

KEY SECURITY TECHNOLOGIES

- Colour-shift ink
- Tamper-evident packaging
- Tamper-resistant tape
- Tamper-evident security seals
- 2D barcodes
- Unit-level serialisation
- RFID
- Holograms and watermarks
- Laser-based Raman spectroscopy
- Chemical markers and micro-texts

TIME TO GET TOUGH

Trade in counterfeit drugs is reaching astronomical figures. Nic Paton investigates the security measures available and how a unilateral effort from governments, regulators and the pharmaceutical industry is necessary if there is any hope of curtailing this illegal trade.

Counterfeit medicines, unlike the illegal narcotics trade, rarely make the headlines. Rarer still are they the subject of Hollywood blockbusters – with perhaps Harry Lime’s watered-down penicillin in the Graham Greene thriller *The Third Man* being the exception. In reality, Hollywood executives may be missing a trick as the continuing growth of the global counterfeit medicines market, and its growing threat to people around the world, reads like something out of a Bond movie.

The figures are certainly eye-watering. The World Health Organization (WHO) estimates that about a tenth of the global medicines market is now counterfeit, as is a quarter of medicines consumed in developing nations, with the percentage sometimes as high as 50% in some countries. The US Centre for Medicines in the Public Interest predicts that sales of counterfeit drugs will reach \$75 billion globally by 2010, a staggering increase of more than 90% since 2005. The value of the market is now worth more than \$3.5 billion a year, according to the US FDA. In the EU, around 2.5 million fake medicines were discovered by authorities in 2006 – a figure that is thought to be just the tip of the iceberg – compared with just 500,000 in 2005.

Deadly attraction

Sadly, it’s not hard to see why counterfeiting is such a booming trade and a target for criminals and, increasingly, organised drug gangs in regions such as Africa, South East Asia, South America, India and China. The largest counterfeit market within close proximity to Europe is Russia, where it is estimated some 12% of medicines produced are fake.

These illegal medicines can be cheap and easy to produce as the amount of technology required can be fitted into a small room.

They are also easy to market, particularly over the internet and, with the enforcement spotlight firmly on narcotics, are often considered by criminals as easier to get away with. The ROI can be significant and, even if the counterfeiters are caught the sanctions are likely to be minimal. For example, in the UK, if criminals are caught dealing in Class A narcotics, they can potentially face a life sentence, but under the Medicines Act, they are likely to receive a jail sentence of just two to three years for dealing in counterfeit medicines.

Further complicating the situation is the issue of parallel trading of legitimate pharmaceuticals. An estimated 140 million packs of medicines are parallel traded every year within the EU. While this is a legitimate trade within the EU, the concern is that it severely weakens the security of the supply chain, as medicine boxes can be opened, their contents removed and the product repackaged, so introducing the possibility of human error into the process.

Packaging integrity is one of the key battlegrounds within this ongoing game of ‘cat and mouse’ between the enforcement authorities, major pharma and organised criminals. The availability of low-cost, high-quality printing and packaging equipment has made the job of producing excellent counterfeit copies of pharmaceutical products much easier. In response, pharma and enforcement agencies are developing authentication technologies that can rapidly and definitively differentiate between genuine and fake products. With the global nature of the problem and the complexity of the supply chain, it is important that authentication technology is easy to use and portable, both by manufacturers and third-party inspectors.



Unilateral control

In practical terms, what is being done to tackle the problem at governmental, regulator and country levels, and by big pharma? Looking at the bigger picture, there has been some movement by regulators and enforcement agencies as recognition of the scale and threat of the problem has grown. In 2006, WHO set up an International Medical Products Anti-Counterfeiting Taskforce to better coordinate responses on the issue from distributors, pharmacists, hospital staff and the public.

The taskforce is also intended to act as a focus for governments to crack down on corruption among police forces and customs services, to provide information, advice and leadership, and to lobby drug manufacturers to make their products more difficult to fake. Alongside this, WHO operates a web-based system, Rapid Alert System, for tracking the activities of drug counterfeiters.

Earlier in 2008, the organisation oversaw a major enforcement operation to tackle counterfeiters in Asia, called Operation Jupiter. This 'sting' undercover operation, coordinated with Interpol, led to the arrest of a Chinese criminal gang peddling fake anti-malaria pills.

Elsewhere, and particularly within Europe, the response has been somewhat lacklustre. It was only in 2006 that the European Parliament got around to making a statement recognising that counterfeiting was a serious problem that needed to be addressed. There are also concerns within the UK, particularly among generic drug manufacturers, that if expensive innovations such as radio frequency identification devices (RFID) become the norm or, worse, a mandatory requirement,

it could have a significant impact on NHS budgets, not to mention the health-care budgets of many developing countries.

Easy access

Many in the pharmaceutical industry are also concerned about the risk from parallel trading, arguing that it is a way for counterfeiters and criminals to enter the legitimate supply chain and an area where a tighter regulatory regime needs to be put in place.

As Julian Mount, senior director and head of European trade at Pfizer, explained in *World Pharmaceutical Frontiers*: 'Pfizer believes that the parallel trading of medicines provides a potential vehicle for counterfeits to enter the legitimate supply chain and that the process of repackaging medicines is not in the interests of patients. The underlying principle

Sadly, it's not hard to see why counterfeiting is such a booming trade and a target for criminals and organised drug gangs.

whereby medicines can be opened and repackaged within the secondary medicines market can only benefit third parties, yet it can undermine the security of the medicines supply chain and put patients at unnecessary risk. Regulatory authorities at EU and member-state level must act to ensure that the medicines supply chain is secure, and that patient safety is enhanced and protected.'

Security solutions

Pfizer, like many drug companies, has had its fair share of run-ins with the drugs counterfeiters. In 2005, counterfeit versions of its cholesterol-lowering drug Lipitor were found in the legitimate UK supply chain by the Medicines and Healthcare Products Regulatory Agency. Viagra, Pfizer's anti-impotence drug, was and is a key target for unscrupulous and criminal counterfeiters.

Over the last three years, the company has been active in tightening up anti-counterfeiting measures on its packaging, in many cases using technologies already in place within the financial services industry, for example, in the protection of bank notes. Key innovations have included the introduction of a unique Pfizer logo on packaging using colour-shift ink. This makes the packaging difficult to fake but easy to verify, and is similar to the ink used on bank notes. Tamper-evident packaging is also being introduced.

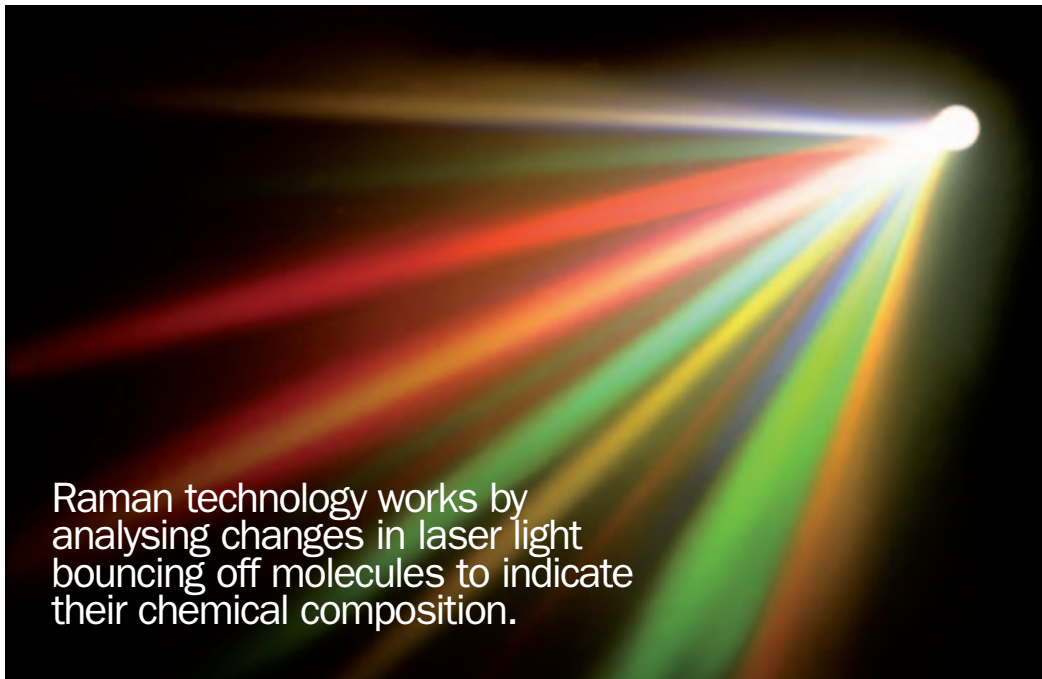
Another option is 2D barcodes. AstraZeneca has been working on a mass serialisation system to make its supply chain more secure for its products, such as the gastrointestinal drug Nexium. In this case, the drug's supply chain is protected by unit-level, serialised, tamper-evident security seals. Each pack also has a unique carton number and there

Packaging

is a unique serialised code on each blister pack. This is then activated, validated and entered into a database, where it can be checked against all serialised codes in the company's supply chain.

Garnering headlines is the development of RFID to tag products. Research into this area is particularly strong in the US, with some analysts suggesting the market for such devices will top \$450m by 2012. Several pharmaceutical companies are now experimenting with RFID, optically variable devices and other technologies to help track and authenticate the drugs. Pfizer, for example, has incorporated RFID tags into its packaging for Viagra, while GlaxoSmithKline is using such tags on its HIV treatment drug Trizivir. Other innovations in this area include holograms, colour-shifting inks and watermarks, inks or dyes and even the use of tamper-resistant packaging tape.

Further down the line, scientists are looking at more innovative use of laser technologies. A study last year in *Analytical Chemistry*



Raman technology works by analysing changes in laser light bouncing off molecules to indicate their chemical composition.

argued that Raman spectroscopy could become a key new tool in helping to trace counterfeit drugs by using it to examine the contents of blister packs and bottlers. The technology works by analysing changes in laser light bouncing off molecules to indicate their chemical composition, and it is flexible enough to be used in battery-operated hand-held instruments.

Holograms are being investigated by Sanofi-Aventis, which is working to develop and combine what it calls 'visible technologies', meaning advancements such as holograms, with

SPOT THE DIFFERENCE



GENUINE OR FAKE?

Of all the product-protection systems on the market, Cryptoglyph is the easiest to use and the most effective. Counterfeiters cannot even detect it, never mind defeat it!

You don't have to invest in security inks or hardware, and there's no change to your package design. Yet it gives you unbreakable security.

You simply capture any part of the packaging with a mobile phone or an ordinary scanner, send the image to your server, and you get the verdict in a few seconds. These solutions meet the requirements of **FDA 21 CFR Part 11 ERES** and the **FDA Revitalization Act S.1082** for medicines delivered in the USA: we have installed complete turnkey systems for major pharmaceutical manufacturers to protect billions of units worldwide.

AlpVision®



DIGITAL IMAGING SECURITY SOLUTIONS

For detailed information please visit: www.alpvision.com

'invisible technologies' such as chemical markers or micro-texts, on printed parts of packaging. The company recently teamed up with the World Customs Organization and regulatory authorities in India and four Asian countries in a drive to weed out spurious and counterfeit drugs originating from that region.

Tough line

But such unilateral actions by manufacturers are just one part of a bigger regulatory challenge. What's needed, argue industry leaders such as Mount, is a combination of tougher regulation, stronger oversight by appropriate regulatory authorities, more rigorous monitoring and better use of technology to provide greater product authentication.

Pfizer, Mount points out, has called for the process of repackaging tamper-proof medicines by third parties to cease. It has also called for the wider introduction of tamper-resistant packaging and new medicine delivery mechanisms within Europe.

Another key advance, he argues, would be the introduction of a standardised Product Pedigree, which allows for the safe recall and identification of medicines. This can be as simple as a bar code or as complicated as RFID but, in essence, means it is possible to vouch for a medication's origin and how it has been subsequently handled.

More widely, the pharmaceutical industry is adamant that greater resources need to be channelled into targeting organised criminal gangs involved in drug counterfeiting, as well as the application of stricter penalties to those found guilty of knowingly supplying or manufacturing such products.

Passport to security

Just as a burglar can break into the best protected house if he is really determined, so it is fair to say it is almost impossible to stop or eradicate counterfeiting altogether. But most burglars prefer to enter houses that are weakly secured, with the security in the case of pharmaceuticals being a combination of regulation, better enforcement and enhanced use of technology and packaging security.

Within this mix, pharmaceutical packaging is becoming one of the most links in the enforcement and security chain. Too often in the past packaging has been viewed as simply a commodity that encases a drug and therefore needs to be produced as cheaply as possible. But in the constant battle against counterfeiters there is a growing recognition that packaging is becoming the passport that shows if a drug is genuine and whether or not it has been tampered with.

The one certainty is that, however fast the technology develops, keeping one step ahead of the criminals will be an ongoing battle, and one that will require concerted effort and investment from all sides. **WPF**



Polyfoil
What else.

pharma solutions

No risks.
Desired side effects.

POLYFOIL tubes offer the highest security, better convenience and high compliance for the packaging of your pharmaceutical products.

Excellent barrier properties: protection against light, diffusion-tight, Water-vapour impermeable, corrosion-resistant.

User-friendly features: secure applications such as airless-pump systems, drop dispensers, single-portion tubes, rectal and ophthalmic tubes with numerous tamper evidence features.

Fascinating look: all-around printing thanks to the invisible longitudinal seam, innovative decoration possibilities.

www.neopac.ch

NEOPAC
THE TUBE