conditions. In the 12 Gy TBI group, the disease free survival after 2 years post HSCT was 56.7 %. In the 2 Gy single fraction TBI group, 50% children have survived and graft rejection was seen in 30%. Out of these, comprehensive late toxicity assessment was done in 25 survivors. The male: female ratio was 1.6:1. The median age at transplantation was 7 years (range 3 years to 19 years). The median follow up was 3 years post HSCT (range 1 year to 9 years). Sixteen children underwent transplantation for relapsed / high risk malignancies and 8 children for benign conditions like Fanconi anemia (4), primary immune deficiency (4) and severe aplastic anemia(1). Eight children received single dose 2 Gy TBI and 16 children received 12Gy TBI in 8 fractions. Growth failure in the form of stunting was observed in 37% (9/24), out of which 3 children had Fanconi anemia. Gonadal failure was seen in 4% (1/24), who had low sex hormone level and was treated with hormone replacement. Hypothyroidism was seen in 25% of children (6/24). Cardiac function and ophthalmological evaluation was within normal limits in all children. Spirometry could be performed in 20 children and 35% (7/20) had restrictive pulmonary function (severe restriction in 1, moderate in 2 and mild in 4 patients). Renal and liver function was normal in all children except one who had transaminitis. Audiometry revealed sensorineural hearing loss in one child (who was later diagnosed to have vestibular schwanomma) and bilateral conductive loss in 1 child. Secondary neoplasm was seen in 1 patient who had vestibular schwanomma. Neuropsychological assessment of the 17 patients evaluated revealed problems of anxiety and depression in 30% of children (5/17).

Conclusion: The immediate and late effects are seen in both 2 Gy and 12 Gy TBI with specific issues related to hypothyroidism, growth failure and restrictive lung disease. Although 50% of the haplo-identical HSCT children survived with no deleterious effects over the last 5 years, they may develop later over a period of time. There is scant data available in children receiving low dose radiotherapy and our study is the first of its kind in children. Vigilant monitoring of late toxicities at frequent interval is important for early intervention.

A STUDY ON CHEMOTHERAPY INDUCED NEPHROTOXICITY IN PEDIATRIC MALIGNANCY-SINGLE CENTRE EXPERIENCE☆

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Introduction: The great improvements in treatment for malignant disease in childhood have led to a major increase in the number of long-term survivors. However, the nephrotoxic effects of this treatment may limit the ability to deliver optimum potentially curative chemotherapy. Renal damage may follow treatment with cytotoxic drugs leading to glomerular, proximal tubular or distal tubular impairment. The rational development of preventive strategies depends on analysis of such toxicity. There is little information on Indian pediatric Cancer patients concerning the frequency of long term toxicity in children due to the paucity of follow-up studies.

Aims: To investigate the prevalence, nature and severity of Nephrotoxicity due to cancer chemotherapy and the relevance of patient and treatment related risk factors.

Methods: This is a Longitudinal Observational Study conducted on 70 children aged 1 to 18 years with pediatric malignancy who have received nephrotoxic chemotherapy i.e Cisplatin, Carboplatin, Cyclophosphamide, Ifosphamide, HD- Methotrexate. Laboratory investigations were done following the recommended protocols and as and when required and compared with the baseline. Nephrotoxicity was graded according to the CTCAE version 4.0. The collected data was analyzed using appropriate statistical tests by Epi info version 7 and interpreted to find out relevant association.

Results: There was a significant difference in the serum creatinine level's measured, where the means of serum creatinine at end of treatment was 0.5±0.1 mg/dl, versus 0.36±0.13 at baseline. A statistically significant fall in GFR was observed in 28 patients measured both at diagnosis and after completion of treatment {mean fall 15.1 ml/min/1.73m2}. hypomagnesemia was observed in 18 of 55 evaluable patients(21%), hypocacaemia in 12 of 55(%), hypokalemia in 5 of 70 pts(15%), hyponatremia in 2 of 70 pts(18%).

Conclusion: The study would indeed have an impact on predicting the early as well as late toxicities of chemotherapy which in-turn would help us predict the dose modifications and to treat the side effects at an early stage before progression to irreversibility. Exposure-based risk assessment is key for identification of renal complications. Counselling regarding timely reporting of worrisome symptoms and compliance with medical recommendations is an important component of good long-term care.

LATE EFFECTS OF TREATMENT IN SURVIVORS OF CHILDHOOD CANCER☆

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Background: With the use of multimodality therapy (chemotherapy, surgery, and radiotherapy) and better supportive care, there has been a drastic improvement in cure rates of all childhood cancer leading to increase prevalence of childhood cancers survivors. This growing population of survivors has raised the necessity of knowledge concerning the risks of adverse long term sequels of life saving treatments provided to them and thus to provide timely adequate intervention. The knowledge gained on the occurrence of long-term adverse outcomes is also needed to the design and test of intervention strategies that will maintain excellent survival while avoiding treatment-related late effects. This study aim to assess the prevalence of late effects of treatment in survivors of childhood cancer.

Materials and methods: Childhood cancer survivors who have been off therapy for at least 2 years were included in this study. For all survivors a complete history and thorough clinical examination was done with specific investigations to detect organ toxicity. Quality of life was assessed using the PedsQL^{TM} questionnaire, which was compared with age, sex and socioeconomic status matched healthy controls.

Results: A total of 150 childhood cancer survivors were included in the study. Most common primary diagnosis compromised of Hodgkin disease (31.33%, n=47), Acute Lymphoblastic Leukemia (22%, n=33), Retinoblastoma (18%, n=18) and Wilms tumor (18%, n=18). Stunting was seen in 23% of population while 2% of survivors were underweight and 6% were obese. Eleven patients who had received doxorubicin equivalent dose >300 mg/m2 were found to have fractional shortening <28 % on 2D Echo ($p<0.001$). Tooth agenesis was present in 19 survivors (12.67%), enamel dysplasia in 41 survivors (27.33%), microdontia in 20 survivors (13.3%) and xerostomia in 20 survivors (13.3%). Quality of life was poor in survivors when compared with controls ($p<0.01$%). 7 out of 19 male had oligospermia/azoospermia.

Conclusions: Childhood cancer survivors are prone to develop therapy related late effects and also have a poor quality of life. Regular follow up visits and screening investigations needs to be performed in them to promote their health and improve their quality of life.

ASSESSMENT OF QUALITY OF CARE IN CHILDREN WITH THALASSEMIA MAJOR☆

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Aim: To assess the quality of care (QOC) in North Indian children with thalassemia major (TM)

Materials & Methods: Children with TM attending the pediatric hematology clinic (PHC) at PGIMER were enrolled over a period of 18 months. This included children receiving transfusion elsewhere but following up for medical care at PGIMER. A predesigned questionnaire was administered to the parents/guardians. A pre-designed score to assess QOC (graded: good, fair, moderate and poor) was applied to all patients.

Results: Total 150 children were enrolled; median age: 8 years (IQR: 5;10.6). Patient characteristics are documented in Table 1.

Chelation details: Median age of initiation was 30 months (IQR: 24; 48); with 78% on regular chelation. Deferiprone; deferasirox; dual chelation were prescribed in 90 (67%); 30 (22%) and 14(10%). Appropriate serum

ferritin (median < 1000ng/mL) was present in only 12.6%. T2*MRI (for age> 10 years) was available in 21/46 patients; with 81% having cardiac/liver iron overload. Complications necessitating interruption/ change in chelation were seen in 20% each with deferasirox/ deferiprone. Children on deferasirox had better compliance compared to deferiprone or dual chelation (p=0.033). Compliance to chelation decreased with increasing age (p=0.016).

Complications: The prevalence of transfusion transmitted infections (TTI) in our cohort was 4.3% in children ≤ 10 years (HCV in all 3) and 9% in >10years (hepatitis C: 5; Hepatitis B: 1; HIV: 0). Underweight and stunting was seen in 22% and 35% children < 10 years; which increased to 73% and 67% after 10 years age. Age > 10 years was significantly associated with underweight and stunting (p< 0.01).

Family history was present in 22(14.6%); with 18 (12%) having an affected sibling with TM. Antenatal screening was done in subsequent conceptions in 75.5%. Irregular follow up was seen in 24% of the cohort; reasons were: unawareness (25%; n=6); financial constraints (27%; n=7); inconvenience (21%; n=5); Alternate treatment/other reasons (27%; n=7).

Conclusions: QOC was good in 60% of children < 10 years; and 13% of children > 10 years. Iron overload and poor chelation remain significant concerns. Growth failure is frequent in older age. Antenatal and extended family screening is require emphasis. Older patients have significantly worse QOC.

Table 1
Patient characteristics (n=150)

Median age at diagnosis of Thalassemia Major 7 months (IQR 5-12)	Diagnosis beyond 1st year age: 20%.
Male: female	60:40
Transfusion center	PGIMER: 52% Civil Hospitals: 37% Government Medical Colleges: 8% Private hospitals/ Others: 3%
Pre-BT Hemoglobin	Median 8.3gm/dL (IQR) Median Hemoglobin 9-10.5 gm/dL in 26.4% (34) Median Hemoglobin < 7 gm/dL in 6.2% (8)
Age- appropriate Schooling	92%; Median absences : 2/ month
Vaccination	Complete as per NIS: 77% HBV: 90% HAV: 18%

RASOPATHIES : LINK BETWEEN BIRTH DEFECTS AND CANCER IN CHILDREN☆

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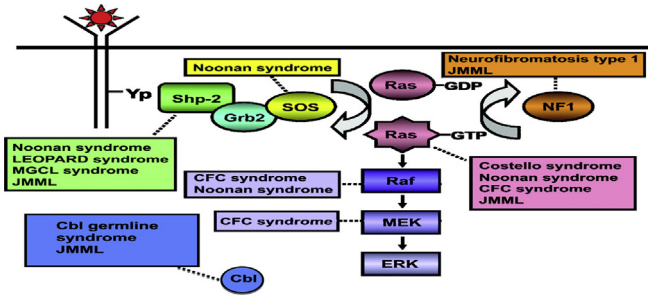
Background: Six months old child admitted with features characterized by distinctive broad forehead, hypertelorism, down-slanting palpebral fissures, and low-set, posteriorly rotated ears . Other important features were Pulmonary stenosis , poor growth etc. Later on he was diagnosed of JMML (juvenile myelomonocytic leukemia). He was evaluated for **NOONAN SYNDROME** and was found with genetic defects like PTPN11 And K-RAS mutations.

Seven years old girl was admitted in the emergency with sudden onset of seizures with history of blurring of vision with headache and onset of menses in the past. On examination she had features of raised ICT. MRI Brain revealed mass at optic chiasma diagnosed as optic glioma treated with chemotherapy as debulking surgery could not be done. On clinical and genetic evaluation , patient was diagnosed with **NEUROFIBROMATOSIS TYPE 1**.

Introduction : RASopathies are clinically defined group of genetic syndromes caused by germline mutations in genes that encode components or regulators of the Ras/mitogen-activated protein kinase (MAPK) pathway.

These disorders include neurofibromatosis type 1, Noonan syndrome, Noonan syndrome with multiple lentigines, capillary malformation–arteriovenous malformation syndrome, Costello syndrome, cardio-facio-cutaneous syndrome, and Legius syndrome. Because of the common underlying Ras/MAPK pathway dysregulation, the RASopathies exhibit numerous overlapping phenotypic features. Ras/MAPK pathway dysregulation has profound deleterious effects on both embryonic and later stages of development. It has been well studied in cancer and is an attractive target for treating various malignancies.

Image 1: RASopathies



Systemic treatment of germline effects : 1. One common feature of the RASopathies is some degree of neurocognitive involvement, which is an attractive target for treatment . The first randomized trial examined the effect of simvastatin treatment on cognitive function in children with NF1. It reduces the activity of RAS oncogene.

2 .Fernesyl transferase inhibitors and MEK inhibitors are under trials for managerment of cancers associated with RASopathies.

Conclusion: RASopathies are caused by germline mutations in regulators of RAS/MAPK pathway required for cell signal transduction. These syndromes share many phenotypic features and common genetic defects. The early identification of these phenotype-genotype correlations will help in better management of patients and in research for newer modalities of treatment.

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AUDIT ON MEDICAL ERRORS IN AN IN-PATIENT PEDIATRIC HEMATOLOGY-ONCOLOGY UNIT☆

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BACKGROUND: Patient safety in the current health care arena is an important indicator of health care quality. 10 to 18% of all reported hospital injuries are attributed to medical errors. ***(Hume 1999, Stetter et all, 2006)***. It is a global issue and the consequences can be mild to life threatening. Medical errors occur due to communication gap, illegible hand writing, inadequate documentation, shortage of nursing professionals and lack of sufficient knowledge about patients and medications etc. We have an ongoing audit process to reduce medical errors and we present results of this audit.

DESIGN/METHODS: Data was collected prospectively from Jan 2017 to May 2018 from daily patient care audit, direct observation, incident reports and adverse events register. Subject confidentiality was maintained

RESULTS: 2496 children were admitted to the unit during this period with an average length of stay of 4.6 days. Children were admitted for chemotherapy, febrile neutropenia as well as diagnostic work up. 20 medical errors were reported. Wrong duration of administration of IV chemotherapy infusion was the most common error (6), followed by IV fluids/medicine extravasation (4). Three children received a different drug than that was prescribed, two others got wrong dose and another two received oral medication for a shorter duration. In one patient the blood counts were reported and later edited by the lab, this was missed by the physician who started chemotherapy in a neutropenic child. A blood sample was labelled wrongly in one patient and in another a diagnostic sample was not sent.