

General public will expect pharmacists to know about pharmacogenetics

Does pharmacogenetics fit into pharmacy practice now? Will it in the future? **Lin-Nam Wang** reports

Whether or not pharmacogenetics should be a specialist area was one of the questions considered at a recent meeting held in London. Alain Li Wan Po, lead professional specialist for pharmacy at the National Genetics Education and Development Centre, believes that community pharmacists should know about the subject. "Consumers are much more aware [about pharmacogenetics] and are much more demanding of health care providers," he said.

He supported his suggestion by considering the pharmacogenetics of a congenital condition called long QT syndrome, which affects one in 5,000 people in the US. Only a third of family members with the gene show clinical symptoms and, often, people never learn that they have the condition because they die suddenly.

Although the syndrome is relatively rare, it could be significant to pharmacists because it overlaps with drugs that prolong the QT interval, Professor Li Wan Po explained. Examples of these drugs that have been withdrawn include terfenadine, sertindole, cisapride (which, at one point, had been proposed for over-the-counter sale), and thioridazine, which was discontinued last year.

He went on to give the following description of a customer in a pharmacy:

- Female and Japanese
- She is taking fluconazole, an antihistamine and a diuretic for premenstrual tension

- Her cousin died suddenly at the age of 18 years running a marathon

The customer asks the pharmacist if she should be tested for long QT genetic mutations and if there are any medicines or herbs that should be avoided. "These are reasonable questions," he said. "How much should we expect pharmacists to know and how do health educators help pharmacists in community practice?"

One problem Professor Li Wan Po pointed out is that the vast quantities of data likely to be associated with pharmacogenetics may be too much for pharmacists to take on board. At the same time there is "a relative paucity of information that can help clinicians and patients make optimal informed decisions", he said. At the moment, community pharmacists may not be able to separate the significant from the non-significant. "Drug regulators should forget about the data sheet as a legal document and translate it into a clinical document," he added.

"Much of pharmacogenetics is to do with shifting the [dose-response] curve and ensuring that we remain in the therapeutic window but, as a development of pharmacogenetics, [pharmacists] probably have new professional responsibilities and competencies," he said.

David Pruce, director of practice and quality improvement at the Royal Pharmaceutical Society, said that what pharmacists should



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know about pharmacogenetics should not be defined by whether they work in community or hospital. Rather, it is a generalist versus specialist issue. "What the generalist probably needs to know is a background underlying that pharmacogenetics exists and when to refer. Specialists need more detail," he said.

Pharmacists a priority group, says genetics centre

The National Genetics Education and Development Centre (NGEDC) has identified four health professions as priority groups who need to be prepared for predicted advances in pharmacogenetics: medical practitioners, nurses, dietitians and pharmacists, said Peter Farndon, director of the NGEDC.

He added that many health care professionals may not see where the subject fits into their jobs but the centre, together with Skills for Health, has developed a set of nine competencies which covers the patient care pathway, from identifying individuals with or at risk of genetic conditions, to ordering a genetic laboratory test and communicating genetic information to individuals, families and other health care staff.

Professor Farndon said that few health professionals would need all the competencies; however, the first competency is for

them to identify where genetics is relevant to their areas of clinical practice.

The NGEDC is working to integrate genetics education into the training of NHS health professionals but the aim is also to ensure that patients get a good service now, Professor Farndon said. Signs in community pharmacies today invite customers to "ask your pharmacist for any health advice you want" and this could involve questions about genetics, he explained.

A workshop at the meeting looked at the skills pharmacists would need to work with pharmacogenetics. Those identified included:

- Communication (including counselling and breaking bad news)
- Ability to identify patients or drugs at risk
- A recognition of where genetics matters
- Interpretation of results
- Application of basic scientific principles

- Point of care testing (eg, how to obtain and handle samples)
- Obtaining consent

Most of these skills were deemed desirable for both specialists and generalists. "The difference is the knowledge and attitudes you need to underpin these," Professor Farndon said.

The meeting also looked at what core knowledge pharmacists would need. A detailed report from the NGEDC is expected to be published this autumn.

Details

The pharmacogenetics in pharmacy practice scoping meeting, organised by The National Genetics Education and Development Centre and the Royal Pharmaceutical Society, took place at the Royal College of Obstetricians and Gynaecologists in London on 12 June

Education now or later? What pharmacy thinks

All the attendees at the scoping meeting agreed that doctors, pharmacists and nurse prescribers, as well as the recipient patients, will need to understand the basis, reliability, sensitivity and specificity of pharmacogenetic tests and the information they provide, and this will require an educational programme. However, only a third thought that appropriate training for pharmacists to become involved in pharmacogenetic testing is of most immediate concern.

"In terms of practical implications, if [pharmacogenetics] does not change the way we practise, then it is knowledge for knowledge's sake. I have other things on my agenda right now. My continuing professional development cycles are jammed up to 2009 and more to do with things like patients with coronary heart disease or diabetes. Somebody has to persuade me that this will make a difference," Liz Colling, head of pharmacy at the Co-operative Group Pharmacy, said.

Ruth Wakeman, information pharmacist at the National Pharmacy Association, told *The Journal* that, so far, the NPA has not had any specific queries about pharmacogenetics from its members. "But it does not take much of a leap to envisage queries as soon as the public and pharmacists become more aware about the topic," she said. "The NPA has had lots of calls about linked topics, such as when the Herceptin stories broke."

David Pruce, director of practice and quality improvement at the Royal Pharmaceutical Society, expressed concern that making pharmacogenetics a special case will cause it to be seen as a specialist subject beyond normal practice and there is a danger that people will not engage with it. "At the end of the day, it [means using] a test with probabilities attached to it like any other test. We have to be careful not to make this too big a deal," he said.

Soraya Dhillon, head of the school of pharmacy, University of Hertfordshire, agreed. She made a comparison to the teaching of pharmacokinetics: "Many pharmacists hated kinetics but when explained in terms of therapeutic drug monitoring and dose optimisation, they realised they were doing it already. Now it is embedded in their minds." She added that the amount of detail that pharmacists need to know about pharmacogenetics depends on their level of practice, but it is fundamental that they have a level of understanding to keep patients safe from drugs.

With regard to future pharmacists, the new MPharm degree at Hertfordshire covers aspects of pharmacogenetics in its cell biology and immunology modules, but is not taught as a sole topic. However, this could be a possibility in three years, Professor Dhillon told *The Journal*.

In terms of pharmacogenetic advances, Mr Pruce said: "The nightmare scenario is if genetic screening kits become widely available. Health care professionals who sell them have a moral obligation to provide support, but this raises huge ethical issues."

Tony Moffat, head of the Centre for Pharmaceutical Analysis at the School of Pharmacy, University of London, called for pharmacists to champion the area. "Secondary care is [using pharmacogenetics] now, for example, in oncology, but it is less obvious in the primary care sector. It has got to be embedded in the industry now. Who is going to lead us? Who is going to make a difference in this? It may well be that there are pharmacists in the regulatory authorities who will champion this. Or is this an area that community pharmacists could drive through? Its an area of expertise we need to have," he said.

New learning pack

Last month, the Centre of Postgraduate Pharmacy Education launched an e-learning pack entitled "Pharmacogenetics: genetic approaches to therapy", which is a basic introduction to pharmacogenetics. This is the centre's first step into e-learning.

The pack is available to any registered pharmacist at www.cppe.manchester.ac.uk

Key questions for NHS pharmacogenetic testing

An example of pharmacogenetic testing already used in the NHS is the measurement of thiopurine methyltransferase (TPMT) enzyme levels to inform the prescribing of azathioprine. The drug is currently introduced in a step-wise manner with blood monitoring. It is effective in 55 to 70 per cent of patients. There is a relationship between TPMT activity and the risk of profound neutropenia. However, use of this phenotype-based test is not routine — a recent survey indicated that only 67 per cent of clinicians use TPMT tests in secondary care, said Katherine Payne, a pharmacist and health economist at the North West Genetics Knowledge Park, University of Manchester.

Before a pharmacogenetic test is used, key questions need to be asked, said Dr Payne. The main question is "what is the predictive power of the test" but often this information is not available. Other questions include:

- Are there alternative medicines?
- How serious are the side effects of the drug?
- How much does the test cost? (Tests for azathioprine cost about £30 per patient.)
- How long does it take to get the result?
- How will the result affect the prescribing decision?

- Who will interpret the result?
- Who will tell the patient the result and answer his or her questions?

In addition, key economic questions arise, Dr Payne said. For example:

- Does the test decrease the incidence of adverse drug reactions and improve associated health outcomes?
- What is the impact on health-related quality of life?
- What are the health care costs?
- What is the added value of providing a test compared with standard care?
- What are the preferences of health care professionals and patients for the characteristics of a test (eg, where the test will be conducted)?
- When and how should the test be introduced into the NHS clinical practice?

However, Dr Payne said, there is little or no robust evidence to answer these questions.

The Department of Health has funded six projects looking at using pharmacogenetics to reduce side effects of drugs. One of these projects, based at the University of Manchester, is investigating a genotype-based test for azathioprine (the TARGET study).

In the Manchester project, patients are given the genotype test, which assesses for three gene variants, before azathioprine is prescribed. If the patient is classed "TPMT homozygous mutant", it is recommended to the clinician that azathioprine is not prescribed because of the high risk of death from neutropenia. If the patient is found to be "TPMT heterozygous mutant", the starting dose is decreased and titrated up. Most patients are found to be "TPMT wild type" and can be started at the normal dose of azathioprine.

In the US, the Food and Drug Administration has changed the licensing for azathioprine and related drugs, and product labels now suggest considering pharmacogenetic testing before use. However, in the UK there has been no change to the product label.

Over 70 per cent of attendees at the scoping meeting were of the opinion that genetic testing is unlikely to remove the need for monitoring and at best, it will only indicate which patients are more or less likely to respond well to a drug.

Relying on genetic tests alone could do more harm than good if it means that signs of a dangerous drug reaction are ignored, the group thought.