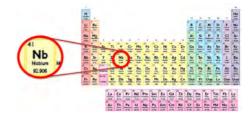
# Niobium for MRI\*



**Niobium** (Nb)\* is a rare grey metal with a number of unique and important qualities. When it is used in magnetic resonance imaging (MRI) machines niobium makes an enormous contribution to improving human health.





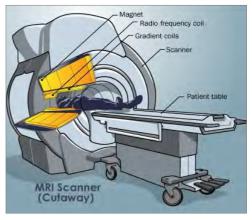
MRI has come of age over the last 30 years. Today there are some 36,000 MRI machines in hospitals and medical centres around the world and millions of people who are still alive today as a direct consequence of MRI machines.

MRI is a radiology technique that uses magnetism, radio waves and a computer to create images.

At the heart of an MRI machine is a system of magnets. These are usually electromagnets made from strands of coppercoated niobium-titanium (NbTi) alloy.

When NbTi is cooled by liquid helium to just above absolute zero (4.2 kelvin, minus 268.8°C) it becomes a superconductor.

Superconductors create very powerful electromagnets that are vital to the scanning process.



A cutaway of an MRI machine showing the magnets (yellow) (Howstuffworks.com)

### \* Is it niobium or columbium?

Officially, it is niobium, but columbium is still widely used in the United States.

When element 41 was first identified in 1801, it was named 'columbium' (Cb). However, for many years chemists believed it was the same element as tantalum (Ta) and when, in 1844, it was rediscovered, it was named 'niobium' (Nb). It was not until 1865 that tantalum and niobium were proven to be two elements, and columbium and niobium to be one element, but by then all three names were already in wide circulation. In 1950 the International Union of Pure and Applied Chemistry officially adopted 'niobium'.

MRI is used in hospitals as a precise and non-invasive diagnostic tool to examine patients. Unlike conventional radiography (X-ray) and computed tomography (CT) scanning, MRI imaging techniques do not expose patients to potentially harmful ionising radiation.

A modern-day MRI system can create threedimensional images in close to real-time: a modern MRI machine, supported by appropriate software, can take a single scan in 15 milliseconds, or some 66 scans per second.



A simple two-dimensional MRI scan (Shutterstock)



Advances in MRI machines and their software now allow three-dimensional representations to be created from multiple MRI scans (Shutterstock)

Every day hundreds of thousands of MRI scans are taken around the world, allowing millions of people to live longer, healthier lives.



For more information on the many uses of niobium visit www.TaNb.org.



# TANTALUM-NIOBIUM

# INTERNATIONAL STUDY CENTER

# www.TaNb.org

The T.I.C. is the international trade body that represents the tantalum and niobium industries. We have around 90 members from over 25 countries involved with all aspects of the tantalum and niobium industry supply chain (from mining and refining through to OEMs and recycling).

### **OBJECTIVES**

- Increase awareness and promote the remarkable properties of tantalum and niobium.
- Host the Anders Gustaf Ekeberg Tantalum Prize, an annual award that recognises excellence in tantalum research.
- Organize a General Assembly (conference) in October each year for business and technical presentations. Non-members may attend.
- Publish a quarterly Bulletin newsletter for members and stakeholders.
- Collect from the members (via an independent company to ensure confidentiality) statistics on the tantalum and niobium industries.
- Address key issues facing the industry, such as legislation, supply chain due diligence, and transport of radioactive materials (NORM).

## Tantalum-Niobium International Study Center (T.I.C.)

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