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Positive Quality Intervention: Neratinib (Nerlynx®) Diarrhea Management

Description: Diarrhea is the main toxicity of neratinib treatment occurring in 95% of patients in the ExteNET trial on the neratinib arm in which antidiarrheal prophylaxis was not protocol specified.[1] Various prevention and treatment strategies for diarrhea have been studied and will be discussed in this document.

Background: Neratinib is indicated for the extended adjuvant treatment of adult patients with early stage HER2-overexpressed/amplified breast cancer, following adjuvant trastuzumab based therapy. Neratinib is also indicated in combination with capecitabine in metastatic/advanced HER2-positive breast cancer following 2 or more anti-HER2 based regimens. The majority of patients (95%) experienced diarrhea in the first month of treatment in ExteNET. The median time to onset of any grade diarrhea is 2 days (8 days for Grade 3) and median cumulative duration of diarrhea was 59 days (5 days for Grade 3). The phase 2 CONTROL trial was designed to investigate various approaches to preventing and managing diarrhea in patients on neratinib, including various anti-diarrheal combinations, as well as dose escalation. The neratinib full prescribing information was updated in June 2021 to include dose escalation.[1]

PQI Process: Upon receipt of neratinib prescription:

- Consider initiating treatment using dose escalation regimen *(*see *Supplemental Information)*
- Diarrhea Prophylaxis
    - Begin prophylaxis with the first dose of neratinib and continue for 2 cycles depending on the regimen selected and the patient response
    - Ensure patient has instructions and supply of antidiarrheals (see *Supplemental Information*)
    - Refer to Oncolytic Induced Diarrhea PQI
    - Identify drug-drug interactions and side effect profiles of loperamide, colestipol, and budesonide when making clinical recommendations
    - Consider weekly assessment of diarrhea throughout the first 2 cycles
- Drug-Drug Interactions
    - Avoid concomitant use of PPIs
    - If H2-antagonists must be used, administer neratinib 2 hours before or 10 hours after
    - Other antacids (Tums, Maalox) should be separated by at least 3 hours
- Verify in EMR that patient is scheduled for monthly CMP (including ALT, AST, bilirubin, and alkaline phosphatase) for the first 3 months then every 3 months as clinically indicated

Patient-Centered Activities:

- Provide neratinib Oral Chemotherapy Education (OCE) Sheet and managing diarrhea Oral Chemotherapy Education Supplemental Sheet
- Express importance of diarrhea prophylaxis and ensure patients to obtain anti-diarrheal medications
- Consider providing Neratinib (Nerlynx®) Treatment Support Kit (TSK)
- Neratinib should be taken with food and around the same time each day
    - Dose escalation: Take three tablets (120 mg) daily for 7 days, then four tablets (160 mg) daily for 7 days, then six tablets (240 mg) daily thereafter
    - Initiation without escalation – Take six tablets (240 mg) daily with loperamide during the first 56 days, then loperamide as needed to maintain daily bowel movements
- Maintain adequate oral hydration throughout treatment unless otherwise indicated
- Counsel on other possible side effects (ExteNET trial[3])

- Diarrhea (95%)
    - Advise patients to call office if diarrhea is uncontrolled with anti-diarrheal
- Nausea (43%)
- Abdominal pain (36%)
- Vomiting (26%)
- Stomatitis (14%)

- Patient Assistance: NCODA Financial Assistance Tool

References:

1. NERLYNX® [Package Insert].
2. Hurvitz S, Chan A, Iannotti N, et al. Effects of adding budesonide or colestipol to loperamide prophylaxis on neratinib- associated diarrhea in patients with HER2+ early-stage breast cancer: CONTROL trial. Presented at: 40th Annual San Antonio Breast Cancer Symposium; Dec 5-9, 2017; San Antonio, TX. Poster P3-14-01.
3. Martin M, Holmes FA, Ejlertsen B, et al. Neratinib after trastuzumab-based adjuvant therapy in HER2-positive breast cancer (ExteNET): 5-year analysis of a randomised, double-blind, placebo-controlled, phase 3 trial. Lancet Oncol. Dec 2017;18(12):1688-1700. https://www.ncbi.nlm.nih.gov/pubmed/29146401.
4. Barcenas CH, Hurvitz SA, Di Palma J, et al. Effect of prophylaxis on neratinib-associated diarrhea and tolerability in patients with HER2+ early-stage breast cancer: Phase II CONTROL trial. Presented at the American Society of Clinical Oncology (ASCO) Annual Meeting. May 31-June 4, 2019; Chicago, IL. *J Clin Oncol.* 2019;37:(suppl; abstr 548). https://bit.ly/2Xu86DO.

Supplemental Information:

Antidiarrheal dosing regimens from the CONTROL study

Loperamide	4 mg TID days 1-14, then 4 mg BID days 15-56, from day 57 on 4 mg PRN not to exceed 16 mg per day; titrate dosing to achieve 1–2 bowel movements per day
Budesonide	9 mg/day for 1 cycle + loperamide 4 mg TID days 1-14, then 4 mg BID days 15-56
Colestipol	2 gm BID for 1 cycle + loperamide PRN + loperamide 4 mg TID days 1-14, then 4 mg BID days 15-28

Dosage Adjustment for Diarrhea

Grade 1 or 2 (≤ 5 days) or Grade 3 (≤ 2 days)

- Maximize use of antidiarrheal agents and assess diet and aggravating substances
- When diarrhea has improved to ≤ Grade 1 or baseline, initiate loperamide 4 mg with each subsequent neratinib dose

Grade 2 (> 5 days) or Grade 3 (> 2 days) or any grade with complicating features of dehydration, fever, hypotension, renal failure, or Grade 3/4 neutropenia):

- Interrupt treatment. Modify diet; maintain fluid intake of ~2 L
- If diarrhea improves to ≤ Grade 1 in 1 week or less, resume neratinib at the same dose
- If diarrhea improves to ≤ Grade 1 in more than 1 week, resume neratinib at the next lower dose
- If diarrhea has improved to ≤ Grade 1/baseline, initiate loperamide 4 mg with each subsequent dose

Recurrent Grade 2 or more occurring at 120 mg once daily dose, or Grade 4 diarrhea:

- Permanently discontinue neratinib

Figure 1: CONTROL Trial: Strategies for Diarrhea Management

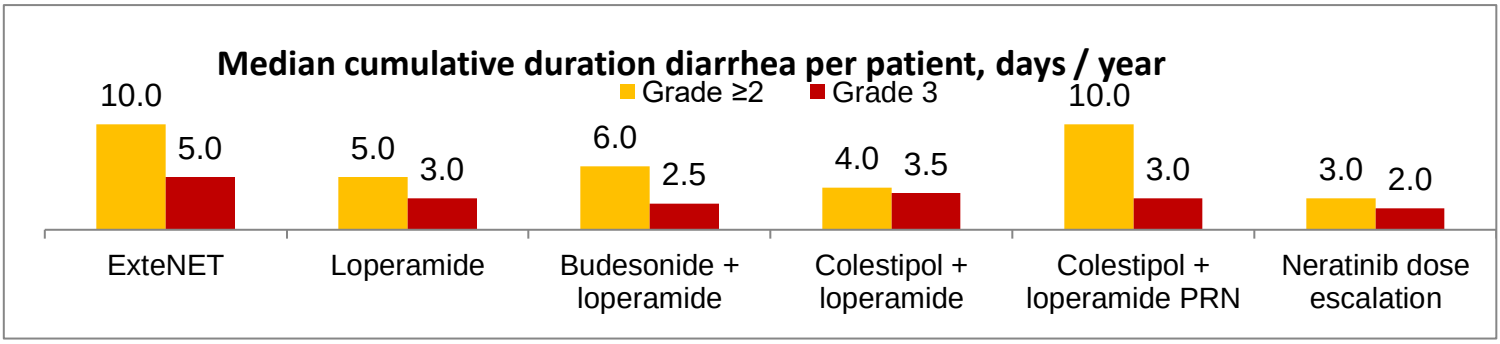
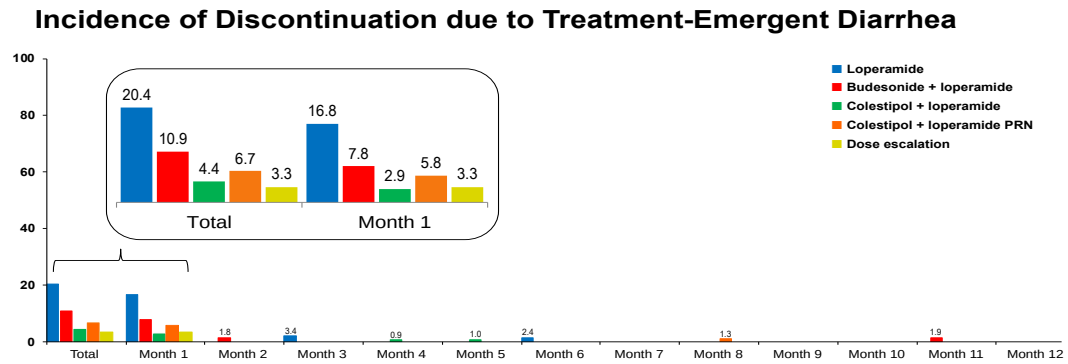


Figure 2: CONTROL Trial: Rates of Discontinuation due to Diarrhea



Lop	23/137	0/93	3/89	0/84	0/83	2/83	0/81	0/80	0/78	0/77	0/76	0/75
Bud + lop	5/64	1/57	0/54	0/53	0/53	0/53	0/53	0/53	0/53	0/53	1/53	0/51
Col + lop	4/136	0/115	0/112	1/108	1/105	0/104	0/103	0/103	0/102	0/102	0/98	0/98
Col + lop PRN	6/104	0/86	0/85	0/83	0/81	0/80	0/79	1/78	0/78	0/74	0/74	0/72
DE + lop PRN	2/60	0/54	0/47	0/43	0/41	0/39	0/26	0/20	0/8	0/0	0/0	0/0

Data for the neratinib dose-escalation cohort included here are not yet complete.

As of April 2019, study treatment had been completed by 100% of patients in all cohorts except for the colestipol + loperamide prn (93.3%) and neratinib dose escalation + loperamide prn (0%) cohorts.
Barcenas et al. Presented at ASCO 2019. J Clin Oncol. 2019;37:(suppl; abstr 548).

11