

Claire O'Connell looks at two research institutes helping Irish companies innovate in the medical device and equipment arena.

FIRST AID FOR MEDICAL INNOVATORS

Pictured above: A CD-based point-of-care device to centrifuge samples for analysis, being developed by BDI

In the future, a trip to the doctor could provide you with some rapid answers. A simple blood test could tell within hours whether or not you have cancer. Or maybe you are on a course of treatment: a few drops of blood could indicate how well you are responding. And if you need to undergo a procedure, smaller and smarter devices could make the experience a good deal less invasive and more effective.

It all sounds like good news for the patient, but how is the technology progressing?

In diagnostics, the point-of-care device that gives a rapid answer in the doctor's office or hospital is not a new concept, but converging technologies mean the approach now stands to offer far more.

That's according to Prof Michael Berndt, the new director of the Biomedical Diagnostics Institute at Dublin City University. The Science Foundation Ireland-funded Centre for Science, Engineering and Technology (CSET) has been on

the go for five years, and the coming phase will continue to see a strong focus on point-of-care diagnostics in oncology, cardiovascular disease and infectious disease.

"The importance of point-of-care is to get a decision at the point, and the relevance is with respect to whether it helps clinical decision-making and whether it makes a difference to clinical treatment," says Berndt, who was at University College Cork before moving to DCU this summer.

He describes the BDI as an "academic-commercial hybrid", where the engagement with clinical and industry partners and collaborators provides crucial information. "There is no point in developing diagnostics if the clinicians either don't wish to use them or don't believe they will be useful or will inform clinical decision making," he says. "But it's not just clinician need. To be viable, it also has to have appropriate market size and industry involvement."

CLINICAL FOCUS So what are they looking at? In oncology, one of the projects aims to detect tumour cells circulating in the patient's blood, explains Dr Joseph Carroll, associate director of the BDI. "You could do this test in a GP's office instead of sending it to a lab and getting the results three weeks later. You could know by the end of the day."

At the moment, the approach is approved for monitoring response to therapy, but it could ultimately have applications in the initial

diagnosis: “If you think about it, it is the ultimate diagnostic,” says Carroll.

Another approach looks at using a point-of-care platform to detect microRNAs, (types of messenger molecules in the cell) that signal cancer.

The project partners with Prof Michael Kerin at NUI Galway, who has clinical data on microRNAs, while the BDI is to develop a CD-based point-of-care device to centrifuge samples for analysis.

The BDI is also working with the Royal College of Surgeons in Ireland – Berndt has a research presence there and collaborates with Prof Dermot Kenny – and has expertise in thrombosis, platelet function and coagulation.

“The best selling drugs in the world right now are antiplatelet drugs [that inhibit clot formation],” says Carroll. “There are more and more drugs going off patent in this class and there are more and more drugs coming out. Our assays will hopefully allow drug companies and patients to understand how they are responding to the therapy.”

Another string to the BDI’s bow is infectious disease, and another collaboration with NUI Galway is developing a rapid test for meningitis. “Someone comes in with suspected meningitis, and at the first point-of-contact with the physician or A&E, they give a broad spectrum antibiotic,” says Berndt. “The next decision window is six hours after that, and the idea of this test is that within that six-hour window, we would be able to confirm whether it is meningitis, and, if it is, which of the three major causes of meningitis you are dealing with.”

INDUSTRY PARTNERSHIPS So how do these technologies see the light of day in the marketplace? The BDI partners with eight companies (among them are Analog Devices, J & J/Ortho Clinical Diagnostics and Millipore) as well as a host of other collaborations.

“The industry partners are the major conduit by which we commercialise these technologies; they partner at the start,” says Carroll, who notes that the partners get first option on intellectual property that arises from the work.

“And we have small companies in to us every week who want to do small collaborations with us, for example, using our microfluidics capabilities. A lot of it is about making our infrastructure available to the community.”

Reaching out has worked for the RCSI too, where the Centre for Innovation in Surgical Technology (CIST) at the Colles Institute has been welcoming ideas from clinicians, surgeons,



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engineers and anyone else who can see a way to a better medical device.

Over the last two years, CIST has received over 200 ideas, almost a quarter of which have gone on for evaluation and validation, says the innovation centre’s head, Derek Young.

The pipeline there is also being enriched with projects arising from a recent memorandum of understanding between RCSI and Tyndall National Institute in Cork to identify new clinical applications for technologies that already exist.

More generally, the drive in recent years has been to make devices smaller and with more functions and fewer mechanical parts, explains Young. “Surgeons have started to identify new procedures that can be done laparoscopically [i.e. through minimally invasive or keyhole surgery], and, around that, enabling technology has been developed,” he says. Here the aim has been to miniaturise and to try to get more information back from the surgery, so it’s not just doing the surgery but diagnostic work and therapeutic work as well, that’s going to be the driver. And making the technology more accessible to doctors will increase the number of procedures being done that may previously have been limited, he adds.

At CIST, there’s a range of projects currently in train, including technologies to improve orthopaedics, urology catheters and visualisation of tissues.

The centre has also built up an impressive network of connections, both in Ireland and internationally – including links with academic centres such as the Cleveland Clinic and industry giant Johnson & Johnson.

Engaging with companies is important for commercialisation, and both Enterprise Ireland and IDA Ireland have been proactive in making connections with the centre, according to Young. “Companies come to us and say: ‘We have all these ideas and we like the evaluation process you are doing with the ideas in your innovation pool, would you be interested in evaluating ours?’ We get a sense of what is going on, and they also see our innovation pool,” he says, remarking that it’s a two-way street.

And for the smaller enterprise, CIST can offer plenty that might otherwise be out of reach. “If you are a start-up of five people, you can’t afford a wetlab facility and a regulatory person on board and access to the surgeons - or if you can get access, are they the right ones?” asks Young. “We are taking out a lot of the guesswork and we give them the right package for that device.”