

Smart labels for drugs and medical devices, both after commercial launch and during clinical trials, do far more than simply identify a product; their built-in intelligence provides functionality, communication capabilities, and interactivity throughout the supply chain all the way to the end-user.



**Altherapy**

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C/curatio salus Tabletts

 **220 mg**

**30**  
Tablets

**STRENGTH TO HEAL FOR 6 HOURS**



# Smart Labels in Healthcare

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## A Smarter Cold Chain: Better Logistics Management for Better Business

Savvy, experienced life-science companies know that maintaining a tightly controlled, closely monitored cold chain results in fewer spoiled, expired, and wasted products, with less time spent trying to manually pinpoint and document the exact location of shipments. Smart technologies make these business goals possible.

*Smart-label solutions.*

Smart labels of various types enable

accurate, nearly effortless monitoring and tracking of products from the shipping- container level down to individual - product level, indicating real-time location and temperature readings throughout the cold chain. One such valuable technology pairs an RFID chip with a temperature sensor. When the RFID tag is interrogated, it logs and communicates the product's temperature history as well as the current temperature. Another RFID solution uses a thermal fuse. When a problematic temperature excursion occurs and the thermal fuse activates, the short circuit built around the chip opens and the antenna is made functional, permitting the tag to be read at normal range and indicating that the temperature excursion has taken place.

Additional lower-cost smart technologies that are simple but effective for the cold chain



include chemistry-based ascending and descending temperature-excursion indicators, which use color changes (green to red, for example) to communicate temperature changes.

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## Smart Security and Authentication for Drugs and Devices

For pharmaceutical companies and medical device firms, security, and authentication are of critical importance due

to their crucial role in ensuring patient safety. Smart labels, especially those featuring RFID technology, help to ensure track-and-trace compliance per the Drug Supply Chain Security Act (DSCSA), maintain a drug's unique

individual identification at all points in supply and shipping chains, and provide anti-theft and inventory management on retail and pharmacy shelves. Smart-label solutions. Dual-frequency RFID technology, when built into a smart label, minimizes security vulnerabilities by both facilitating tracking at the logistical level and performing inventory-management and theft-monitoring functions at the retail and pharmacy levels. This type of dual-technology label incorporates both radio frequency (RF) and RFID in a single tag; these labels can protect retail healthcare merchandise using existing electronic article surveillance (EAS) infrastructure while performing cycle counting, inventory management, and automatic replenishments via RFID. At the end-user, consumer level, healthcare brands can utilize smart technology known as Invisi-Link, whereby an invisible watermark is added to a product label

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that, when scanned by the consumer using a smartphone equipped with an application, performs instant authentication. “It’s a simple, inexpensive step in the brand-protection strategy,” Karl Hoelper, Director of Marketing at CCL Healthcare, explains.

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### Marketing, Communicating, Engaging, and Interacting: Tapping Smart Technology’s Huge Potential

Smart technology’s advantages extend even beyond the critical functions of track-and-trace, cold-chain monitoring, inventory management, security, and authentication into the realm of brand-to-consumer marketing, communication, engagement, and interactivity. The massive potential for relationship building between brands and the consumer via smart packaging is only now beginning to be realized. CCL’s Hoelper shares that exciting future developments are set to become commercially available in the next year.

*Here and now: How smart labels are currently functioning as marketing and consumer-engagement tools.* Today, smartphones can scan RFID, Invisi-Link, and 2D bar codes to incorporate web connectivity into smart labels. When labels and packages are scanned, the user is directed to the product brand’s website or mobile health application, where a trove of additional information and marketing intelligence can be gathered and stored. Instructions for use, videos, customer-loyalty

programs, coupons, cross-selling initiatives, and more can be published on the site for instant consumer access. An added benefit offered by these 2D bar codes, Invisi-Links, and RFID tags are the marketing intelligence that can be collected and transmitted back to the brand owner in real-time. “The more frequently the data is collected, the higher the quality and accuracy for targeted campaigns and gleaned other marketing insights,” says Hoelper. The Invisi-Link web connect can connect the consumer to the brand website in addition to

authenticating the product—without altering the current package’s artwork, in many cases.

Another consumer-scannable smart-label technology already in use is a brand-chosen image displayed on the product label that is made up of hidden 2D bar codes.

This image can be

anything, including a company logo. When scanned by the user with a smartphone equipped with the brand’s application, that user is taken to the brand’s website for further information, authentication, marketing, and more.

For the visually impaired, and anyone who may benefit from audio prompts, including the elderly and their caregivers, brands can implement the talking bar code, which can be



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programmed to relay information comprising up to 200 words to a smartphone via scanning. After the bar code is scanned, the smartphone translates the code, and verbally speaks aloud to the user. “We have used this technology to aid the visually impaired by verbally dictating the information for use instead of having them read the small-print literature,” Hoelper says.

*On the horizon: Future brand-to-consumer engagement opportunities made possible by smart labels.* Smart labels and smart packaging in life sciences and healthcare offer unprecedented opportunities for brand-to-consumer outreach and interactivity. Smart technology offers a solution for pharmaceutical and medical device marketers who want to gain intelligence and interact directly with consumers and patients, both after commercialization and during clinical trials. In addition to opening-up new avenues for marketing, advertising, and cross-promotion, advanced smart technology can lead, ultimately, to improved patient and consumer safety and health outcomes via enhanced adherence and compliance with prescribed or recommended therapies—the true end game for every drug and device brand.

Future smart technologies for life sciences and healthcare will extend beyond the label to include the whole product package. For instance, sensors on a drug bottle will sense and record events occurring at the consumer level after purchase, such as cap removal, measurement of container weight, and replacement of cap. These and other events—or the lack there-

of—will trigger notifications to the consumer’s smartphone or other personal device (via such technologies as NFC), with the possibility of elevated notifications to caregivers and brand-owned call centers as needed. And once a smart pill bottle, for example, senses and records a certain low weight, that bottle can communicate automatically and directly to the consumer via smartphones, taking the consumer or patient to the brand’s or physician’s website for reorder and access to interactive customer-loyalty pages.

Outside the home and in the clinical setting, such as within a hospital room, a drug-container RFID label will communicate seamlessly with an RFID-containing patient bandage that identifies the patient, his or her drug, personalized dosing instructions, dosing history, and more. The two RFID tags “talk” to one another, and, when hospital staff scan the patient bandage with a smartphone, all of that personalized drug and patient information is instantly

displayed, with restrictions set on dosing that falls outside of the preset parameters, thereby helping to prevent dosing errors and ensure patient safety.



“Where smart technology is going,” CCL Label’s Hoelper explains, “is seamless communication between the packaging and smartphones and mobile-health applications, making the medical-product package an

intricate peripheral ‘device,’ if you will.” This “seamless” communication, which will require no opening of apps or manual data entry on the part of the consumer can already be seen in such products as smart scales, smart glucose monitors, and wireless ECG sensors. “Removing the barrier of manual data entry will help increase patient adherence and improve health outcomes,” Hoelper adds. “I believe this is the future of smart labels.”

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#### **Smart, Smarter, Smartest: Continued Innovation in Healthcare**

Smart technology has already transformed the life science and healthcare industry for the better in terms of supply-chain management, cold-chain monitoring, track-and-trace compliance, and security and authentication. Through both chemical and RFID technologies, drugs and medical devices are visible, trackable, and well monitored from manufacture all the way through to retail shelves and even consumers’ homes. Smart technologies are living up to their promise of preventing spoiled, expired, or counterfeit products from reaching the market and aiding adherence to DSCSA, but they are also presenting new opportunities to brand owners for more targeted, better personalized marketing and customer engagement.

Newer technologies, such as NFC, which provide package-to-smartphone communication without requiring an app to be open, and the printing of RFID antennae and electronic circuitry directly to labels using conductive inks, are paving the way to even better, more

capable, streamlined use of smart labeling and packaging.

Best of all, smart healthcare packaging, when developed to its full potential with the cooperation of pharmaceutical and medical device brand owners, label companies, mobile-health app firms, and marketers of smartphones, has the power to improve patient/consumer adherence, thereby maximizing patient safety and health outcomes overall.

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### About CCL

A global specialty packaging pioneer, CCL is the largest label company in the world and provides innovative solutions to the Home & Personal Care, Premium Food & Beverage, Healthcare & Specialty, Automotive & Durables and Consumer markets worldwide.

### Free Digital Printing Consultancy Service

CCL Healthcare is the leader in digital printing for the pharmaceutical and life sciences industries, with more than 30 digital printing facilities (and growing) worldwide utilizing digital printing under cGMP.

Conveniently located all over the globe, CCL works with companies of all sizes to develop digital printing strategies that lower cost and increase revenue.

Contact a digital printing specialist for a free 30-minute consultation to learn more about digital printing or print-on-demand.



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