improvement in overall survival.
Rubraca® (rucaparib)

Rubraca® (rucaparib) 600mg twice daily as monotherapy has been studied in 377 patients with ovarian cancer treated in two open label, single arm trials. In these patients, the median age was 62 years (range 31 to 86), 100% had an Eastern Cooperative Oncology Group (ECOG) performance status of 0 or 1, 38% had BRCA-mutated ovarian cancer, 45% had received 3 or more prior lines of chemotherapy, and the median time since ovarian cancer diagnosis was 43 months (range 6 to 197). Adverse reactions led to dose reduction or interruption in 62% of patients, most frequently from anemia (27%), and fatigue/asthenia (22%). Adverse reactions led to dose discontinuation in 10% of patients, most frequently from fatigue/asthenia (2%). The median duration of treatment was 5.5 months (range 0.1 to 28.0).

Idhifa® (enasidenib)

The efficacy of Idhifa® (enasidenib) 100 mg was evaluated in an open-label, single-arm, multicenter, two-cohort clinical trial of 199 patients with relapsed or refractory AML and an IDH2 mutation. IDH2 mutations were identified by a local diagnostic test and retrospectively confirmed by the Abbott RealTime IDH2 assay or prospectively identified by the Abbott RealTime IDH2 assay. Efficacy was based off of the rate of complete response (CR)/complete response with partial hematologic recovery (CR/CRh), the duration of CR/CRh, and the rate of conversion from transfusion dependence to transfusion independence. For patients who achieved a CR/CRh, the median time to first response was 1.9 months and the median time to best response was 3.7 months. Of the 157 patients who were dependent on red blood cell and/or platelet transfusions at baseline, 34% became independent of transfusions during any 56-day post baseline period.65

Verzenio™ (abemaciclib)

The efficacy of Verzenio™ (abemaciclib) in combination with Faslodex® (fulvestrant) was evaluated in the Monarch 2 trial. Monarch 2 was a randomized, placebo-controlled, multicenter study in 669 women with HR-positive, HER2-negative metastatic breast cancer in patients with disease progression on endocrine therapy. The primary endpoint was progression-free survival. The median extended progression free survival duration for abemaciclib plus fulvestrant vs. fulvestrant alone was 16.4 months vs. 9.3 months. The efficacy of Verzenio™ as monotherapy
was evaluated in the Monarch 1 trial. Monarch 1 was a single-arm, open-label, multicenter study in 132 women with measurable HR-positive, HER2-negative metastatic breast cancer whose disease progressed during endocrine therapy, had received taxane in any setting, and who received 1 or 2 prior chemotherapy regimens in the metastatic setting. The primary objective of Monarch 1 was investigator-assessed objective response rate. Other endpoints were clinical benefit rate, progression-free survival, and overall survival. At the 12 month final analysis, the confirmed objective response rate was 19.7%, median progression-free survival was 6 months and median overall survival was 17.7 months.

**Aliqopa™ (copanlisib)**

The efficacy of Aliqopa™ (copanlisib) in patients with R/R FL was evaluated in a phase II published trial along with two published study abstracts and provided dossier information. Current evidence is from examining the efficacy of copanlisib in phase II, open-label, uncontrolled trials. In each of these studies, the primary efficacy endpoint was overall response rate (ORR). Copanlisib was not compared to placebo or an active control in any completed trials. Therefore, it is unclear if it is superior to watchful waiting, as measured via placebo, or an active control. Watchful waiting is a common practice with indolent follicular lymphoma.

The pivotal trial was CHRONOS-1 Part A, and included patients with both indolent and aggressive FL. All efficacy endpoints (ORR, median progression free survival (MPFS), median duration of response (MDR)) were larger in the indolent group compared to patients with aggressive FL. This is expected due to the nature of these forms of the disease. For both patient types, survival and response rates ranged from 0 to over 890 days, suggesting some patients simply respond to copanlisib better than others. Median time to response was 52 days (0-109 days) indolent and 51 days (range 0-117) in the aggressive cohort. Providers would most likely be able to assess efficacy and response in less than 2 months, and at most by 4 months of treatment. In CHRONOS-1, patients with aggressive lymphoma were treated for an average of 2 cycles compared to indolent patients with an average of 5.5 cycles.

CHRONOS-1 Part B was an extension in the examination of the efficacy of copanlisib, though only in indolent lymphoma patients. Similar response rates and duration of response were observed to the indolent cohort in Part A. In the study examining copanlisib in DLBCL, an aggressive lymphoma, results were also similar to the aggressive cohort in CHRONOS-1 Part A. DLBCL is considered a curable disease; however, the study failed to report cure rates of any patients.
2013 Update

Policy was updated to reflect new NCCN guidelines which recommend abiraterone as an initial therapy for metastatic castrate-resistant prostate cancer.

2014 Update

A literature search from 7/1/12 to 10/31/14 found no new evidence requiring changes to this policy.

2015 Update

A literature search from 1/1/14 to 3/31/15 found no new evidence requiring changes to the Erivedge® (vismodegib) policy. Added criteria for two recently approved drugs: Opdivo® (nivolumab) and Lynparza™ (olaparib). Added criteria for recently approved drug: Ibrance® (palbociclib).

2016 Update

A literature search and review was conducted focusing on recently FDA-approved indications for use of Opdivo® (nivolumab) and Keytruda® (pembrolizumab) in non-small cell lung cancer, and for nivolumab in renal cell carcinoma. We also reviewed this evidence for combined use of nivolumab and ipilimumab in unresectable or metastatic melanoma. Medical necessity language was updated per new product labels.

Reasonable evidence exists to support the use of ipilimumab, nivolumab, the combination of ipilimumab + nivolumab and Keytruda® (pembrolizumab) in the treatment of advanced and metastatic melanoma. Median survival benefits seem to fall in the range of 3-4 months, with the combination PD-1/CTLA-4 inhibition yielding slightly longer survival. To date the evidence is spotty and lacking in head-to-head comparisons. NCCN guidelines do not rate one option over others. Given the number of different molecular targets now available (PD-1, CTLA-4, BRAF V600, MEK) it is impossible to say at this point which is the best treatment sequence to follow.

Tecentriq’s label criteria was added to the policy, along with description and rationale sections for this drug. Keytruda recently got a new recommendation for use in NSCLC as a first-line agent. Added criteria (along with description and rationale) for recently approved drugs:
Lonsurf®, Ninlaro, and Lartruvo. Tecentriq’s recent approval in the setting of NSCLC was also added to the policy.

Added criteria per label for Rubraca® (rucaparib), along with the drug description and clinical trials rationale.

2017 Update

Added two new indications for Opdivo® (nivolumab). Added four new indications for Keytruda® (pembrolizumab) and included their references.

2018 Update

Added Paloma-2 study for Ibrance® (palbociclib) and Rydapt® (midostaurin) safety and efficacy study in drug description.

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41. FDA Approved Drugs for Ibrance. Available at: https://www.fda.gov/Drugs/InformationOnDrugs/ApprovedDrugs/ucm549978.htm Accessed October 2018.

42. FDA Approved Drugs for Rydapt. Available at: https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm555778.htm Accessed October 2018.


## History

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
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<tbody>
<tr>
<td>06/12/12</td>
<td>New policy, add to Prescription Drug section. Reviewed by Pharmacy &amp; Therapeutics Committee, June 2012.</td>
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<tr>
<td>07/08/13</td>
<td>Minor Update – Clarification was added to the policy that it is managed through the</td>
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<tr>
<td>10/14/13</td>
<td>Replace policy. Policy updated to reflect new NCCN guidelines which recommend abiraterone as an initial therapy for metastatic castrate-resistant prostate cancer.</td>
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<tr>
<td>11/11/13</td>
<td>Replace policy. Policy section updated with the removal of Zytiga® (abiraterone); Rationale section updated in accordance with this change. (See policy 5.01.544 for coverage on Zytiga®).</td>
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<tr>
<td>12/08/14</td>
<td>Annual review. Policy updated with literature review; no change in policy statement.</td>
</tr>
<tr>
<td>05/27/15</td>
<td>Annual Review. Policy updated with literature review. Title changed to match the scope of the policy which is no longer limited to oral medications. New policy statements added: nivolumab and olaparib may be considered medically necessary; Opdivo for treatment metastatic squamous non-small cell lung cancer with progression on or after platinum-based chemotherapy may be considered medically necessary; all other uses of Erivedge, Lynparza or Opdivo are considered investigational. Rationale section updated in accordance with this change and new references added. The word &quot;oral&quot; removed from the title to match the scope of the policy.</td>
</tr>
<tr>
<td>07/14/15</td>
<td>Interim Update. Added new policy statements for newly approved drug palbociclib.</td>
</tr>
<tr>
<td>01/19/16</td>
<td>Coding update. New HCPCS codes J3380 and J9299 – effective 1/1/16 – added to policy.</td>
</tr>
<tr>
<td>01/29/16</td>
<td>Minor update. Removed code J3380.</td>
</tr>
<tr>
<td>04/01/16</td>
<td>Annual review, approved March 8, 2016. Policy updated to reflect current labeling indications.</td>
</tr>
<tr>
<td>05/26/16</td>
<td>Coding update. J9271 added, effective 1/1/16.</td>
</tr>
<tr>
<td>10/01/16</td>
<td>Interim update, approved September 13, 2016: inclusion of a new indication for Opdivo and Keytruda. Addition of length of approval as 3 months. Inclusion of Gazyva criteria, and rationale for Yervoy.</td>
</tr>
<tr>
<td>11/01/16</td>
<td>Interim review, approved October 11, 2016. Tecentriq criteria and description added to the policy.</td>
</tr>
<tr>
<td>12/01/16</td>
<td>Interim review, approved November 8, 2016. Keytruda's criteria was updated to reflect first-line use in NSCLC. Also, Lonsurf, Ninlaro, and Lartruvo criteria was added to the policy. Tecentriq’s newest indication for NSCLC was also added to the policy.</td>
</tr>
<tr>
<td>01/01/17</td>
<td>Interim review, approved December 13, 2016. Minor clarifications made to the criteria language. Also, Yervoy's criteria has been expanded based on NCCN guidelines.</td>
</tr>
<tr>
<td>02/01/17</td>
<td>Annual review, approved January 10, 2017. Added ruparcarib's labeled criteria, as well as drug description and clinical trials rationale. References section has been updated accordingly.</td>
</tr>
<tr>
<td>03/01/17</td>
<td>Interim review, approved February 14, 2017. Added two new indications for nivolumab (recurrent or metastatic squamous cell carcinoma of the head and neck; urothelial</td>
</tr>
<tr>
<td>Date</td>
<td>Comments</td>
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<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>04/01/17</td>
<td>Interim review, approved March 14, 2017. Updated criteria for Lartruvo.</td>
</tr>
<tr>
<td>06/01/17</td>
<td>Interim review, approved May 16, 2017. Updated an indication for Tecentriq. Updated criteria for Ibrance to include any aromatase inhibitor therapy. Fixed minor grammatical/formating errors. Added coverage criteria for Odomzo® (sonidegib).</td>
</tr>
<tr>
<td>09/01/17</td>
<td>Minor update; updated title of related policy 5.01.543.</td>
</tr>
<tr>
<td>10/01/17</td>
<td>Interim Review, approved September 21, 2017. Added coverage criteria for Idhifa®.</td>
</tr>
<tr>
<td>01/01/18</td>
<td>Coding update, added HCPCS codes J9022, J9023, and J9285 (new codes effective 1/1/18).</td>
</tr>
<tr>
<td>02/01/18</td>
<td>Interim Review, approved January 16, 2018. Added coverage criteria for Aliqopa™ (copanlisib) and added new indication for Opdivo®</td>
</tr>
<tr>
<td>03/01/18</td>
<td>Interim Review, approved February 27, 2018. Added new indication for Lynparza - deleterious or suspected deleterious germline BRCA-mutated (gBRCAm), human epidermal growth factor receptor 2 (HER2)-negative metastatic breast cancer who have been previously treated with chemotherapy either in the neoadjuvant, adjuvant or metastatic setting. Updated Opdivo and Imfinzi criteria to include all FDA approved indications.</td>
</tr>
<tr>
<td>06/01/18</td>
<td>Interim Review, approved May 3, 2018. Updated criteria for combination therapy with Opdivo and Yervoy as well as Rubraca to include newly approved FDA labeled indications.</td>
</tr>
</tbody>
</table>

**Disclaimer:** This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. The Company adopts policies after careful review of published peer-reviewed scientific literature, national guidelines and local standards of practice. Since medical technology is constantly changing, the Company reserves the right to review and update policies as appropriate. Member contracts differ in their benefits. Always consult the member benefit...
booklet or contact a member service representative to determine coverage for a specific medical service or supply. CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). ©2018 Premera All Rights Reserved.

**Scope:** Medical policies are systematically developed guidelines that serve as a resource for Company staff when determining coverage for specific medical procedures, drugs or devices. Coverage for medical services is subject to the limits and conditions of the member benefit plan. Members and their providers should consult the member benefit booklet or contact a customer service representative to determine whether there are any benefit limitations applicable to this service or supply. This medical policy does not apply to Medicare Advantage.
Discrimination is Against the Law

Premera Blue Cross complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex. Premera does not exclude people or treat them differently because of race, color, national origin, age, disability or sex.

Premera:
- Provides free aids and services to people with disabilities to communicate effectively with us, such as:
  - Qualified sign language interpreters
  - Written information in other formats (large print, audio, accessible electronic formats, other formats)
- Provides free language services to people whose primary language is not English, such as:
  - Qualified interpreters
  - Information written in other languages

If you use these services, contact the Civil Rights Coordinator.

If you believe that Premera has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability, or sex, you can file a grievance:

Civil Rights Coordinator - Complaints and Appeals
PO Box 91102, Seattle, WA 98111
Toll free 855-332-4535, Fax 425-918-5992. TTY 800-842-5357
Email AppealsDepartmentInquiries@Premera.com

You can file a grievance in person or by mail, fax, or email. If you need help filing a grievance, the Civil Rights Coordinator is available to help you.

You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at https://ocrportal.hhs.gov/ocr/portal/lobby.jsf, or by mail or phone at:

U.S. Department of Health and Human Services
200 Independence Avenue SW, Room 509F, HHH Building
Washington, D.C. 20201, 1-800-368-1019, 800-537-7697 (TDD)

Getting Help in Other Languages

This Notice has Important Information. This notice may have important information about your application or coverage through Premera Blue Cross. There may be key dates in this notice. You may need to take action by certain deadlines to keep your health coverage or help with costs. You have the right to get this information and help in your language at no cost.

Call 800-722-1471 (TTY: 800-842-5357).


Kreyòl ayisyen (Creole): Avi sila a gen enfòmasyon Enpòtan ladann. Avi sila a kapab genyen enfòmasyon enpòtan konèsan aplikayson w lan oswa konèsan koutëvi asirans lan atrare Premera Blue Cross. Kapab genyen dat ki enpòtan nan avi sila a. Ou ka gen pou pran kék aksyon avan sèten dat limit pou ka kenbe koutëvi asirans sante w la oswa pou yo ka ede w akèk depends yo. Se dwa w pou resewwa enfòmasyon sa a ak asistans nan lang ou pale a, san ou pa gen pou peye pou sa. Rate nan 800-722-1471 (TTY: 800-842-5357).


Ilokano (Ilocano): Daytoy a Pakdaak ket naglaon iti Napateg nga Impormacion. Daytoy a pakdaak mabal ini nga adda ket naglaon iti napateg nga impormasion maianggpec iti aplikayson yowo coverage babanen iti Premera Blue Cross. Daytoy ket mabalini dagiti importante a penta iti daytoy a pakdaak. Mabalini nga adda rumbengan nga aramidenyo nga addang sakkab dagiti partikular a naituding nga adda lawv tapno mapagtaliyedad ti coverage ti salun-atyo wenyoo tulong kadagiti gastos. Adda karbenganyo a mangala iti daytoy nga impormasjon ken tulong iti bukodyo a pagasasao nga awan ti bayadanyo. Tumawag ti numero nga ooy 800-722-1471 (TTY: 800-842-5357).

Premera Blue Cross. Maaaring may mga mahalagang petsa dito sa paunawa. Maaring hayaan o kinsa nga hakbang sa ilang mga itinakdang mga petsa kini. 

Hindi (Tagalog):
Ang Pagawa na ito ay naglalaman ng mahalagang impormasyon. Ang paunawa na ito ay naglalaman ng mahalagang impormasyon tungkol sa iyong aplikasyon o pagsakop sa pamamagitan ng Premera Blue Cross. Maaaring hayaan o kinsa nga hakbang sa ilang mga itinakdang mga petsa kini. 

Román (Romanian): 

Filipín (Tagalog):
Ang Panawala na ito ay naglalaman ng mahalagang impormasyon. Ang paunawa na ito ay naglalaman ng mahalagang impormasyon tungkol sa iyong aplikasyon o pagsakop sa pamamagitan ng Premera Blue Cross. Maaaring hayaan o kinsa nga hakbang sa ilang mga itinakdang mga petsa kini. 

Polskie (Polish):

Português (Portuguese):
Este aviso contém informações importantes. Este aviso poderá conter informações importantes a respeito de sua aplicação ou cobertura por meio do Premera Blue Cross. Poderão existir dados importantes neste aviso. 

Tiếng Việt (Vietnamese):