

# The Prophylactic Use of Probiotics in the Prevention of Radiation Therapy-Induced Diarrhea

**Karen L. Visich, MSN, ANP-BC, OCN®,  
and Theresa Pluth Yeo, PhD, MPH, MSN, AOCNP®**

Cancer treatment regimens that include radiation therapy (RT) to the abdominal region for cervical, ovarian, prostate, sigmoid, or colorectal cancer potentially disturb the colonization resistance of the indigenous gut flora, causing RT-induced diarrhea, enteritis, and colitis in more than 80% of patients with cancer. One approach for the prevention of RT-induced diarrhea is the use of probiotics. Randomized clinical trials have demonstrated efficacy of probiotic preparations VSL #3 and *Lactobacillus casei* DN-114 001 in decreasing the incidence and grade of RT-induced diarrhea. Oncology nurses and advanced practice clinicians are in a position to interpret research findings related to RT-induced diarrhea, enteritis, and colitis and to apply evidence-based practice principles in patients with cancer receiving RT to promote positive outcomes.

**R**adiation therapy (RT) treatment regimens focused on the abdominal and pelvic region for cervical, ovarian, prostate, sigmoid, or colorectal cancer have the potential to disturb the colonization resistance of the indigenous gut flora. Disruption of colonization resistance is the main pathophysiologic mechanism of acute RT-induced enteritis and colitis, a common and often severe complication among patients with cancer receiving RT (Delia et al., 2007) (see Figure 1). The gut is a complex microbial ecosystem that consists of three basic components: microflora, host cells, and ingested food (Blanarova, Galovicova, & Petrasova, 2009). The gut contains an estimated 60%–80% of the immune system's components (Minocha, 2009). Disruption of this ecosystem alters the host's homeostasis, contributes to intestinal injury, and prevents healing (Giralt et al., 2008). Despite the success of abdominal and pelvic RT in treating tumors, it has adverse effects. More than 80% of patients receiving abdominal or pelvic RT will experience adverse effects that include diarrhea, nausea, and vomiting. As Giralt et al. (2008) noted, diarrhea is not only the most frequently reported adverse effect of RT, but it also causes the most distress.

Acute radiation enteritis is defined as an inflammatory and degenerative process that affects all components of the gastrointestinal tract and can occur as early as five to eight days after RT doses of 8 Gy or more (Blanarova et al., 2009). The pathogenesis of RT-induced enteritis includes DNA damage, expression of adhesive molecules in the gastrointestinal tract, decelerated mitotic activity in the cryptal epithelium, denudation of the basal membrane, and micro-ulcerations (Blanarova et al., 2009). These changes lead to cryptal and villi atrophy along with cellular necrosis. Functional changes in the intestinal mucosa which

## At a Glance

- ◆ Radiation therapy (RT) to the abdominal and pelvic region can cause RT enteritis, a gastrointestinal tract inflammatory process that leads to severe diarrhea.
- ◆ Probiotics such as VSL #3 and *Lactobacillus casei* DN-114 001 have demonstrated efficacy in reducing the incidence and severity of diarrhea from RT enteritis.
- ◆ Oncology nurses and advanced practice clinicians are instrumental in providing patients with evidence-based information on the use of probiotics to decrease diarrhea.

lead to diarrhea include the malabsorption of lactose and bile acids, altered composition of intestinal flora, and changes in the structure of intestinal motility resulting in impaired secretion, absorption, and immune function of the digestive tract (Blanarova et al., 2009; Giralt et al., 2008).

Karen L. Visich, MSN, ANP-BC, OCN®, is an oncology clinical instructor at Saint Peter's University Hospital in New Brunswick, NJ, and Theresa Pluth Yeo, PhD, MPH, MSN, AOCNP®, is an associate professor and coordinator of the oncology nurse practitioner program at the Thomas Jefferson School of Nursing in Philadelphia, PA. Mention of specific products and opinions related to those products do not indicate or imply endorsement by the *Clinical Journal of Oncology Nursing* or the Oncology Nursing Society. (First submission September 2009. Revision submitted December 2009. Accepted for publication December 28, 2009.)

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