

Implants such as pacemakers, defibrillators, artificial joints, metal plates, and dental work have become increasingly common. In the past, these implants were buried, incinerated, or sent to landfills after a death. Today many can be recycled—extracted, processed, and ultimately reused in some form. The metal in surgical and dental implants can be melted down and reconstituted as new implants or as heavy machinery and vehicles. Life-saving heart devices can be sterilized, refurbished and sent abroad to help impoverished patients who cannot afford new ones. Reusing the materials can also help the environment and save valuable natural resources. All of us can make a difference by supporting this recycling.

Metal joints, inserts and dental implants

For more than 100 years, metals have been implanted in the human body to repair or replace joints or teeth, and they have dramatically improved the lives of those patients. However, when these recipients die, their surgical and dental implants are buried in cemeteries or landfills, generating hundreds of tons of hazardous waste every year. Fortunately, many crematory operators have begun pursuing an alternate strategy. After separating the post-cremation metals from the ashes and collecting them in bins, they can ship the metal to an implant recycling company free of charge. The crematory may either receive payment for the metals or have the proceeds donated to charity.

■ The recycling process

The implant recycling companies analyze, sort, smelt and then sell the metals to industry for reuse. Some high-grade metals like cobalt and titanium from joints, plates and screws are sold to manufacturers for machinery like aircraft engines, wind turbines, and automobiles, or they may be refashioned into new joints. The most valuable metals come from dental implants, and they are the biggest source of recycling revenue. Gold and silver can be reused for jewelry, electronics, and new dental implants; platinum and palladium will be recycled for catalytic converters, electronic equipment, medical and dental implants. Lower grade metals can be sold as scrap.

■ Benefits

Without a doubt, metal implant recycling benefits all those involved in the process. For the crematories and recycling companies, this arrangement can be very lucrative. A large crematory could see a six-figure annual return from metal recycling, and recycling companies make excellent profits as well. Many crematories and recycling companies donate some or all of their recycling proceeds to charity.

Communities benefit from these charitable gifts and from improved environmental quality. Recycling reduces toxins in landfills, preventing metals like silver, mercury and cobalt from leaching into the ground and polluting fresh water. Because recycling reduces the need for new metal extraction, communities enjoy less landscape destruction, soil erosion, water and soil contamination and air pollution from mining. Finally, the bereaved families receive the cremated remains free of extraneous materials and contaminants.

■ How to donate

If you or a loved one has metal implants and wants to join this recycling effort, consider choosing traditional cremation or water cremation (alkaline hydrolysis) instead of burial so that the implants can be retrieved and reused. While in traditional cremation, dental amalgam is vaporized during combustion, releasing mercury vapor into the atmosphere, in water cremation the mercury amalgam remains solid throughout the cycle and is captured with other metal implants after processing—completely eliminating this emission. Be sure to choose a crematory that practices recycling, or ask your funeral director to do so. If no crematory in your area recycles implants, you could encourage them to begin.

NOTE: If you hope to retrieve a loved one's gold tooth or crown, be aware that it's almost never worth the effort. A funeral director is not licensed to perform an extraction and very few dentists would agree to perform the task. In fact, in some jurisdictions the removal would be a felony. After a traditional cremation, the gold has liquefied and thoroughly mixed with the ashes, so would be impossible to collect.

Pacemakers and defibrillators

Pacemakers are implanted to regulate dangerously fast, slow or irregular heart rhythms, and implantable cardiac defibrillators restore a normal heartbeat after an arrhythmia episode or cardiac arrest. Tens of thousands of these critical life-saving devices are buried when the person dies, or are removed and discarded by funeral directors or crematory personnel before cremation. Although some of these devices are in good working condition, the Food and Drug Administration (FDA) classifies them as single-use devices, and prohibits their reuse in patients in this country. At the same time, millions of people overseas will needlessly die every year because they cannot afford the $6,000 to $15,000 price tag for implanting a new pacemaker or defibrillator. In



response to this overwhelming need, some organizations have found ways to refurbish the devices and allow them to continue saving lives.

■ Recycling for human use

The University of Michigan Medical School collaborates with World Medical Relief and other international partners to collect used pacemakers and defibrillators through their nonprofit program "My Heart Your Heart." The devices are inspected and tested; those suitable for reuse are sterilized and shipped overseas to participating hospitals in the developing world. Since the physicians there often waive all charges, many devices can be implanted in impoverished patients at no charge.

The organization hopes to prove that with proper processing, the recycled pacemakers and defibrillators are as safe as new ones. If the FDA eventually approves large-scale reuse, thousands more critically ill patients around the world could be saved. Recycled pacemakers have already improved and lengthened the lives of poor patients in Africa, Asia, South America and the Caribbean.

■ Recycling for animal use

Implanting a new veterinary pacemaker in a pet can cost many thousands of dollars. Fortunately a refurbished human pacemaker can be a cost-effective alternative. Three veterinary schools, at the University of Georgia, University of Missouri, and University of Tennessee, have successfully implanted recycled human pacemakers in companion animals at a much lower cost. While dogs have been the primary recipients so far, smaller pets could also benefit, and enjoy longer, happier lives.

■ Benefits

The greatest benefit goes to the impoverished patients with severe heart disorders who might otherwise die within the next few weeks or months without this life-saving treatment. After surgery, most are able to resume work and care for their families. Often the donors, or their survivors, are delighted to help prolong the lives and ease the suffering of these patients. In addition, the lives of hundreds of family pets have been saved or extended using recycled pacemakers.

The lithium batteries in pacemakers are considered hazardous waste, so burial or disposal in landfills can cause environmental damage. Reusing the devices helps reduce the millions of tons of medical waste generated each year, and saves the cost of treatment and disposal.

■ How to donate

If your loved one dies with a recently implanted pacemaker, consider donating it to help save human lives overseas or animal lives in the US. Ideally, any donated pacemaker should have at least 70–80% battery life remaining, or 4–5 years. You can instruct the hospital, funeral director or crematory to remove it and send it to be recycled.

If you wish to have your own device reused after your death, be sure to tell your family. You should state your exact wishes in your Advance Medical Directive. If you are being cremated, the device will have to be removed anyway to prevent the battery from exploding during incineration; if you are being buried, your family may have to pay a small extra fee for its removal.

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Recycling Medical Devices After Death

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