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Research aims to better target treatment for young cancer patients

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Thirty years ago any child diagnosed with paediatric malignancy would succumb to their disease. Today, children's cancer is a success story, due to advancements in medical clinical trials and translating research into clinical outcomes.

However, treatments that help children survive cancer can also cause health problems later on, so minimising the toxicity of treatments by individually tailoring drug therapy is an important new goal.

In attacking this problem pharmacy PhD student Felicity Wright from the UTS Graduate School of Health is among researchers exploring the area of paediatric stem cell transplants and using knowledge about a patient's genetic makeup to personalise therapy.

Wright, who is a Paediatric Haematology Oncology Pharmacist at the Sydney Children's Hospital at Randwick, says acute lymphocytic leukemia is the most common paediatric malignancy.

"We now have cure rates at around 95 per cent at standard and medium risks and about 80 per cent for high risk cases," she says. "That still means there are a number of children plagued by those diseases each year and whilst it's a small number, it's incredibly traumatic. You can't really put into words what that means for those families."

Based on years of research and trials, one of the only cures for children with high risk malignancies is stem cell transplants. The procedure

involves scientists taking somebody else's stem cells and matching them to the patient, giving the patient between 7-10 days of high-intensity chemotherapy followed by stem cell reinfusion.

It is extremely high-risk, with success rates often based on where the stem cells are sourced and the risk factor of the patient upon diagnosis.

Associate Professor Mary Bebawy, head of the Graduate School of Health's Laboratory of Cancer Cell Biology and Therapeutics Discipline, says researchers are now in a position to identify genes that are responsible for drug metabolism and drug handling.

"It's a fine balance in terms of how these enzymes work," Associate Professor Bebawy says. "These genes code for metabolising enzymes and these enzymes are predominantly found in the liver. Some individuals don't have the capacity to metabolise drugs, whereas others hyper-metabolise drugs. Therefore you need to fine tune doses to suit individual patients.

That is where Wright's research comes into focus.

"Over the last couple of years there has been a lot of thought and high-quality research into understanding how to best use stem cells and match them to the patient," says Wright.

Dr Wright's research explores a patient's particular genetic makeup through genotyping and researching how drug therapy can be individualised. Her research goal is to improve the patient's overall quality of life by reducing toxicity and relapse rates and increasing overall survival.

The collaboration between Wright and Associate Professor Tracey O'Brien from the Sydney Children's Hospital's Oncology department is

focused on how an individual tolerates a drug given to them by hospitals and using knowledge about their genetic makeup to tailor the therapy.

"Rather than giving everyone one vial or one tablet of a particular drug, we are looking at how their liver and kidneys will handle that drug and base therapy on their individual parameters. The intent is that we will have an increased success rate from the transplant procedures," says Wright.

"You have to appreciate that these children are under enormous physical stress so we want to minimise toxicity as much as possible for these kids," Associate Professor Bebawy says. "In doing so they are taking the therapeutic in the most optimal way."

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