

St. Teresa's Hospital

Oncology Centre

Active Breathing Coordinator™ (ABC) is one of the advanced tumor-immobilizing technologies available at the St. Teresa's Hospital Oncology Centre (STHOC). It is designed to assist patients to hold their breath temporarily during the planning and treatment procedures. Its aim is to minimize tumor's movement caused by breathing motion.

1. What is Active Breathing Coordinator™ (ABC)?

ABC is a non-invasive, computer-controlled breathing equipment. It is able to track patients' breathing cycle by measuring the breathe-in (inhalation) volume. Once patients reach the pre-determined breathe-in volume, ABC will be activated to help patients hold their breath. Internal organ and tumor movements caused by respiratory motion will halt. Radiation treatment will be delivered during the breath-hold period.

2. Why is ABC important?

Breathing motion may hinder the accuracy of tumor localization during the planning and treatment delivery procedures. Treatment for chest and abdominal regions may require larger treatment margins in order to compensate for the breathing movements; this correlates to a larger radiation field. As a result, surrounding healthy tissues may receive more radiation dose.



3. Keypoints about ABC

- Suitable for chest and abdominal cases (such as breast, lung and liver)
- Better image quality of planning CT (minimized breathing motion artifacts)
- Reduce tumor motion which leads to smaller planning margins
- Capable of High Dose Rate RapidArc IMRT Beams (fast treatment time)

4. Planning Procedures for ABC

Patients chosen for ABC treatment at STHOC will be given an ABC training session to determine the optimal breath-hold time and inhalation volume. Patients will learn and follow some simple instructions via audio and visual aids. With the assistance from ABC, we aim for patients to hold their breaths for 15-20 seconds. An ABC training sessions typically takes 30 minutes.

After the training session, a customized immobilization device will be made for each patient. It is used to help patients maintain their positions during treatment.

Following, patients will undergo a breath-hold planning CT scan. Patients may be asked to extend their breath-hold time a few more seconds in order to complete a single breath-hold CT scan. A planning CT scan session typically takes 30 minutes.

Computerized radiation treatment plans will be designed based on breath-hold CT images. Due to less internal motion, which leads to better image quality, oncologists are able to adjust treatment planning margins in order to reduce surrounding healthy tissues being irradiated.



5. Treatment Procedures for ABC

To verify the treatment position, 2D verification x-ray images will be taken under breath-hold circumstances before treatment is administered. To complete each treatment session, it may require patients to repeat breath-hold procedures 6 to 10 times. An ABC treatment session usually lasts around 15 to 30 minutes.

During the entire course of the treatment session, patients will be holding a control switch. When patients are ready for the breath-hold, they will press the button to activate the ABC. Once the button is pressed by patients and reach the pre-determined breathe-in volume, the radiation therapist will initiate or resume treatment delivery.

An important reminder to patients is that they are always in control and they can interrupt their breath-hold at any time by releasing the control switch.

Our radiation therapists will closely monitor the entire treatment process through CCTV. They will interrupt the treatment if patients are uncomfortable or unable to hold their breath. After any interruption, 2D X-ray verification imaging may be needed to ensure the remaining dose can be delivered accurately.