Q: Would you tell us about the research program in which you are using the BD Accuri™ C6 flow cytometer?

Dr. Jones: The primary focus of my platelet lab is to look at the variation between people. Although we all manage on a day-to-day basis not to have heart attacks or bleed to death, our platelets have vastly different abilities to become activated, stick together, and form hemostatic thrombi. My interest is in working out why people are so different, how their platelets are so different, and what’s different in their platelet signaling. To do that we use genome-wide association studies, using variation at a genetic level within subjects to tell us how the platelet phenotype changes after activation.

Q: What’s the role of the BD Accuri C6?

Dr. Jones: We use the BD Accuri C6 to phenotype platelets, and particularly to observe changes in the rate and acceleration of platelet activation. We also look at the binding of fibrinogen to the surface of platelets, the calcium mobilization within platelets, and the expression of molecules on the surface, such as P-selectin as a marker of degranulation. Any measure of platelet activation or change in status that you can reasonably measure with a flow cytometer, we do on the BD Accuri C6.

Q: Can you describe a typical study or experiment?

Dr. Jones: I’m just finishing a study of a molecule called ILK (integrin-linked kinase) within platelets. When you inhibit ILK or knock it out in mice, it seems to change the rate at which platelets respond to collagen. It’s a relatively subtle phenotype effect, but when you look at thrombus formation, it makes a big difference—it makes the thromboid very unstable. So if you knock out ILK in mice, they will form thrombus normally, but the thrombus just falls off after about 30 seconds. It will grow again normally and fall off again, and then grow again normally and fall off again.

We wanted to know why this happens. We used the BD Accuri C6 to look at the rate at which platelets become activated when we’ve inhibited ILK. We place a heated mouse dissection mat under a 96-well plate on the BD CSampler™ automation accessory, which keeps our platelet samples at 37°C (see photo). We start acquiring and measuring them on the BD Accuri C6—and then rapidly add our activating agent during the acquisition cycle, ensuring complete sample mixing. So we’re looking at rapid changes in the platelets early in their phases of activation. And we saw that when you knock out or inhibit ILK, you get a reduction in the rate of platelet activation, but not in its total magnitude.

Q: So it’s a kinetic study in which you have a continuously feeding sample, and you activate the sample as you go and watch the changes?

Dr. Jones: Absolutely! For us, that is the joy of the BD Accuri C6. I can suck up my diluted whole blood sample, stimulate it while it’s being acquired, and watch over time as platelet activation changes. It’s a remarkably simple design, but it seems to work really well. I’ve previously used [another vendor’s] machines, but this has really got something extra that we can use.

We’re now doing kinetic assays looking at the activation of individual platelets. Because the instrument acquires data at reasonably high rates, we can acquire an average of one platelet every millisecond. That gives us a great density of data, so that we can see very subtle changes in the rate of platelet activation.

Q: Besides the ability to sample continuously, what other features were important to you?
Dr. Jones: The simplicity of the machine. It's incredibly easy to set up. It's incredibly easy to get people who aren't flow cytometry experts up and running. And it seems to be very reliable.

Q: Did anything surprise you once you got it into the lab?

Dr. Jones: The first thing that surprised me was when it came out of the box. When I've had flow cytometers previously, they arrive with an engineer who fiddles around with it, aligning it and sorting it out. This came in the post in a box, and we pulled it out, plugged it in, and it worked! That makes a huge difference.

As we move on to bigger genome-wide association studies, we need to get in a lot of subjects over a long period of time. That means having a very reliable flow cytometer. And if the flow cytometer breaks, it means getting it replaced quickly. For the first time after three years, we had to send ours off for repair. A valve got stuck on it. And it was so easy! You sent us another one. We plugged that in and it worked perfectly. We packaged up our old one and off it went and came back again. That makes a big difference.

Q: Do you use the BD Accuri C6 as a tool to teach flow cytometry?

Dr. Jones: We bring undergraduate students into the lab to do projects every year. They try their best to break it, and it works well. It's nice from the students' point of view because of its relative simplicity. You don't have to set voltages and other things that complicate student projects. It's just very easy. They can get on and do their experiments, and if they've made any mistakes, we can review and correct them afterwards.