



The chips that are good for your health

Pharmacy to sell edible microchips that will alert doctors if patients are not taking right medicines. By Steve Connor

An edible microchip that records the precise details of a patient's pill regime will be available in Britain by the end of year following a commercial deal that opens the door to an era of digital medicines.

An American biomedical company has signed up with a British healthcare firm to sell digestible sensors, each smaller than a grain of sand, that can trigger the transmission of medical information from a patient's body to the mobile phone of a relative or carer.

The aim is to develop a suite of "intelligent medicines" that can help patients and their carers keep track of which pills are taken at what time of day, in order to ensure that complex regimes of drugs are given the best possible chance of working effectively.

Ultimately, the plan is for every one of the many pills taken each day by some of the most chronically-ill patients, especially those with mental health problems, to be digitally time-stamped as they are digested within the body.

The healthcare company Lloydspharmacy said it intends to sell the edible microchips of Proteus Biomedical of California by the end of the year, as part of a trial to

test whether NHS patients would be prepared to pay privately to ensure that they or their relatives take the right medicines at the right time.

"There is a huge problem with medicines not being taken correctly," said Steve Gray, healthcare services director of Lloydspharmacy.

"Anyone taking several medications knows how easy it can be to lose track of whether or not you've taken the correct tablets that day," he added.

"Add to that complex health issues and families caring for loved ones who many not live with them

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and you can appreciate the benefits of an information service that helps patients to get the most from their treatments and for families to help them to remain well."

Lloydspharmacy said the World Health Organisation has found that about half of all patients fail to take their medicines correctly, which can lead to people not getting the full benefits of treatment, or ending up with harmful side-effects.

Unused prescription medicines

are estimated to cost the NHS nearly £400m a year.

The Proteus technology is based on the company's digestible sensors, which are no bigger than a grain of sand. They are composed of the ingredients commonly found in food and are activated when they come into contact with stomach fluids.

At the heart of the technology is a tiny silicon wafer separating tiny quantities of copper and magnesium, which effectively forms a microscopic battery that generates an electric current when immersed in the acidic environment of the stomach.

These electric currents, which can be given individual signatures to match the drug taken with the edible sensor, are detected passively by an intelligent patch stuck to the patient's skin, in much the same way that electrocardiogram (ECG) skin patches can record the electric currents within the heart.

The patch, which is designed to be worn for seven days, includes a flexible battery and chip that records the information and sends it by Bluetooth wireless technology to the mobile phone of a relative or professional carer.

"In the future the goal is a fully integrated system that creates an information product that helps patients and their families with the de-



SMART PILL HOW THE NEW TECHNOLOGY WORKS



1. Digestible sensor embedded within an "edible microchip" is taken with a pill and becomes electronically activated when immersed in the acidic solution of the stomach. The sensors, composed of microscopic quantities of copper, magnesium and silicon, pass harmlessly through the body.

2. Electric currents with unique signatures are triggered by the sensors when inside the patient. These can be detected by an intelligent skin patch which records the type of drug and time of day it was taken. The patch can also record other medical information, such as sleeping habits and exercise.

3. Mobile phone of health carer can record details collected by the skin patch via a Bluetooth connection. The mobile phone app can calculate how closely the patient is conforming to the drug regime and what further steps may be necessary.

mands of complex pharmacy," said Andrew Thompson, the chief executive and founder of Proteus Biomedical.

"What we know is that we've cre-

ated many pharmaceuticals with great potential but much of that potential is not realised because these drugs are not being used properly."

Neither company was prepared to comment on the cost of the digestible microchips, but industry sources suggested a starting cost of about £50 per week.