

The project adds the University of California to a growing list of hospitals and schools turning to RFID technology to track human bodies, tissues or specimens.

By Mary Catherine O'Connor

June 2, 2009—Most universities rely on public funding to support their educational and research programs, but the gifts are not always money-based. Each year, for instance the [University of California's Anatomical Services](#) department receives nearly a thousand human cadavers, donated to support the education of health professionals, as well as further scientific research. In order to simplify and improve the accuracy of the process of tracking these bodies, the department is currently testing an RFID system developed by the [Wireless Internet for Mobile Enterprise Consortium](#) (WINMEC), a UCLA-based research group.

This project adds the UC Anatomical Services department to a growing list of hospitals and research centers that are turning to RFID to improve the tracking of cadavers and human specimens, such as tissue samples and biopsies. The first such application, developed by VeriTrace, was used for tracking corpses in the aftermath of Hurricane Katrina (see [VeriChip's VeriTrace Platform Sees Sales Boost](#)). In 2008, the Mayo Clinic began employing RFID to track biopsy specimens (see [At Mayo Clinic, RFID Slashes Error Rate](#)). And recently, the University of Michigan Health System began using RFID to track body tissues (see [University of Michigan Health System Tags Surgical Tissue](#)).



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Brandi Schmitt, director of the UC Anatomical Services department, says the WINMEC solution, known as [SpecimenTrak](#), is currently being evaluated at the Anatomical Services lab serving UCLA. The UC campuses in Davis, Irvine, San Francisco and San Diego also operate Anatomical Services labs. At each of these locations, systems for tracking the specimens require the manual entry of information into a database.

While the RFID hardware has been in use and functioning well for more than a year, Schmitt explains, the software integration required to expand the system to the other labs is still in progress. "We are currently working on merging the WINMEC software with the [Anatomical Services system] existing database," she says. "Right now, we have the database that manages the majority of our data, and then we have the SpecimenTrak database. They are separate, so we are working on the interface needed to merge them." Once this step is complete—which Schmitt hopes will happen by the fall of this year—all

other Anatomical Services labs will adopt the RFID system as well.

When a cadaver arrives at the UCLA facility, an alphanumeric identification code is issued in order to identify and track that corpse. This code is entered into the software, where it is associated with the unique ID number encoded to an RFID tag that is then sutured to the body.

In cases in which a specimen is to be subdivided (as opposed to remaining whole throughout the time it is used for study), an additional RFID tag is issued to each separate part removed from the body, such as a section or organ. In the software, the unique ID encoded to each additional tag is associated both with the unique ID number assigned to the whole cadaver, and with a non-serialized ID representing the type of specimen it is. The tags are either sutured directly onto the removed body parts or, if that is impossible, permanently attached to the containers in which the specimens are stored.

The work environment within the anatomical services labs, where the tags are encoded and read, presents a number of challenges when it comes to transmitting and receiving radio frequency signals. Metal tends to reflect RF waves, and most work surfaces and storage areas in the lab are made of metal. What's more, most liquids are highly RF-absorbent, so the fact that the cadavers and body parts are composed largely of water also presents a challenge. Higher radio frequencies are more prone to these types of interference than lower ones.

WINMEC and Schmitt's team tested several different types of passive RFID tags for tracking the specimens, including ultrahigh-frequency (UHF) passive RFID tags compliant with the EPC Gen 2 standard. Due to interference from the metals and liquids, however, these tags did not perform well, so the group decided to employ low-frequency (LF) passive tags compliant with the ISO 11784 and 11785 standards. To read the tags, lab workers utilize a wand-shaped handheld RFID interrogator.

When each specimen—be it a whole cadaver or an individual part—reaches the end of its usefulness, it is disposed of through cremation. Rather than recollect and recycle the tags, Schmitt says, they are left on the specimens when they are cremated. This decision, she explains, was made because the tags are inexpensive, and because recollecting and reusing them would introduce the unlikely possibility of an error in the tracking system, since the tag identification number would be reintroduced to the software—albeit in association with a new specimen ID.

Today, the RFID system supports two main business processes for the UCLA lab: It is used to identify donations, and to automate the process of taking inventory of the specimens stored at the facility. Previously, donations were identified using hand-written tags, and inventory was performed by manually reading the tags. Now, staff members pass the reader wand over the tag attached to each donation, at close proximity, in order to collect the inventory data. This task is being performed on a monthly basis, and requires significantly less time than the process previously took, when inventory was counted manually.

Once the system is installed at the four other labs, the RFID tags will also be used to support an

additional process: transferring specimens between facilities. At present, this exchange is conducted through a manual process, in which an item is checked out of the inventory at the facility from which it is sent, noting its destination. When the item arrives at the receiving lab, its receipt is then manually logged in a shared database. Using the SpecimenTrak system, the software will guide employees at both the sending and receiving labs, through a process of reading the RFID tag attached to each loaned specimen, in order to check it in or out of inventory and note its destination.

Schmitt began discussing the idea of using RFID for tracking donations with WINMEC in 2005, she says. After testing a number of different tags and readers, and developing the SpecimenTrak software, the current UCLA pilot program was launched in late 2007.

Schmitt says she knows of some anatomical services labs using bar codes to track specimens, and others that utilize implanted RFID tags, similar to those used for pet-tracking. However, she notes, the tags being used by UCLA—low-frequency tags in a rugged housing, sutured to the specimens—are not employed in other anatomical services applications. What's more, she says, while the UC system has opted not to recollect and reuse its RFID tags, other organizations using the SpecimenTrak solution—which WINMEC is actively marketing—could choose to do so.

In fact, WINMEC's director, Rajit Gadh, says SpecimenTrak was designed so that an end user can select any type of passive RFID tag and reader to use with the SpecimenTrak software. The end user will also be able to decide whether to reuse the tags (assuming they are in packaged in a long-lasting, waterproof housing that can be sterilized for multiple uses).

According to Schmitt, the main benefit that the RFID system provides is improved accuracy of the labs' inventory, based on the fact that ID codes are no longer manually logged. The other benefit, she adds, is time-savings, through faster data collection.

WINMEC hopes that additional anatomical labs will begin using SpecimenTrak, and has a patent pending on the product.