Challenges in Childhood Cancer – Can nanomedicine save us?

Ziegler DS

Kids Cancer Centre
Sydney Children's Hospital
High St, Randwick, NSW, 2031
d.ziegler@unsw.edu.au

Cure rates for childhood cancer have steadily increased since the first child was cured of leukaemia in the 1960s. Overall cure rates for all cancers in children now exceed 80%. This success has been achieved via a series of clinical trials over several decades, that have optimised the delivery of chemotherapy and radiation therapy and incorporated the use of biological markers to improve patient stratification. However several challenges remain to further improve outcomes for children with cancer. The majority of drugs currently used to treat childhood cancer are cytotoxic chemotherapeutic agents that were developed 50 years ago and are associated with significant acute and long term toxicities. Further, there are many high risk cancers that remain incurable, despite trials of multiple different chemotherapeutic combinations, and novel strategies are urgently needed for these children. Thirdly, drug delivery to specific tumours remains a challenge, particularly for example, for brain tumours that are protected by an intact blood brain barrier. Strategies that utilise nanomedicine offer the potential to reduce systemic toxicity, improve drug delivery and enhance therapeutic efficacy. The use of this technology also warrants further exploration in order to target genetic aberations that are specific to childhood cancers and which are otherwise considered 'undruggable'. The rationale for trials of nanomedicine for childhood cancer will be discussed and potential pathways for clinical translation will be presented.