An ethnic comparison of incidence, cytogenetic risk and survival for New Zealand children and adolescents and young adults diagnosed with Acute Myeloid Leukaemia.

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Introduction: Acute Myeloid Leukaemia (AML) is a form of leukaemia in which the myeloid stem cells malfunction. Around 10 children, 0-14 years, and 10 adolescent and young adults (AYA), 15-29 years are diagnosed with AML in New Zealand each year. Five-year survival rates in New Zealand for these patients is approximately 70%.

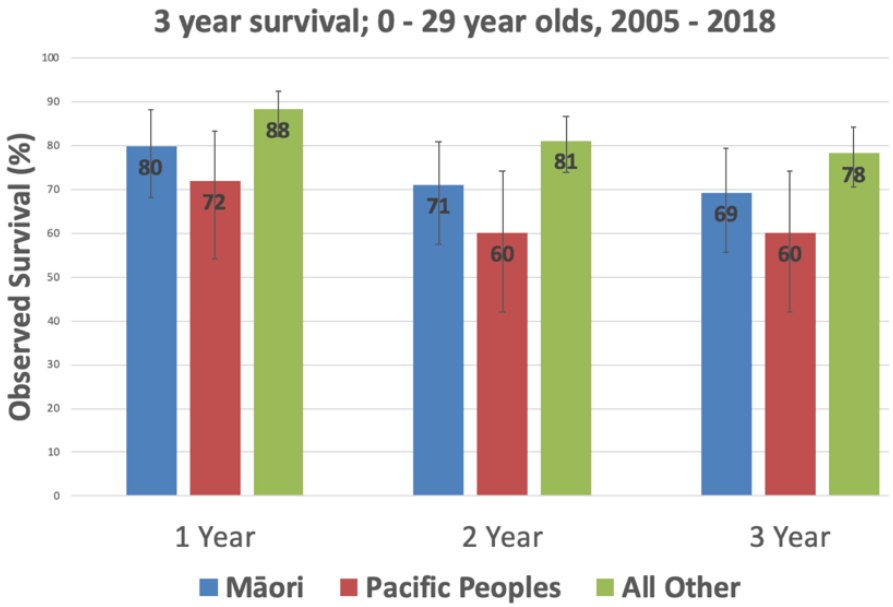
A recent report on 'Equity in New Zealand health care' suggested that survival outcomes for Māori children with AML were poorer than the survival for non-Māori non-Pacific Peoples and that Māori had a higher than expected incidence rate of AML. These differences were not statistically significant, but they did warrant further investigation. A previous study conducted in New Zealand identified ethnic differences in the prevalence of certain cytogenetic profiles in paediatric patients with Acute Lymphoblastic Leukaemia, however there was no impact on survival outcomes. Therefore, a focus of this study was patient cytogenetics, which is the study of chromosomes and their abnormalities.

Aim: Our descriptive study aimed to use a combined child and AYA cohort to explore both biological and non-biological factors that could contribute to any potential ethnic differences in AML incidence and survival. The focus on cytogenetics was to identify any ethnic differences that could contribute to survival outcomes.

Impact: This study has added to our understanding of AML by providing up to date information on the role of biological and non-biological factors, in regards to survival for young patients with AML. In particular, this study has identified the significance of patient cytogenetics, which will help to direct areas for future research and allow us to compare treatment outcomes in New Zealand to international benchmarks.

Method: Basic demographic and diagnosis information was obtained from the New Zealand Cancer Registry and the New Zealand's Children's Cancer Registry for all AYA and children diagnosed with AML between 2005 and 2018. A comprehensive review of patient medical records was then undertaken for all those treated in a paediatric centre. The data collected included information regarding treatment protocol, treatment complications, relapse, cause of death, and individual cytogenetics. The two data sets were then collated and a limited analysis of overall incidence and survival was conducted for the entire cohort, with a specific focus on exploring ethnic differences.

Results: The cohort consisted of 122 paediatric patients and 152 AYA patients, of whom 25% were Māori, 14% were Pacific and 60% were classified as 'All Other' ethnicities. This study found no statistically significant differences in survival, by prioritized ethnicity, at any stage post diagnosis for the 0-29 year old cohort. However, there does appear to be some variation in survival according to ethnicity. 3-year survival was 69% for Māori, and 60% for Pacific Peoples in comparison to 78% for those of 'All Other' ethnicities. Other findings include that for the paediatric cohort there was no statistically significant difference by ethnicity in regards to relapse rate, central nervous system involvement at diagnosis or risk group allocation.



One of the study aims was to identify whether there were ethnic differences in the incidence and survival of paediatric patients based on their cytogenetic abnormalities. Our study identified that Māori & Pacific Peoples accounted for 42% of paediatric AML cases, yet 75% of all complex cytogenetics were identified in these two groups. The definition of complex cytogenetics was based on current literature. Compared to the 'All Other' ethnic group, Māori and Pacific People were significantly more likely to have AML with complex cytogenetics at diagnosis with a Fisher exact test p=<0.05. In addition, compared to those of other ethnicities, Māori and Pacific paediatric patients with complex cytogenetics appeared to have much poorer survival, with only 2 out of 12 of these children surviving three years. When patients with complex cytogenetics were excluded from the survival analysis, the paediatric survival rates for the three ethnic groups were similar. The 3-year survival for Māori was 80%, Pacific Peoples was 89% and survival for those 'All Other' ethnicities was 85%. Our preliminary analysis found that of the six patients who died from treatment related effects, three were children of Maori or Pacific ethnicity who had complex cytogenetics.

Conclusion: Although this study did not find a statistically significant difference in AML survival by ethnicity, such differences are difficult to detect due to the small number of cases of AML diagnosed even over this extended time period. Nevertheless, the variation in survival observed warrants further attention, particularly in light of the finding that Māori and Pacific children are significantly more likely to have complex cytogenetics. According to the current paediatric AML study protocol used in both of nationally for childhood cancer, the presence of complex cytogenetics does not place patients in the high-risk category for treatment. This is in contrast to the current adult protocol for AML where it does influence treatment group allocation. Preliminary results from this study indicate that the presence of complex cytogenetics could be an important prognostic factor for paediatric patients, particularly for Māori and Pacific patients. As we did not have access to cytogenetic data for the AYA cohort we were unable to identify if there were also ethnic variations in the frequency of complex cytogenetics for AYA with AML and, if so, whether this contributes to variation in survival. However, our findings from the paediatric cohort indicate that this is an important area for future research.

This study adds to our understanding of AML and the significance of patient cytogenetics. Our increase in knowledge will allow for optimisation of treatment for patients, and therefore improvement in clinical practice as we aim to achieve the vision of the New Zealand Cancer Action plan of achieving equity in cancer outcomes by 2030.