

# DRAGON BOAT RACING: LIFE AFTER BREAST CANCER TREATMENT

*Research indicates that this sport and other forms of upper-body exercise often confer invaluable benefits.*

For many years, women who underwent surgical or radiologic treatment (or both) for breast cancer were cautioned to avoid vigorous, repetitive movements of their upper extremities. It was believed that this would reduce their chances of developing post-breast cancer lymphedema, a chronic and debilitating condition characterized by swelling of the arm, neck, or breast. But now this view is being challenged. Studies evaluating the effects of various forms of exercise—in particular the sport of dragon boat racing—indicate that such exercise neither triggers nor worsens lymphedema, and might even help prevent it.



A view from the Hope Chest Dragon Boat drummer's seat during paddling practice, Buffalo, New York, July 2006. Photos courtesy of Jon Hand.

## THE LYMPHATIC SYSTEM AND SECONDARY LYMPHEDEMA

The lymphatic system functions as a kind of drainage system, transporting lymph (which consists of interstitial fluid, leukocytes, proteins, and other particulate matter) from body tissues to the circulatory system and filtering out foreign particles and microorganisms. Contraction of surrounding skeletal muscles (sometimes called the “muscle pump” mechanism) helps promote the lymph flow.

Lymphedema, which is characterized by an abnormal accumulation of fluid in interstitial spaces, can be either primary or secondary. Primary lymphedema, a hereditary condition, is beyond the scope of this article. Secondary lymphedema can result from trauma to the lymphatic system, such as that incurred through surgical or radiologic treatment for breast cancer. Surgical treatment has traditionally meant radical or modified radical mastectomy, with or without axillary lymph node biopsy or dissection. There are indications that newer procedures aimed at reducing risk, such as breast-conserving surgery

(lumpectomy) and sentinel lymph node biopsy, might reduce the incidence of lymphedema, but long-term follow-up studies are needed, as lymphedema can develop many years after treatment for breast cancer.<sup>1</sup>

Lymphedema can cause physical discomfort, reduced function, altered appearance, and emotional distress. Symptoms include swelling, pain, decreased range of motion, and paresthesia (such as sensations of heaviness, tightness, burning, tingling, or numbness). Swelling can be severe enough to change the appearance of the affected area, although in an obese person it may be less evident. If an infection or injury occurs in the involved limb, healing may be slowed.

One recent review found that the incidence of lymphedema was reported to range from 24% to 49% after mastectomy and from 4% to 28% after lumpectomy.<sup>2</sup> Onset can occur months or years after treatment for breast cancer; survivors remain at risk for life.<sup>3</sup> Once lymphedema develops, chronic inflammation, hypertrophy of adipose tissue, and fibrosis can subsequently occur.<sup>2</sup>

Lymphedema can be very difficult to manage. Typically treatment begins with complex physical

therapy (also called complete decongestive therapy), which includes manual lymph drainage (massage), the use of compression bandaging or garments, elevation of affected areas, prescribed exercises, and scrupulous skin care. Consultation with or treatment by a trained lymphedema therapist is recommended.<sup>1</sup> For those unresponsive to complex physical therapy, another option might be low-level laser therapy,

result in a more efficient muscle pump mechanism and improved lymph and venous flow. Aerobic conditioning also enhances lymph and venous flow. Flexibility exercises (stretching) help preserve range of motion and enhance lymph flow. Resistive exercises (using weights or bands) improve muscle tone and strength, and they may enhance lymph flow and help prevent limb swelling.

## DRAGON BOAT RACING'S INCREASING POPULARITY AMONG BREAST CANCER SURVIVORS HAS PROMPTED STUDIES OF ITS PSYCHOSOCIAL EFFECTS.

although more research is needed.<sup>1</sup> Surgical treatments such as debulking and lymphatic anastomosis appear to be only marginally effective and their possible benefits must be weighed against the risk of further complications.<sup>1</sup>

As yet, no scientific studies have shown that lymphedema can be prevented, according to the American Cancer Society (ACS).<sup>4</sup> That said, the ACS emphasizes that following basic guidelines may reduce the risk of developing the condition or delay its onset. These include avoiding infection and trauma in the arm and hand on the side treated for breast cancer, as well as weight gain. Patients at risk are taught to protect against cuts, burns, insect bites, and pressure or constriction of the affected extremity, and to seek prompt treatment even for minor injuries. Patients are also usually counseled against permitting blood pressure measurements, venipunctures, and injections on the treated side. Although Warren and colleagues cite one study finding these last concerns “unsubstantiated,”<sup>2</sup> both the ACS and the Medical Advisory Committee of the National Lymphedema Network (NLN) continue to advise against such practices.<sup>4,5</sup> Normal use of the affected extremity can be resumed once healing occurs. Wearing a fitted compression sleeve is recommended during air travel for patients at risk for lymphedema.<sup>6</sup> (For more on assessment and management, see “Post-Breast Cancer Lymphedema: Part 1,” July 2009, and “Post-Breast Cancer Lymphedema: Part 2,” August 2009.)

### PHYSIOLOGIC EFFECTS OF EXERCISE ON BREAST CANCER SURVIVORS

The NLN has described the effects of various types of exercise on people with or at risk for lymphedema.<sup>7</sup> Prescribed “lymphedema” exercises (those used during complex physical therapy) have been found to

The NLN has cautioned that properly fitted compression garments or bandages should be worn on the affected or at-risk side during exercise, although it acknowledged that such use is controversial.<sup>7,8</sup> Hayes and colleagues stated that this recommendation lacks evidence.<sup>9</sup> Their study of 32 women diagnosed with post-breast cancer lymphedema found no relationship between compression garment use and lymphedema status changes. The NLN also noted that exercising carries risks. For example, improper technique or overly vigorous exercise can cause tissue injury and inflammation; and even when done properly, exercise that increases lymphatic and venous flow has the potential to trigger or worsen limb swelling.<sup>7</sup> Thus the NLN recommends that people who have or are at risk for post-breast cancer lymphedema<sup>7</sup>

- obtain medical clearance before starting an exercise program.
- use compression garments or bandages during exercise.
- monitor effects and rest between sets during resistive exercise.
- adjust the exercise program based on individual needs and responses.
- begin gradually, increase cautiously, and stop if pain, discomfort, or increased swelling occurs.

**What investigation has shown.** In the mid-1990s Canadian sports medicine specialist Donald McKenzie began questioning the exercise restrictions placed on those treated for breast cancer.<sup>10</sup> He noted that although survivors were routinely cautioned against vigorous, repetitive upper-body exercise, such exercise could “improve range of motion and reverse muscle atrophy, activate skeletal muscles (which may help pump lymph), stimulate the immune system, and reset the sympathetic tone of the lymph vessels.” In 1996

McKenzie recruited 24 women (ages 31 to 62 years) to exercise and train as a dragon boat racing team; the only criterion was a history of breast cancer.

Dragon boats are long, narrow canoes with dragon's head and tail carvings at the bow and stern, respectively. The sport originated in China about 2,500 years ago; in ancient Chinese culture, the dragon was honored as a fierce but benevolent guardian against evil spirits. According to the International Dragon Boat Federation ([www.idbf.org](http://www.idbf.org)), a standard, modern racing boat will have a crew of 22, which includes 20 paddlers, one steersperson, and one drummer to set the stroke rate. McKenzie

chose to use dragon boat racing because it provides strenuous exercise for the upper-body extremities and trunk, it's associated with a lower risk of injury than are weight-bearing exercises, and the workout intensity can be modified.<sup>10</sup> McKenzie's project involved progressive stretching, strength-building, and aerobic exercise, as well as training in dragon boat paddling. Paddlers were encouraged to use compression garments or bandages, but not everyone did so. Findings were reported anecdotally. Although no measurements of fitness or of arm circumference or volume were described, McKenzie noted that "the paddlers became fitter and on-the-water performance improved"; no new cases of lymphedema occurred and several paddlers had improved upper-extremity range of motion.

A 2005 study by Lane and colleagues looked at the effect of a whole-body exercise program and dragon boat training on arm circumference and volume in 16 breast cancer survivors without lymphedema.<sup>11</sup> The volunteer subjects had been diagnosed with stage I, II, or III breast cancer and were at least six months posttreatment. All had undergone breast surgery (lumpectomy, mastectomy, or both), 13 had also had axillary node dissection, and 15 had undergone radiation therapy. Arm circumference, upper-extremity volume, and upper-body strength were measured before, during, and at the end of the 20-week program. Use of compression garments wasn't reported. The researchers found no significant differences at any time point between a given survivor's contralateral and ipsilateral upper extremities. Although significant increases in strength and arm circumference and volume occurred, these were similar in both arms. The researchers concluded that progressive upper-body exercise wouldn't cause the development of lymphedema.

Bicego and colleagues conducted a review of studies related to exercise and its effect on women with or at risk for post-breast cancer lymphedema.<sup>12</sup> Eight studies met the inclusion criteria (each "related



The team pauses for a rest during paddling practice, Buffalo, New York, July 2006.

directly to breast cancer–related lymphedema and aerobic or resistance exercise”), including six involving women at risk for post-breast cancer lymphedema and two involving women who'd developed the condition. Although the exercise programs that were studied varied, most included aerobic, flexibility, and resistive exercises. One program involved dance movement therapy and two included dragon boat racing (one was that described earlier by Lane and colleagues). The use of compression garments during exercise wasn't consistently reported, and researchers measured arm circumference and volume at various time points. The reviewers concluded that lymphedema was neither triggered nor exacerbated by the various exercise programs reported. (One study did report more new cases of lymphedema, but its design was among the least rigorous.) They added that more research with larger sample sizes, more rigorous design, and more sophisticated tools to measure lymphatic flow is needed.

In a recent randomized controlled trial, Schmitz and colleagues studied the effects of resistance training in 141 breast cancer survivors with stable lymphedema.<sup>13</sup> As a related editorial stated, the racial, educational, and occupational diversity of the sample suggests that the results are highly generalizable.<sup>14</sup> The intervention group followed a gradually progressive weight-lifting program twice a week for one year; participants wore custom-fitted compression garments during their workouts.<sup>13</sup> The control group was asked to maintain their usual exercise regimen during the study period. Standardized baseline and outcome measurements of limb volume and lymphedema symptoms were used, as well as measurements of maximum weight lifted. The researchers found no significant difference between the two groups in the proportion of women who experienced limb swelling. Moreover, compared with controls, the women in the intervention group had a lower incidence of lymphedema exacerbations, increased strength, and a reduced number and severity of symptoms.

## DISABILITY AND EXERCISE

Mortality rates for breast cancer have been declining since 1990, and more women who get the disease are living longer.<sup>15</sup> Yet follow-up care tends to focus on cancer treatment rather than on complications resulting from the cancer or its treatment.<sup>16</sup> It can be difficult for survivors to have their needs addressed. (For more on this subject, see *AJN*'s March 2006 supplement on nursing and cancer survivorship, <http://journals.lww.com/ajnonline/toc/2006/03003>.)

Some researchers are studying disability after breast cancer. In a recent qualitative study, Thomas-MacLean and colleagues interviewed 40 Canadian women who'd had breast cancer surgery 12 to 24 months earlier, in order to learn the effects of arm morbidity (pain, restricted range of motion, and lymphedema) on their lives.<sup>16</sup> From the data, the researchers identified three key themes: paid work, unpaid work, and family relationships. The women reported having to cease or modify paid work and being unable to complete tasks they'd previously been able to complete, as well as both positive and negative changes in family relationships. The researchers concluded that "development of a suitable measure for the effects of disability" is needed for optimal physical and social rehabilitation planning.

Karki and colleagues studied upper-body impairments and their effects on activity in 96 breast cancer patients at six and 12 months postsurgery.<sup>17</sup> Data were collected by means of a questionnaire. Participants reported several impairments of upper-body functions and structures, including scar tightness, upper-limb numbness, and neck and shoulder pain. Many experienced limitations in activities of daily living, and some had sleep disturbances. The researchers concluded that rehabilitation protocols should be developed to support physical functioning and prevent permanent disabilities.

The exercise and training programs designed by McKenzie and by Schmitz and colleagues gradually prepared dragon boaters for increased activity.<sup>10, 13</sup> McKenzie observed that the act of paddling "uses predominantly upper extremity and trunk muscles, and the improvement in strength has a carry-over effect to day-to-day activity."<sup>10</sup> But it's not clear to what extent such programs prepare and support survivors in returning to work and resuming household tasks; further study in this area is needed.

## PSYCHOSOCIAL BENEFITS OF DRAGON BOAT RACING

McKenzie's original team, known as Abreast in a Boat, was formed to promote breast cancer awareness and demonstrate the benefits of upper-body exercise; it was expected to disband once the project was over.<sup>10</sup> But the women benefited so much from the experience, gaining not only improved physical fitness but also emotional support and camaraderie,

that they wanted to continue. More dragon boat racing teams were formed, and Abreast in a Boat went on to become a nonprofit society ([www.abreastinaboat.com](http://www.abreastinaboat.com)). The sport's increasing popularity among breast cancer survivors has prompted studies of its psychosocial effects.

McNicoll and Doyle identified nine themes from audio transcripts of group meetings with women who were on the original or a later Abreast in a Boat team.<sup>18</sup> The researchers sought to explore the social

## LANE AND COLLEAGUES CONCLUDED THAT PROGRESSIVE UPPER-BODY EXERCISES WOULDN'T CAUSE THE DEVELOPMENT OF LYMPHEDEMA.

processes that contributed to the "enhanced well-being" experienced by the team members. The identified themes were as follows:

- "connection, cohesion" ("we're all in the same boat")
- "receiving and providing support"
- "cancer experience" (boating offered a way to accept it)
- "public experience, media attention" (surprising and fun)
- "exercise, exertion, challenge"
- "fun, excitement, enthusiasm, positive attitude"
- "competitiveness"
- "positive spin, turning negative into positive"
- "mystical, transcendental experience, water" (boating had spiritual meaning)

Similarly, Mitchell and colleagues interviewed 10 breast cancer survivors before and after their first season of dragon boat training and racing.<sup>19</sup> The researchers identified themes that provided insight into the sport's potential for "reducing cancer-related dread and anxiety and improving women's post-treatment quality of life." The three preseason themes were:

- "the body betrayed" (vulnerability, betrayal: "Why me?")
- "the allure of the dragon" (a way to reclaim power, move forward with others)
- "dragon quest" (attraction to positive, meaningful adventure)

The five postseason themes were:

- "awakening of the self" (a wake-up call to embrace life fully, let go of "poor me")

- “common bond” (emotionally safe, shared experience)
- “regaining control” (over dealing with cancer; over body, mind, and emotions)
- “uplifting” (invigorating physical activity, “letting go of worries”)
- “transcendence” (pushing limits, going beyond constraints)

Interestingly, none of the women learned about dragon boating from physicians, breast cancer agencies, or treatment centers; rather, they learned of it through friends or the media. The researchers concluded that many survivors have “considerable

post-treatment needs” that aren’t being met by traditional health care providers. Indeed, in a study of 136 breast cancer survivors, Fu and colleagues noted that nearly half (43%) reported receiving no information from their providers about lymphedema and risk-reduction behaviors.<sup>20</sup>

Parry interviewed 12 breast cancer survivors (one man and 11 women) about their experiences with dragon boat racing.<sup>21</sup> Using creative analytic practice—a method in qualitative research that allows the use of imaginative write-up to better represent and convey a participant’s lived experience—she compiled vignettes for nine of them. She noted the

## STARTING A TEAM

If a region already has a dragon boat racing club, a breast cancer survivors’ team might be organized through the club. Existing clubs might require a membership fee. Some clubs will donate the use of their boats to a survivors’ team. If there’s no preexisting club in your region, the information below can help you start one. You can also ask an existing team or club for guidance.

Components necessary to start a team include the following.

**A trainer.** A qualified trainer will understand the concerns and needs of breast cancer survivors and know what to include in the training program.

**A training program** should include fitness exercises designed to help members gradually improve strength, flexibility, endurance, and balance; ideally the fitness program will run year-round. The number of sessions required before a member can begin paddling should be determined. Regular paddling training and practice are required during the boating season. Festivals often offer paddling practice sessions before the races. Paddling training camps such as those run by Great White North ([www.gwn.dragonboat.com](http://www.gwn.dragonboat.com)) may also be helpful.

**A coach.** A qualified coach will be able to teach paddling technique and direct the team in boating drills and races, and will understand the concerns and needs of breast cancer survivors. The coach and trainer can be the same person.

**An exercise site** is essential for regular exercise. A local gym might donate time, space, and equipment for team workouts.

**Equipment.** A dragon boat can either be purchased for between \$10,000 and \$15,000 or rented. The boat should be outfitted with

trailer, paddles, drum, and life jackets. An existing dragon boat club will likely have these. At dragon boat races, boats and equipment are provided. A boat slip at a marina or boathouse during the boating season, as well as a place to keep the boat during the off season, will also be needed.

**Criteria for team inclusion.** Potential team members should be interested in improving and maintaining fitness and have their physician’s approval to begin exercising. Each person will need to decide whether to use a compression garment; that decision is usually made based on consultation with one’s physician or physical therapist.

**Team members.** A dragon boat team involves a minimum of 20 paddlers, one drummer, and one trained steersperson. Recruitment can be done through media advertisements, events such as fundraising walks, breast cancer treatment centers, cancer support groups, and health care providers such as oncology specialists. A first meeting can be held to discuss interest. At races, start-up teams who don’t yet have 20 paddlers can usually find volunteers from other teams to fill the boat.

**Mission.** The team should decide on its mission, which may include goals beyond competition.

**Funding.** Some teams have received funding from major corporations or local businesses. If a team decides to seek grant funding, nonprofit incorporation may be necessary. Most teams will also need to raise funds themselves for equipment, insurance, race registration, and travel expenses. Professional, college, and high school sports events, celebrity sports events, concerts, regattas, and the like offer opportunities to raise funds along with awareness. A local marina might be willing to donate the use of a slip.

psychosocial nature of many benefits of dragon boat racing for survivors, which included finding camaraderie in new friendships and “sisterhood,” experiencing unconditional acceptance (reported by the male survivor), finding stress relief through shared laughter, and feeling empowered and more in control. Parry concluded that the survivors’ stories “demonstrate how dragon boat racing contributed to the social, emotional, physical, spiritual, and mental dimensions of health,” helping each to be a “thriver, not just a survivor.”

A few drawbacks to dragon boat racing were also noted.<sup>21</sup> Some survivors had difficulty coping with cancer recurrences and deaths within the group. Differences in how individuals viewed dragon boating—some saw it as competitive sport, while others saw it as recreation—also caused “some tensions.”

Breast cancer survivors (and survivors of other cancers) have reported feeling abandoned when, after months of frequent visits to health care providers, treatment ends and they’re told to follow up with their physician in six months. For many, post-treatment concerns persist. Joining a dragon boat team can provide some support. But the sport doesn’t appeal to everyone; some survivors aren’t interested in such vigorous physical activity, and some don’t want to be reminded of their experiences with cancer.

#### WHAT I’VE GAINED FROM DRAGON BOATING

As a breast cancer survivor and dragon boater, I’m familiar with the psychosocial dimensions described in the literature. My team, the Hope Chest Dragon Boat Team ([www.hopechestbuffalo.org](http://www.hopechestbuffalo.org)) consists of 80 female breast cancer survivors between the ages of 46 and 79 years; I joined in 2003, one year after my diagnosis. The team exercises and practices under the guidance of our trainer-coach. The only criterion for participating in the basic exercise program is having a physician’s permission. (Some joined the team just for the basic exercise, not for the paddling.) Additional criteria for becoming a paddler include having an interest in improving and maintaining flexibility and fitness, demonstrating ease in the water by passing a dunk test (this involves jumping into a pool while wearing a life jacket), and prior attendance at a minimum of 12 exercise workout sessions. We have two boats, so everyone who meets these criteria has an opportunity to practice paddling.

Exercise workouts are held once a week from June through January and twice a week from February through May. After an aerobic warm-up, we stretch and work on upper-body strength and balance. We support each other and share laughter and friendship. Paddling practices are held once or twice a week during our boating season, which runs

from late May through early October in our area of Buffalo, New York. We participate in three or four dragon boat festivals each summer, competing against other breast cancer survivors. Although we don’t have a fixed racing team, enough members usually attend so that we can fill one boat as well as offer substitute paddlers to other teams as needed.

Dragon boat races usually range from 250 to 500 meters in length. Many of the festivals are held in Canada, where dragon boat racing among breast cancer survivors has caught on much faster than it has in the United States. Fundraising and donations provide the financial support needed for race registration, team travel, clothing, and even team pins. At every festival, a carnation ceremony is held: in a moving tribute to team members who have died, teams drop pink carnations from their boats into the water.

Efficient paddling is hard work, requiring both strength and stroke synchronization. But dragon boat racing is exhilarating, a natural high. Whether or not we win a race, participating is a winning experience. For me team membership is something very positive, an unexpected blessing after the awful experience of breast cancer. It’s a way to stay fit and to demonstrate that breast cancer survivors can lead active lives. We don’t dwell on the negative, but in times of need (such as recurrences of cancer, or other grave illness) the team provides strong support.

**Nurses need to be aware** of the tremendous benefits of dragon boat racing for breast cancer survivors, and to recommend it. Nurses can be influential in starting a team (see *Starting a Team*). They can conduct methodologically rigorous studies to develop additional interventions that address survivors’ needs. Other areas for research include the potential cost savings and risk reductions of exercise programs that incorporate dragon boat racing, as compared with traditional lymphedema management. Some dragon boat teams include survivors of other types of cancer; and some breast cancer survivors participate in other sports, such as fly fishing through organizations like Casting for Recovery ([www.castingforrecovery.org](http://www.castingforrecovery.org)). What other activities might offer cancer survivors a chance to live life more fully? Paddles up! Take us away! ▼

**Keywords:** breast cancer survivor, cancer survivorship, dragon boat racing, upper-body exercise, post-breast cancer lymphedema

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