

## TACE

Transarterial chemoembolization or TACE places chemotherapy and synthetic materials called embolic agents into a blood vessel feeding a cancerous tumor to cut off the tumor's blood supply and trap the chemotherapy within the tumor. It is most often used to treat liver cancer but may also be used in patients whose cancer has spread to other areas of the body. Chemoembolization may be used as a standalone treatment or in combination with surgery, ablation, chemotherapy or radiation therapy.

Your doctor will instruct you on how to prepare, including any changes to your medication schedule. Tell your doctor if you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking, including herbal supplements and aspirin. Your doctor may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure. They may also tell you not to eat or drink anything after midnight before your procedure. Plan to stay at the hospital overnight. Leave jewelry at home and wear loose, comfortable clothing. You may need to change into a gown for the procedure.



### What is TACE?

Transarterial chemoembolization or TACE combines the local delivery of chemotherapy with a procedure called embolization to treat cancer, most often of the liver. It is a non-surgical and minimally invasive procedure performed in radiology, usually by an interventional radiologist.

In TACE, anti-cancer drugs are injected directly into the blood vessel feeding a cancerous tumor. In addition, synthetic material called an embolic agent is placed inside the blood vessels that supply blood to the tumor, in effect trapping the chemotherapy in the tumor and blocking blood flow to the tumor.

### What are some common uses of the procedure?

TACE is most beneficial to patients whose disease is predominately limited to the liver, whether the tumor began in the liver or spread to the liver (metastasized) from another organ.

Cancers that may be treated by TACE include:

- hepatoma or hepatocellular carcinoma (primary liver cancer)
- cholangiocarcinoma (primary cancer of the bile ducts in the liver)
- Metastasis (spread) to the liver from:
  - colon cancer
  - breast cancer
  - carcinoid tumors and other neuroendocrine tumors
  - islet cell tumors of the pancreas
  - ocular melanoma
  - sarcomas

- other vascular primary tumors in the body

Depending on the number and type of tumors, your doctor may use TACE or combine it with other treatment options such as surgery, chemotherapy, radiation therapy, or ablation.

## How should I prepare?

Several days before the procedure, you will have an office consultation with the interventional radiologist who will be performing your procedure.

Prior to your procedure, your doctor may test your blood.

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic, general anesthesia, or contrast materials. Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners before your procedure.

Patients should always tell their doctor and technologist if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Radiation Safety page (<https://www.radiologyinfo.org/en/info/safety-radiation>) for more information about pregnancy and x-rays.*

You will receive specific instructions on how to prepare, including any changes you need to make to your regular medication schedule.

If you are to receive a sedative during the procedure, the doctor may tell you not to eat or drink anything for four to eight hours before your exam. If you are sedated, have someone accompany you and drive you home afterward.

Children may require general anesthesia for the procedure to help them hold still and be comfortable for the procedure. The anesthesia department will provide instructions to the family.

While TACE can be done as an outpatient procedure, be prepared to stay overnight at the hospital for one or more days.

The nurse will give you a gown to wear during the procedure.

## What does the equipment look like?

This procedure uses x-ray equipment, a catheter, and embolic agents.

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

A catheter is a long, thin plastic tube that is considerably smaller than a "pencil lead." It is about 1/8 inch in diameter. Various materials called embolic agents are used to occlude or block off blood vessels.

This procedure may use other equipment, including an intravenous line (IV), ultrasound machine, and devices that monitor your heart beat and blood pressure.

## How does the procedure work?

TACE attacks the cancer in two ways. First, it delivers a very high concentration of chemotherapy, or anti-cancer drugs, directly into the tumor, without exposing the entire body to the effects of those drugs. Second, the procedure cuts off blood supply to the

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tumor, trapping the anti-cancer drugs at the site and depriving the tumor of the oxygen and nutrients it needs to grow.

The liver is unique because it has two blood supplies—an artery (the hepatic artery) and a large vein (the portal vein). The normal liver receives about 75 percent of its blood supply through the portal vein and only 25 percent through the hepatic artery. But when a tumor grows in the liver, it receives almost all its blood supply from the hepatic artery.

Chemotherapy drugs injected into the hepatic artery reach the tumor directly, sparing most of the healthy liver tissue. Then, when the artery is blocked, the blood is no longer supplied to the tumor, while the liver continues to be supplied by blood from the portal vein. This also permits a higher concentration of the anti-cancer drugs to be in contact with the tumor for a longer period.

## How is the procedure performed?

Image-guided, minimally invasive procedures such as TACE are most often performed by an interventional radiologist in an interventional radiology suite or occasionally in the operating room.

X-ray images will be taken to map the path of the blood vessels feeding the tumor. Contrast material may also be used to map the path.

You may be given a medication called Allopurinol, which may help protect the kidneys from the chemotherapy and the byproducts produced by the dying tumor cells.

Your doctor may provide medications to help prevent nausea and pain and antibiotics to help prevent infection.

You will lie on the procedure table.

The doctor or nurse may connect you to monitors that track your heart rate, blood pressure, oxygen level, and pulse.

A nurse or technologist will insert an intravenous (IV) line into a vein in your hand or arm to administer a sedative. This procedure may use moderate sedation. It does not require a breathing tube. However, some patients may require general anesthesia.

The doctor will make a very small skin incision at the site.

Using x-ray guidance, the doctor inserts a thin catheter through the skin into an artery, either in the groin or in the wrist, and advances it to the liver. Then contrast material is injected through the catheter and another series of x-rays will be taken.

Once the catheter is positioned in the branches of the artery that are feeding the tumor, the anti-cancer drugs and embolic agents are mixed together and injected.

Additional x-rays will be taken to confirm that the entire tumor has been treated.

When the procedure is complete, the doctor will remove the catheter and apply pressure to stop any bleeding. Sometimes, your doctor may use a closure device to seal the small hole in the artery. This will allow you to move around more quickly. No stitches are visible on the skin. The nurse will cover this tiny opening in the skin with a dressing.

You can expect to stay in the recovery room between two to six hours, which depends on which artery was accessed and if a closure device was used.

TACE is usually completed within 90 minutes.

## What will I experience during and after the procedure?

The doctor or nurse will attach devices to your body to monitor your heart rate and blood pressure.

You will feel a slight pinch when the nurse inserts the needle into your vein for the IV line and when they inject the local anesthetic. Most of the sensation is at the skin incision site. The doctor will numb this area using local anesthetic. You may feel pressure when the doctor inserts the catheter into the vein or artery. However, you will not feel serious discomfort.

If the procedure uses sedation, you will feel relaxed, sleepy, and comfortable. You may or may not remain awake, depending on how deeply you are sedated.

You may feel slight pressure when the doctor inserts the catheter, but no serious discomfort.

As the contrast material passes through your body, you may feel warm. This will quickly pass.

One to seven days after the procedure most patients experience some side effects called post-embolization syndrome. Symptoms include pain, nausea, vomiting and fever. Most people describe their symptoms as similar to the flu. Pain is the most common side effect that occurs because the blood supply to the treated area is cut off. It can readily be controlled by medications given by mouth or your IV.

You should be able to leave the hospital within 24-48 hours after the procedure once your pain and nausea are controlled with oral medication.

You will be sent home with prescriptions for pain and nausea medicine. You may be sent home with antibiotics. It is normal for you to run a fever up to a week following the procedure. Fatigue and loss of appetite are also common and may last two weeks or longer. In general, these are all signs of a normal recuperation.

If your pain suddenly changes in degree or character, if your fever becomes suddenly higher or you notice any other unusual changes, you should contact your physician.

You may receive a breathing apparatus called an incentive spirometer. Your nurse will instruct you how to use it. This will help you inflate your lungs so that you will not develop pneumonia.

You should be able to resume your normal activities within a week.

During the first month following the procedure, you should check in routinely to let your physician know how your recovery is progressing. You will return for a CT scan or MRI and blood tests to determine the size and status of the treated tumor.

The liver is divided into two parts—a right hepatic lobe and a left hepatic lobe. If there is tumor involving both lobes, this is usually treated in a staged fashion. During the first setting, one of the lobes is treated. The second lobe is usually treated approximately one to two months later.

CT or MRI will be performed every three months thereafter to determine how much the tumors ultimately shrink, and to see if any new tumors arise in the liver. The average time before a second round of TACE is necessary (because of new tumor) is between 10 and 14 months. TACE can be repeated many times over the course of many years, as long as it remains technically possible and you continue to be healthy enough to tolerate repeat procedures.

## **Who interprets the results and how do I get them?**

After the procedure is complete, the interventional radiologist will tell you whether the procedure was a success.

You will also be scheduled for additional CT or MRI exams and blood tests to determine the status of the treated tumor.

## **What are the benefits vs. risks?**

### **Benefits**

- In about two-thirds of cases treated, TACE can stop liver tumors from growing or cause them to shrink. This benefit lasts for an average of 10 to 14 months, depending upon the type of tumor, and usually can be repeated if the cancer starts to grow again.
- Other types of therapy (tumor ablation, chemotherapy, radiation) may be used in combination with TACE to control the tumor. This is all dependent on the size and location of the tumor.
- When cancer is confined to the liver, most deaths that occur are due to liver failure caused by the growing tumor, not due to the spread of cancer throughout the body. TACE can help prevent this growth of the tumor, potentially preserving liver function and maintaining a relatively normal quality of life.

## Risks

- Any procedure that penetrates the skin carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- Any procedure that places a catheter inside a blood vessel carries certain risks. These risks include damage to the blood vessel, bruising or bleeding at the puncture site, and infection. The doctor will take precautions to mitigate these risks.
- There is always a chance that embolization material can lodge in the wrong place and deprive normal tissue of its blood supply. However, mapping the pathway of the tumor and blood supply minimizes this risk.
- There is a risk of infection after embolization, even if an antibiotic has been given.
- Because angiography (which uses IV contrast) is part of the procedure, there is a risk of an allergic reaction to the contrast material. The radiologic technologist will determine your allergies prior to the procedure.
- Because angiography is part of the procedure, there is a risk of kidney damage in patients with diabetes or other pre-existing kidney disease.
- Reactions to chemotherapy may include nausea, hair loss, a decrease in white blood cells, a decrease in platelets and anemia. Because TACE traps most of the chemotherapy drugs in the liver, these reactions are usually mild.
- Serious complications from TACE occur after about one in 20 procedures. Most major complications involve either infection in the liver or damage to the liver. Reporting indicates that approximately one in 100 procedures result in death, usually due to liver failure.
- Pediatric patients are at increased risk of blood clots forming at the entry site of the catheter because of the small size of the vessels.

## What are the limitations of TACE?

TACE is not recommended in cases of severe liver or kidney dysfunction, abnormal blood clotting, prior surgery, or if you have a history of stenting or blockage of the bile duct(s). In some cases—despite liver dysfunction—TACE may be completed with smaller doses of chemotherapy spread over several procedures to try and minimize the effect on the normal liver.

TACE is a treatment, not a cure. Approximately 70 percent of patients will see decreased disease in the liver and, depending on the type of liver cancer, may also see improved survival rates and quality of life.

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