

BCCA Protocol Summary for Palliative Combination Chemotherapy for Metastatic Colorectal Cancer Using Oxaliplatin, Fluorouracil, Leucovorin, and Bevacizumab

Protocol Code:

UGIFFOXB

Tumour Group:

Gastrointestinal

Contact Physician:

GI Systemic Therapy

ELIGIBILITY:

- First line therapy for locally advanced, locally recurrent or metastatic colorectal adenocarcinoma, not curable with surgery or radiation and not suitable for irinotecan-based therapy (UGIFFIRB)
- May be considered for first line therapy only for those patients who have Gilbert's syndrome or who may be compromised by potential irinotecan toxicities
- Second line therapy will be considered only for those patients who have undergone resection of metastasis and therefore were not suitable for pre-operative therapy with bevacizumab
- No major surgery within 28 days of administration of therapy
- No untreated CNS metastases
- ECOG performance status less than or equal to 2
- Adequate marrow reserve (ANC greater than or equal to $1.2 \times 10^9/L$, platelets greater than $100 \times 10^9/L$)
- Adequate renal (Creatinine less than or equal to $1.5 \times \text{ULN}$) and liver function (bilirubin less than or equal to 26 micromol/L ; AST/ Alkaline Phosphatase less than or equal to $5 \times \text{ULN}$)
- A BCCA "Compassionate Access Program" or "Undesignated Indication" request with appropriate clinical information for each patient must be approved prior to treatment
- Caution in patients with: 1) previous pelvic radiotherapy; 2) recent MI; 3) uncontrolled angina, hypertension, cardiac arrhythmias, congestive heart failure, renal disease including proteinuria, bleeding disorders, previous anthracycline exposure, prior radiation to the chest wall or other serious medical illness
- Caution in patients with baseline greater than 3 loose BM per day (in patients without colostomy or ileostomy)
- Caution in patients with symptomatic peripheral neuropathy
- Caution in patients with recent (less than 6 months) arterial thromboembolic events

TESTS AND MONITORING:

- **Baseline:** CBC and differential, Platelets, Creatinine, LFTs (Bilirubin, AST, Alkaline Phosphatase), Albumin, Electrolytes, dipstick or laboratory urinalysis for protein, Blood Pressure measurement and appropriate imaging study and tumour markers.
- **Prior to each cycle:** CBC and differential, Platelets, Blood Pressure measurement
- **Each time seen by physician:** LFT's (Bilirubin, AST, Alkaline Phosphatase), Creatinine, Electrolytes, Albumin
- **Prior to each even numbered cycles:** dipstick or laboratory urinalysis for protein
- 24 hour urine for protein if occurrence of proteinuria dipstick urinalysis shows 2+ or 3+ or laboratory urinalysis for protein is greater than or equal to 1g/L
- Blood Pressure measurement to be taken pre and post dose for first 3 cycles only and then pre-therapy with each subsequent visit.
- For patients on warfarin, weekly INR until stable warfarin dose established, then INR prior to each cycle.
- Quantitative evaluation of disease response status every six to twelve weeks; discontinue therapy if any progression of disease.

PREMEDICATIONS:

- Antiemetic protocol for high-moderate emetogenic chemotherapy (see SCNAUSEA)
- Counsel patients to avoid cold drinks and exposure to cold air, especially on day of oxaliplatin.
- **Cryotherapy (ice chips) should NOT be used as may exacerbate Oxaliplatin-induced pharyngo-laryngeal dysesthesias.**
- **OPTIONAL:** Calcium Gluconate 1000 mg and Magnesium Sulfate 1000 mg given together in 250 mL D5W IV over 20 minutes Pre and Post Oxaliplatin to reduce neurotoxicity (See note and precautions below under Dose Modifications for Neurologic Toxicity)

TREATMENT:

A cycle equals -

| Drug | Dose | BCCA Administration Guidelines |
|---------------------|------------------------|---|
| Oxaliplatin* | 85 mg/m ² | IV in 500 mL** of D5W over 2 hours |
| Leucovorin* | 400 mg/m ² | IV in 250 mL D5W over 2 hours |
| Fluorouracil (5-FU) | 400 mg/m ² | IV bolus, after Leucovorin, THEN |
| Bevacizumab | 5 mg/Kg† | IV in 100 mL NS over 10 minutes‡ |
| Fluorouracil | 2400 mg/m ² | IV over 46 h in D5W to a total volume of 92 mL by continuous infusion at 2 mL/h via appropriate infusor device*** |

Repeat every 14 days for a maximum of 12 cycles. If there is continued evidence of response or stable disease by imaging or tumour markers, apply for 12 additional cycles of chemotherapy and bevacizumab via Compassionate Access Program

*** Oxaliplatin and Leucovorin may be infused over the same two hour period by using a Y- site connector placed immediately before the injection site. Oxaliplatin and Leucovorin should not be combined in the same infusion bag. Oxaliplatin is not compatible with normal saline. Do not piggyback or flush lines with normal saline.**

**** for oxaliplatin dose less than or equal to 104 mg, use 250 mL D5W**

† The Bevacizumab dose should be recalculated for patients who experience more than a 10% change in body weight.

‡ Observe for fever, chills, rash, pruritus, urticaria or angioedema and stop infusion and contact the physician if any of these occur. Infusion reactions should be treated according to severity. If the bevacizumab infusion is restarted then it should be given at an initial rate of 60 minutes or longer.

If acute hypertension (increase in BP measurement of greater than 20 mm Hg diastolic or greater than 160/100 if previously within normal limits) occurs during bevacizumab infusion – stop treatment. Resume at ½ the original rate of infusion if blood pressure returns to pretreatment range within one hour. If blood pressure does not return to pretreatment range within one hour – hold bevacizumab and subsequent infusions of bevacizumab should be given over 3 hours. Acute hypertension that is symptomatic (e.g. onset of headaches or change in level of consciousness) or BP measurement of greater than 180/110 that does not improve within one hour of stopping bevacizumab is an urgent situation that requires treatment.

Line should be flushed with Normal Saline pre and post dose as Bevacizumab should not be mixed with dextrose solutions.

***** for total dose greater than 4400 mg, to a total volume of 230 mL by continuous infusion at 5 mL/h via Baxter LV5 infusor (Inpatients: 1200 mg/m²/day in 1000 mL D5W by continuous infusion daily over 23 h for 2 days)**

Patients with PICC lines should have a weekly assessment of the PICC site for evidence of infection or thrombosis.

DOSAGE MODIFICATIONS (A, B & C)

- A. Dose Modifications for NEUROLOGIC Toxicity
- B. Dose Modifications for HEMATOLOGIC Toxicity
- C. Dose Modifications for NON-HEMATOLOGIC, NON-NEUROLOGIC Toxicity

Table 1 - Dose Reduction Levels for All Toxicity

| Agent | Dose Level +1 | Starting Dose | Dose Level -1 | Dose Level -2* |
|------------------------------|----------------------------|------------------------|------------------------|------------------------|
| Oxaliplatin | 100 mg/m ² ** | 85 mg/m ² | 65 mg/m ² | 50 mg/m ² |
| Fluorouracil Bolus | 400 mg/m ² | 400 mg/m ² | 320 mg/m ² | 200 mg/m ² |
| Fluorouracil Infusion | 3000 mg/m ² *** | 2400 mg/m ² | 2000 mg/m ² | 1600 mg/m ² |

If bolus Fluorouracil is delayed/omitted, Leucovorin may also be delayed/omitted or reduced to 20 mg mg/m² IV push.

** For any additional dose reductions, use 20% less than previous level or consider discontinuing this regimen.*

*** The recommended starting doses are based on the modified FOLFOX6 regimen which is widely accepted but has not been studied in comparison to the original FOLFOX6 regimen. Patients may start with oxaliplatin 100 mg/m² as per FOLFOX6 at the discretion of their physician.*

****Infusional Fluorouracil dose may be escalated to 3000 mg/m² at Cycle 3 if the patient has experienced Grade 2 toxicity or less.*

Table 2 - Oxaliplatin Neurotoxicity Definitions

| | |
|--|---|
| Grade 1 | Paresthesias / dysesthesias of short duration that resolve; do not interfere with function |
| Grade 2 | Paresthesias / dysesthesias interfering with function, but not activities of daily living (ADL) |
| Grade 3 | Paresthesias / dysesthesias with pain or with functional impairment which interfere with ADL |
| Grade 4 | Persistent paresthesias / dysesthesias that are disabling or life-threatening |
| Pharyngo-laryngeal dysesthesias (investigator discretion used for grading): Grade 0 = none; Grade 1 = mild; Grade 2 = moderate; Grade 3 = severe | |

Neuropathy may be partially or wholly reversible after discontinuation of therapy; patients with good recovery from Grade 3 (not Grade 4) neuropathy may be considered for re-challenge with Oxaliplatin, with starting dose one level below that which they were receiving when neuropathy developed

There is evidence that infusions of Calcium gluconate and Magnesium sulphate prior to and following Oxaliplatin may reduce the incidence and severity of Oxaliplatin-induced peripheral neuropathy. Concerns about the Ca/Mg infusion reducing the efficacy of FOLFOX chemotherapy raised previously by an unscheduled interim analysis of the CONcePT trial have been refuted.⁷⁻⁹ Physicians are encouraged to consider this therapy, especially in patients in whom peripheral neuropathy develops on treatment. CAUTION: Calcium and Magnesium therapy is NOT recommended in those patients with known hypercalcemia or those receiving therapy with Digitalis or Thiazide diuretics (See Premedications above for administration directions).

A. Dose Modifications for Oxaliplatin NEUROLOGIC Toxicity

| Toxicity Grade | Duration of Toxicity | | Persistent (present at start of next cycle) |
|---|--|--|---|
| | 1 – 7 days | greater than 7 days | |
| Grade 1 | Maintain dose level | Maintain dose level | Maintain dose level |
| Grade 2 | Maintain dose level | Maintain dose level | Decrease 1 dose level |
| Grade 3 | 1 st time: ↓ 1 dose level 2 nd time: ↓ 1 dose level | 1 st time: ↓ 1dose level 2 nd time: ↓ 1dose level | Discontinue |
| Grade 4 | Discontinue therapy | Discontinue therapy | Discontinue therapy |
| Pharyngo-laryngeal (see precautions) | Maintain dose level | Increase duration of infusion to 6 hours | Increase duration of infusion to 6 hours |

B. Dose Modifications for HEMATOLOGIC Toxicity

| Prior to a Cycle (Day 1) | Toxicity | | Dose Level For Subsequent Cycles | |
|--|----------|---------------------------------|----------------------------------|--|
| | Grade | ANC (x10 ⁹ /L) | Oxaliplatin | Fluorouracil |
| <ul style="list-style-type: none"> If ANC less than 1.2 on Day 1 of cycle, hold treatment. Perform weekly CBC, maximum of 2 times. If ANC is greater than or equal to 1.2 within 2 weeks, proceed with treatment at the dose level noted across from the lowest ANC result of the delayed week(s). If ANC remains less than 1.2 after 2 weeks, discontinue treatment. | 1 | greater than or equal to 1.2 | Maintain dose level | Maintain dose level |
| | 2 | 1 – 1.19 | Maintain dose level | Maintain dose level |
| | 3 | 0.5 – 0.99 | ↓ 1 dose level | Maintain dose level |
| | 4 | less than 0.5 | ↓ 1 dose level | omit bolus and ↓ 1 infusion dose level |
| | | | | |
| | Grade | Platelets (x10 ⁹ /L) | Oxaliplatin | Fluorouracil |
| <ul style="list-style-type: none"> If platelets less than 75 on Day 1 of cycle, hold treatment. Perform weekly CBC, maximum of 2 times. If platelets greater than or equal to 75 within 2 weeks, proceed with treatment at the dose level noted across from the lowest platelets result of the delayed week(s). If platelets remain less than 75 after 2 weeks, discontinue treatment. | 1 | greater than or equal to 75 | Maintain dose level | Maintain dose level |
| | 2 | 50 – 74.9 | Maintain dose level | Maintain dose level |
| | 3 | 10 – 49.9 | ↓ 1 dose level | Maintain dose level |
| | 4 | less than 10 | ↓ 2 dose levels | Maintain dose level |

C. Dose Modifications for NON-HEMATOLOGIC, NON-NEUROLOGIC Toxicity

| Prior to a Cycle (Day 1) | Toxicity | | Dose Level For Subsequent Cycles |
|--|----------|---|---|
| | Grade | Diarrhea | |
| <ul style="list-style-type: none"> ▪ If diarrhea greater than or equal to Grade 2 on Day 1 of cycle, hold treatment. Perform weekly checks, maximum 2 times. ▪ If diarrhea is less than Grade 2 within 2 weeks, proceed with treatment at the dose level noted across from the highest Grade experienced. ▪ If diarrhea remains greater than or equal to Grade 2 after 2 weeks, discontinue treatment. | 1 | Increase of 2-3 stools/day, or mild increase in loose watery colostomy output | Maintain dose level |
| | 2 | Increase of 4-6 stools, or nocturnal stools or mild increase in loose watery colostomy output | Maintain dose level |
| | 3 | Increase of 7-9 stools/day or incontinence, malabsorption; or severe increase in loose watery colostomy output | ↓ 1 dose level of bolus and infusional fluorouracil |
| | 4 | Increase of 10 or more stools/day or grossly bloody colostomy output or loose watery colostomy output requiring parenteral support; dehydration | ↓ 1 dose level of both oxaliplatin, bolus and infusional fluorouracil |
| | | | |
| | Grade | Stomatitis | |
| <ul style="list-style-type: none"> ▪ If stomatitis greater than or equal to Grade 2 on Day 1 of cycle, hold treatment. Perform weekly checks, maximum 2 times. ▪ If stomatitis is less than Grade 2 within 2 weeks, proceed with treatment at the dose level noted across from the highest Grade experienced. ▪ If stomatitis remains greater than or equal to Grade 2 after 2 weeks, discontinue treatment. | 1 | Painless ulcers, erythema or mild soreness | Maintain dose level |
| | 2 | Painful erythema, edema, or ulcers but can eat | Maintain dose level |
| | 3 | Painful erythema, edema, ulcers, and cannot eat | ↓ 1 dose level of bolus and infusional fluorouracil |
| | 4 | As above but mucosal necrosis and/or requires enteral support, dehydration | ↓ 2 dose levels of bolus and infusional fluorouracil |

Proteinuria:

There are 3 different measures of proteinuria that may be used to assess the need for modification of Bevacizumab therapy – urine dipstick analysis (measured in + values), laboratory urinalysis for protein (measured in g/L) and 24 hour urine collections for protein (measured in g/24 hours)

Urine dipstick analysis or laboratory urinalysis for protein should be performed at baseline and then prior to each even numbered cycle of therapy:

| Degree of Proteinuria | |
|---|---|
| Neg or 1+ dipstick or less than 1 g/L laboratory urinalysis for protein | Administer Bevacizumab dose as scheduled |
| 2+ or 3+ dipstick or greater than or equal to 1 g/L laboratory urinalysis for protein | Administer Bevacizumab dose as scheduled. Collect 24-hour urine for determination of total protein within 3 days before the next scheduled bevacizumab administration. Adjust Bevacizumab treatment based on the table below |

| 24-Hour Urine Total Protein (G/24 hours) | Bevacizumab Dose |
|---|---|
| less than or equal to 2 | 100% |
| greater than 2-4 | Hold dose and recheck 24 hour urine every 2 weeks, resume therapy when less than or equal to 2g/24 hour |
| greater than 4 | Discontinue Therapy |

Hypertension:

| Blood Pressure (mm Hg) | Bevacizumab Dose |
|-----------------------------------|--|
| less than or equal to 160/100 | 100% |
| greater than 160/100 asymptomatic | 100% Notify physician and start or adjust antihypertensive therapy* |
| Hypertensive Crisis | Discontinue Therapy |

* Antihypertensive therapy may include hydrochlorothiazide 12.5-25mg PO once daily, ramipril (ALTACE®) 2.5-5 mg PO once daily, or amlodipine (NORVASC™) 5-10mg PO once daily.

PRECAUTIONS:

- Platinum hypersensitivity** can cause dyspnea, bronchospasm, itching and hypoxia. Appropriate treatment includes supplemental oxygen, steroids, epinephrine and bronchodilators. Vasopressors may be required. (see below)
For Grade 1 or 2 acute hypersensitivity reactions no dose modification of oxaliplatin is required and the patient can continue treatment with standard hypersensitivity premedication:
45 minutes prior to Oxaliplatin:
 - Dexamethasone 20 mg IV in 50 mL NS over 15 minutes
 30 minutes prior to Oxaliplatin:
 - Diphenhydramine 50 mg IV and Ranitidine 50 mg IV in 50 mL NS over 20 minutes (compatible up to 3 hours when mixed in bag).
- Laryngo-pharyngeal dysesthesia** is an unusual dysesthesia characterized by a loss of sensation of breathing without any objective evidence of respiratory distress (hypoxia, laryngospasm or bronchospasm). This may be exacerbated by exposure to cold air. If this occurs during infusion, stop infusion immediately and observe patient. Rapid resolution is typical, within minutes to a few hours. Check oxygen saturation; if normal, an anxiolytic agent may be given. The infusion can then be

restarted at a slower rate at the physician's discretion. In subsequent cycles, the duration of infusion should be prolonged (see Dose Modifications above in the Neurological Toxicity table.)

| Clinical Symptoms | Laryngo-pharyngeal Dysesthesia | Platinum Hypersensitivity |
|---------------------------|---|---|
| Dyspnea | Present | Present |
| Bronchospasm | Absent | Present |
| Laryngospasm | Absent | Present |
| Anxiety | Present | Present |
| O ₂ saturation | Normal | Decreased |
| Difficulty swallowing | Present (loss of sensation) | Absent |
| Pruritus | Absent | Present |
| Cold induced symptoms | Yes | No |
| Blood Pressure | Normal or Increased | Normal or Decreased |
| Treatment | Anxiolytics; observation in a controlled clinical setting until symptoms abate or at physician's discretion | Oxygen, steroids, epinephrine, bronchodilators; Fluids and vasopressors if appropriate |

3. **Neutropenia:** Fever or other evidence of infection must be assessed promptly and treated aggressively.
4. **Gastrointestinal perforations and wound dehiscence:** Can be fatal. Typical presentation is reported as abdominal pain associated with symptoms such as constipation and vomiting. Bevacizumab should be discontinued in patients with gastrointestinal perforation or wound dehiscence requiring medical intervention.
5. **Hemorrhage:** Bevacizumab has been associated with hemorrhage. Cases of CNS hemorrhage, some with fatal outcome, have been observed. Patients should be monitored for signs and symptoms of CNS bleeding. If Grade 3/4 hemorrhage occurs, discontinue Bevacizumab. Patients with significant bleeding diatheses should not receive Bevacizumab. Platelet inhibitory medications such as NSAIDs (including ASA at doses greater than 325 mg/day) should be discontinued prior to institution of Bevacizumab. COX-2 inhibitors are permissible.
6. **Thrombosis:** A history of arterial thromboembolic events or age greater than 65 years is associated with an increased risk of arterial thromboembolic events with Bevacizumab. If Grade 3 thromboembolic event or incidentally discovered pulmonary embolus arises, hold Bevacizumab for 2 weeks, then consider resumption of Bevacizumab if risks of tumour-related hemorrhage are judged low AND the patient is on a stable dose of anticoagulant. If a second Grade 3 thrombosis occurs, or if a Grade 4 thrombosis occurs, discontinue Bevacizumab. Patients on warfarin should have INR checked frequently, at least once per cycle, while receiving Bevacizumab.
7. **Proteinuria:** Has been seen in all clinical trials with Bevacizumab to date and is likely dose-dependent. If proteinuria of greater than or equal to 2g/24 hr persists for more than 3 months, consider further investigations - possibly a renal biopsy.
8. **Hypertension:** Has been seen in all clinical trials with Bevacizumab to date and is likely dose-dependent. The most commonly used therapies are Calcium Channel Blockers, ACE Inhibitors and Diuretics. Blood pressure should be monitored through routine vital signs evaluations. If hypertension is poorly controlled with adequate medication, discontinue Bevacizumab.
9. **Reversible Posterior Leukoencephalopathy Syndrome:** Rarely, patients may develop seizures, headache, altered mental status, visual disturbances, with or without associated hypertension consistent with RPLS. May be reversible if recognized and treated promptly.
10. **Congestive Heart Failure:** Has been reported in up to 3.5% of patients treated with Bevacizumab. Most patients showed improvement in symptoms and/or LVEF following appropriate medical therapy.
11. **Myocardial** ischemia and angina occurs rarely in patients receiving Fluorouracil. **Myocardial** ischemia and angina occurs rarely in patients receiving Fluorouracil. Development of cardiac

symptoms including signs suggestive of ischemia or of cardiac arrhythmia is an indication to discontinue treatment.

12. **Dihydropyrimidine dehydrogenase (DPD) deficiency** may result in severe and unexpected toxicity – stomatitis, diarrhea, neutropenia, neurotoxicity – secondary to reduced drug metabolism. This deficiency is thought to be present in about 3% of the population.
13. Oxaliplatin therapy should be interrupted if symptoms indicative of **pulmonary fibrosis** develop – nonproductive cough, dyspnea, crackles, rales, hypoxia, tachypnea or radiological pulmonary infiltrates. If pulmonary fibrosis is confirmed oxaliplatin should be discontinued.
14. **Extravasation:** Oxaliplatin causes irritation if extravasated. Refer to BCCA Extravasation Guidelines.
15. **Venous Occlusive Disease** is a rare but serious complications that has been reported in patients (0.02%) receiving Oxaliplatin in combination with Fluorouracil. This condition can lead to hepatomegaly, splenomegaly, portal hypertension and/or esophageal varices. Patients should be instructed to report any jaundice, ascites or hematemesis immediately.
16. Oxaliplatin therapy should be interrupted if **Hemolytic Uremic Syndrome (HUS)** is suspected: hematocrit is less than 25%, platelets less than 100,000 and creatinine greater than or equal to 135 micromol/L. If HUS is confirmed, Oxaliplatin should be permanently discontinued.
17. **Possible drug interactions with fluorouracil and warfarin, phenytoin and fosphenytoin** have been reported and may occur at any time. Close monitoring is recommended (eg, for warfarin, monitor INR weekly during fluorouracil therapy and for 1 month after stopping fluorouracil).

Call the GI Systemic Therapy physician in your regional cancer centre or Dr. Sanjay Rao at (250) 712-3900 or 1-888-563-7773 with any problems or questions regarding this treatment program.

Date activated: 01 Jan 2006

Date revised: 1 June 2011 (Infusion section revised)

References:

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