# HOW THE LACK OF RARE EARTH ELEMENTS ADVERSELY IMPACTS THE U.S. HEALTHCARE SYSTEM AND DELIVERY OF CARE

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The subject of availability of rare earth elements (REEs), or lack thereof, has deservedly received a great deal of attention from our legislators and the media, primarily due to the needs of our military defense systems. Many REEs have unique capabilities such as high levels of magnetism and unique optical and luminescent behaviors making them of essential importance across a wide range of industries, especially high-tech consumer products, such as cellular telephones, computer hard drives, electric and hybrid vehicles, flat-screen monitors and televisions, the defense industry including weaponry, missiles, electronic displays, guidance systems, lasers, radar and sonar systems. In the healthcare industry they are key elements in such applications as diagnostic imaging devices, lasers, oncological diagnosis and treatment, biosensing, regenerative therapies, and drug delivery systems to name a few.

China currently controls approximately 90% of the REE market, making the US highly susceptible to shortages caused by the actions of the Chinese government. In addition to end-product availability, enormous susceptibility to dependence on REEs exists throughout entire industrial supply lines, further emphasizing the need for domestic access to these elements.

Much of focus today has been directed at the impact of REE shortage on military and civilian industrial production. According to the New York Times, as reported on August 3, 2024 “More than 80,000 parts that are used in Defense Department weapons systems are made with critical minerals now subject to Chinese export controls.”

**Background**

Rare earth elements are not, in fact, rare. These seventeen metallic elements include the fifteen lanthanides on the periodic table plus scandium and yttrium. Although not technically included as a rare earth element, gallium is also essential to a vast number of applications utilizing semi-conductors across a myriad of industries. It does not exist in a pure mineral form, and the US has long been thought to have no significant active domestic source of Gallium until very recent discoveries in Montana.

REEs are actually plentiful in the earth’s crust, but present enormous challenges in extraction, processing and purification in applicable concentrations due to their tendency to be spread thinly as trace impurities requiring the mining of enormous amounts of raw ores at great expense.

While experimentation and development efforts for REE application are ongoing, several have a well-established presence upon which the healthcare industry is dependent for diagnostic and therapeutic application. The unique properties of these elements highlight their essential importance. Lack of access has been forcing innovation to replicate their unique capabilities using alloys and mixtures of more commonly available materials. Many of the rare earths such as gadolinium do not have substitutes.

**REEs in Healthcare**

The REEs most widely utilized in healthcare include:

- **Neodymium** (atomic # 60) is the most highly magnetic substance that is commercially available. It is essential to the production of high-powered, temperature resistant magnets used across various industries, including MRI, CAT and PET scanners. Neodymium is also used in doping for active medium for solid state lasers that are used across the spectrum of many medical and dental specialties.
- **Gadolinium** (atomic # 64) is used in contrast materials essential to radiological diagnostic procedures, and to bone density and absorption differential measurements in conditions such as osteoporosis. Because it is ferromagnetic at room temperature, it is particularly valuable for intravenous use as an MRI contrast agent.
- **Yttrium** (atomic # 39) is widely used in certain lasers, superconductors, and in chemotherapeutics in agents that target, bind to and poison cancer cells, including brachytherapy for certain liver cancers and eye tumors. It is also used in combination with Zirconia ceramic to prevent breakdown of certain implants, and as a component in optical isolators and microwave equipment. It is also used to intensify radiographic imagery.
- **Holmium** (atomic # 67) and **Erbium** (atomic # 68) are used for lasers, with Holmium also used for optical isolators and microwave equipment. Erbium is used in manufacturing lasers for use in aesthetic and dental implant surgery.
- **Lanthanum** (atomic # 57) is widely used in conditions related to hyperphosphatemia including dialysis, renal disease, bone-joint malformations, cardiovascular disease, and the prevention of nephrolithiasis and urolithiasis. Lanthanum is also known to affect human metabolism, lowering cholesterol levels, blood pressure, appetite, and risk of blood coagulation.
- **Samarium** (atomic # 62) is used in the palliative treatment of bone pain associated with osteoblastic metastatic bone lesions.

**Gallium** (atomic # 31) is not technically a rare earth element, but in terms of application that spill over into the healthcare industry, is somewhat in a class of its own. Pure gallium does not occur naturally in nature, but rather as gallium (III) compounds in trace amounts in zinc ores (such as sphalerite) and in bauxite, although forms closer to gallium itself have recently been found in the US. Gallium has applications in pharmaceuticals and cancer treatment. An illustration of its industrial and medical value can be found with a quick internet search. (100 uses of Gallium).

Presently, the United States is completely dependent on foreign sources of gallium and therefore highly vulnerable to the geo-political factors which could impact access to this critical element. As reported in a Wall Street Journal article dated August 3, 2025, “China has since December 2024 banned sales of gallium to the US.”

**Batteries**

Currently China controls over 80% of the critical materials needed for production of batteries, including graphite, cobalt, and manganese, as well as the rare earth elements required in anodes and cathodes powering batteries.

A discussion of the use of batteries in healthcare devices is far beyond the scope of this discussion, but as an exemplary overview one can only imagine the impact of limited access to batteries required for portable oxygen concentrators, pacemakers, implantable cardioverter defibrillators, insulin pumps, hearing aids, automated external defibrillators, portable ECG monitors / Holter monitors, blood glucose meters, powered wheelchairs & mobility scooters, and infusion pumps – not to mention the many

thousands of existent and constantly developing wearable and digestible micro and nano medical technology devices.

**Artificial Intelligence**

As in virtually all realms of society and industry globally, artificial intelligence is having an ever-expanding influence in healthcare and is dependent upon enormous capabilities for processing and storage of data. REEs are essential to meeting the computing technological infrastructure of AI processing. Shortage or supply line REE disruptions could slow the application of enhanced diagnosis, maximally effective treatment plans, robotic surgery, machine learning, natural language processing, analytics, decision-making algorithms, disease prediction and image interpretation to name just a few transformational areas of AI applications in healthcare.

**Potential Impact of Limited REE Access on U.S. Healthcare**

China's control of approximately 90% of REEs creates a widespread danger to our ability to effectively deliver high quality healthcare to patients.

An example of how a limitation in access to a key mineral negatively impacted care occurred in 2022/2023 when the industry experienced a shortage of iodine-containing contrast agent for CAT scanning due to the Covid-related temporary closure of GE Healthcare's manufacturing facility in Shanghai. The shortage resulted in rationing of imaging procedures within hospitals, patient backloads, and programs to preserve the supply that was available.

CAT, MRI and PET scanners are dependent on high powered magnets. With more than 130 million diagnostic procedures annually, a disruption of high-powered magnet supply lines could significantly impact diagnoses, progress monitoring and treatment of patients, maintenance and repair of existing machines, future production and development.

**What Should Be Done**

A June 24, 2025 meeting of the House of Representatives Small Business Committee included the leaders of four U.S. based companies in the REE mining, production and processing industry. It was collectively agreed that there needs to be a sense of urgency to achieve domestic independence in securing unlimited access to REEs and reduce the U.S. dependency on foreign countries.

A partnership between the public and private sectors may be the best option for the U.S. to achieve REE independence in an expedited time frame by providing private sector expertise and innovation supported by legislatively designated capital and a reduction of regulatory hurdles.

While discussion of the importance of our lack of access to REEs has largely been portrayed as essential to meeting our military and semiconductor needs, it is of vital importance to consider that the ability of our healthcare industry to provide research and development, and the highest quality of diagnostic, therapeutic, and pharmacological care to our citizens is also at risk. Without that assurance, healthcare costs will skyrocket, delays and reduction in care will become inevitable, morbidity will increase and lives will be lost.

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