

# Lead is essential to safe, effective and sustainable medical imaging



Medical imaging has revolutionised the diagnosis and treatment of numerous medical conditions from broken bones to cancer treatment. At some stage in our lives, most of us will have an X-ray, for example to check for bone fractures or tooth damage or as part of cancer screening programs such as mammograms. Millions of X-ray scans are taken daily for diagnostic purposes in hospitals and clinics around the world and as access to healthcare improves globally, these numbers are set to increase.

Medical imaging procedures such as radiography and CT scans ionising radiation to generate images of the body. Although critical, the radiation used in these procedures can damage DNA and could therefore increase the risk of developing cancer. For this reason, medical imaging facilities are strictly regulated to ensure that radiation exposure is both controlled and minimised for patients and staff alike.

Effective radiation shielding is therefore essential to protect staff and patients ensuring this critical diagnostic tool can be used successfully. Shielding can be in the form of personal protective equipment such as aprons, collars and glasses or physical barriers such as mobile screens, wall and floor panels. The imaging equipment itself also needs shielding to minimise patient exposure to stray radiation. The availability and sustainability of radiation shielding materials is critical to the continuing expansion of medical imaging services globally.

No materials can compete when it comes to both blocking radiation and the practicalities of integrating with medical equipment and buildings. [Due to its high density, as little as a few millimetres of lead can completely block the passage of harmful radiation.](#) Leaded aprons, collars, glass, mobile screens and curtains are standard protective equipment in hospital radiography departments. Lead sheeting also provides shielding in walls, doors and floors. In fact, its abilities are so unparalleled that the radiation shielding of non-lead materials is reported in 'lead equivalents' i.e. the thickness of that material that is needed to give the same radiation protection as lead under the same conditions.

Lead also offers unique advantages over other metals in terms of availability and sustainability. High-density materials based on tungsten, bismuth and barite can provide similar radiation shielding properties but as their supply is already critical at EU level, further expansion of their use in radiation shielding is not sustainable.

Moreover such materials have a far greater environmental impact in particular CO<sub>2</sub> emissions and therefore they do not qualify as substitutes. Steel and high-density concretes are also widely used for radiation shielding but need to be used at significantly greater thickness. This restricts their use in facilities where space is a limiting factor, for example in city-centre hospitals.

Lead is always fully enclosed in radiation shielding fixtures and fittings – from aprons to lead-lined walls or mobile screens – it is therefore both a safe and sustainable material for this use. Easily obtainable, lead is highly recyclable and an ideal material for circular economies. In practice, almost 100% of lead is recycled after use and specialist manufacturers of radiation shielding source the vast majority of their lead from recycled material. Lead-based radiation protection is currently the most effective and cost-efficient way to safeguard the use of medical imaging today. As the medical profession continue to work toward cures for global health challenges, lead will remain central to occupational and patient safety for years to come. The availability and sustainability of lead as an effective, safe radiation shielding material will support the expansion of medical imaging services in hospitals and clinics globally.



## Fact file

- Medical imaging has revolutionised diagnostics in the past 50 years. Effective radiation shielding ensures that occupational exposure to ionizing radiation is minimised
- Lead is the industry standard for radiation shielding - no alternative material can compete
- At **over 75%**, lead has one of the highest reported recycling rates of all metals although, in practice, close to 100 % is recycled
- The low melting point makes lead scrap easy to refine for reuse – specialist manufacturers of radiation shielding source 95 % of their lead from recycled material
- Lead is a sustainable resource and the vast majority of lead used in radiation shielding comes from secondary sources
- Lead use for radiation shielding accounts for approximately 1% of the annual volume of lead used in the EU

Developed in collaboration with Calder Group and Curium, this case study highlights just one of the many essential uses of lead that provide societal benefits and boost the EU's economy

For Europe's future, lead matters.

