Endocrine Evaluation in Children and Adolescents Submitted to Allogenic Bone Marrow Transplantation
Kuperman H1, Della Manna T1, Dichtchekhianen V1,2, Menezes Filho HC1, Steinmetz L1, Cominato L1, Folloni Fernandes J2, Mendelli A2, Mantovani LF2, Zanichelli MA2, Colassanti, MD2, Cristofani LM2, Odone Filho V2, Damiani D1.
Pediatric Endocrine Unit1
Pediatric Oncology Unit2
Instituto da Criança do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo - Brazil
hkuperman@terra.com.br

BACKGROUND
Pediatric bone marrow transplantation (BMT) can lead to endocrine dysfunctions due to common pre-transplantation regimens involving chemotheraphy.

OBJECTIVE
To evaluate the prevalence and time-of-onset of endocrine dysfunctions after allogenic BMT (aBMT) in children and adolescents.

PATIENTS AND METHODS
- Retrospective cohort-study design.
- Beginning of BMT program: 2010
- Inclusion criteria: 
  - Age: < 18 years at aBMT
  - Follow up:
    - First endocrine evaluation: 
      - 100 days after BMT (time zero)*
      - Interval between endocrine evaluation: every six months* when possible
- Clinical evaluation: 
  - Height (cm) and z-score*
  - Weight (kg) and z-score*
  - Pubertal stage (Tanner)
  - BMI (kg/m²) and z-score*
  - NCHS 2000
- Laboratory evaluation:
  - Growth: 
    - IGF-1, IGFBP-3, Bone Age (Greulich-Pyle), stim test**
  - Puberty – precocious or delayed: 
    - LH, FSH, Estradiol, Testosterone, Pelvic US
  - Thyroid: 
    - T3, FT4, TSH, Thyroid Antibodies, Thyroid US**
  - Adrenal: 
    - Basal cortisol, ACTH
  - Diabetes insipidus: 
    - Na*, Osmolality (serum and urinary)
  - Bone disease: 
    - Calcium, Phosphorus, Alkaline Phosphatase, PTH, Vitamin D, Bone Density**
  - Metabolic syndrome: 
    - Glucose, Insulin, Cholesterol (Total, HDL, LDL, VLDL)
    - Triglycerides, oGTT**

RESULTS
- Patients: 
  - 75 submitted to aBMT
  - 40 pts (21 F) referred to for endocrine evaluation
- Primary diseases: 
  - Acute lymphoblastic leukemia 14
  - Acute myeloid leukemia 8
  - Blackfan-Diamond anemia 2
  - Fanconi anemia 2
  - Krabbi disease (d) 2
  - Chronic Granulomatous d 2
  - Chediaki-Higashi d 1
  - Combined Immune Deficiency 1
  - Others (Korchman d, Osteopetrosis, Muccop) 1 each
- Clinical Data
  - Age at diagnosis: 5.5 ± 4.2 years old (0.0 – 15.0)
  - Age of aBMT: 8.5 ± 4.5 ys (0.8 – 17.8)
  - Bone marrow donors:
    - Siblings 21
    - Bone marrow bank 6
    - Umbilical cord 5
    - Parents 5
- Endocrine Evaluation
  - Age: 9.9 ± 4.0 ys (2.0 – 18.0)
  - Interval between BMT and endocrine evaluation: 1.5 ± 1.3 ys (0.0 – 5.0)
  - Endocrine complications:
    - Follow up 15* 
    - Growth disorders 8 (5 with GH deficiency) 
    - Dyslipidemia 5
    - Hypothyroidism 5
    - Obesity 3
    - Pubertal disorders 3 amenorrhea
      1 precocious puberty
      2 delayed puberty
    - Failure to thrive 1
    - Adrenal insufficiency 1

CONCLUSION
These findings emphasize the importance of screening for endocrine complications, particularly growth disorders, thyroid and metabolic syndrome, in children who have undergone aBMT. Children require an early and long follow up so that endocrine complications can be diagnosed and promptly treated.

References
3. Endocrine-Related Cancer 2010;17: R141–R159