

Laser applications in medicine

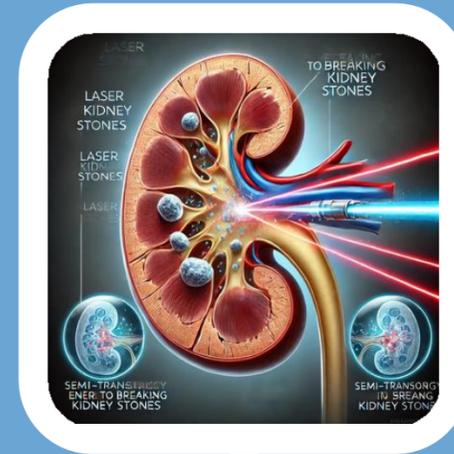
Department of Medical Physics



Laser kidney stone fragmentation

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Use of laser in cancer treatment

The Use of Lasers in Cancer Treatment

Lasers are used to treat cancer in different ways, depending on the type and location of the tumor. Here are the main uses:

1. Removing or Destroying Tumors

Lasers can vaporize or cut cancerous tissue, especially in surface tumors like skin cancer or cervical cancer.

2. Photodynamic Therapy (PDT)

This involves injecting a light-sensitive drug into the body. Cancer cells absorb this drug. When the laser is directed at the tumor, the drug is activated, destroying the cancer cells. This method is used for cancers such as esophageal and lung cancer.



3. Relieving Symptoms (Palliative Care)

Lasers help ease symptoms caused by tumors, such as opening airways in lung cancer patients or reducing bleeding in advanced cancers.

4. Closing Blood Vessels That Feed Tumors

Lasers can close blood vessels that supply the tumor, slowing its growth and spread.

5. Enhancing Radiation and Chemotherapy

In some cases, lasers are combined with chemotherapy or radiation therapy to improve treatment effectiveness.



Advantages of Laser Therapy

1. High precision in targeting tumors
2. Less damage to healthy tissues
3. Less blood loss during treatment
4. Faster recovery compared to traditional surgery

However, laser treatment is not suitable for all types of cancer. It is most effective for surface tumors or those that are easy to reach.

Introduction

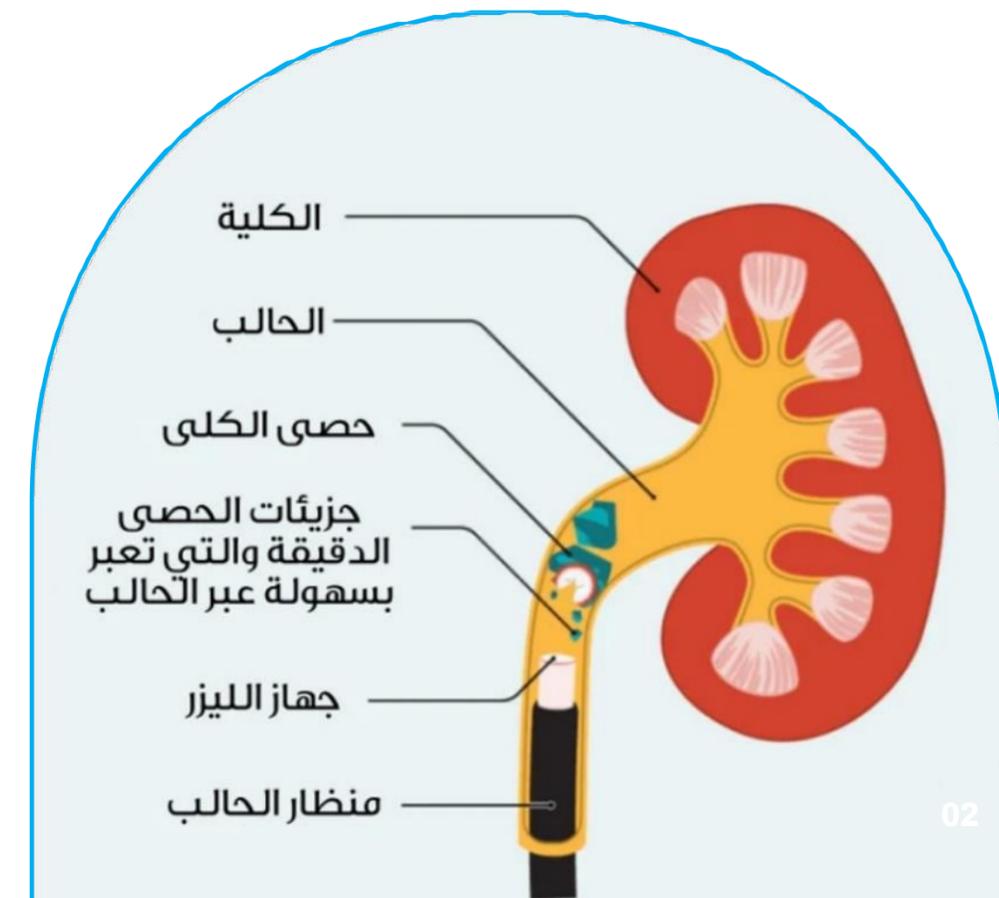
Kidney stones are hard deposits that form in the kidneys and can cause pain when passing through the urinary tract.

Laser lithotripsy is a modern technique used to break stones without surgery.

What is Laser Lithotripsy?

Laser lithotripsy is a medical procedure that uses a high-energy laser to break stones into small pieces that pass out in urine.

The procedure is done using a ureteroscope, a thin tube with a camera and laser fiber that reaches the stone inside the urinary tract.



How Does Laser Lithotripsy Work?

1. The doctor inserts the ureteroscope to reach the stone.
2. A laser fiber targets the stone and breaks it into small pieces.
3. The pieces pass out naturally with urine.

Types of Laser Used:

The Holmium:YAG Laser is the most common because:

1. It works on all stone types.
2. It has little effect on surrounding tissues.
3. It provides strong energy to break stones effectively.



Benefits of Laser Lithotripsy:

1. A safe, non-surgical procedure.
2. Faster recovery compared to surgery.
3. No long hospital stay is needed.

How much energy does a holmium laser produce?

The energy of a single pulse ranges from **0.2 to 6 J**, depending on the device settings and the type of stone.

What is the frequency range used in holmium laser for lithotripsy?

The frequency can be adjusted **between 5 to 80 Hz**, allowing for efficient stone fragmentation.

Possible Complications:

1. Mild bleeding.
2. Pain during urination.
3. Risk of infection.

Laser treatment of arthritis

Arthritis is a common condition that affects the joints, causing pain, swelling, and limited movement. Laser therapy is a modern and effective treatment option

How Does Laser Work?

The laser works by sending focused light to the affected joint. This light helps reduce pain, decrease inflammation, and improve joint movement. It is a non-invasive and painless procedure.



Types of Lasers Used in Treatment:

1. CO2 Laser
2. Nd:YAG Laser
3. Ho:YAG Laser

Benefits of Laser Treatment for Arthritis:

1. Reduces pain
2. Decreases inflammation
3. Improves joint movement
4. No need for surgery

Conclusion

Laser treatment for arthritis is a safe and effective method that can help reduce pain and improve joint mobility. It is a great option for those looking for non-surgical solutions.



Reference

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- 3. Mayo Clinic, National Cancer Institut, American Cancer Society**



Thank you