Nuclear Medicine Technologist Role in MIBG Therapy

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Introduction: Neuroblastoma

• Most common extracranial solid pediatric cancer
• 50-60% of cases present w/ metastases
• 40-50% survival rate in high-risk patients
• MIBG therapy is promising for MIBG-avid disease
Introduction: I-131 MIBG

- Meta-IodoBenzylGuanidine, or MIBG is chemically related to norepinephrine
- 90% neuroblastoma is MIBG-avid
- When labeled with I-123 or I-131, MIBG has both diagnostic and therapeutic utility in neuroblastoma and other neuroendocrine tumors
MIBG Therapy at CHOA:

• CHOA began performing MIBG therapies in July of 2013 after a grant from a patient’s family allowed us to create a state of the art therapy program in the Southeast.

• CHOA is a Children’s Oncology Group Phase I institution and a member of the New Approaches to Neuroblastoma Therapy (NANT) consortium.
Purpose:

- Highlight the role of the nuclear medicine technologist in MIBG therapy
- Share lessons learned after starting MIBG therapy program
- Share dose-saving techniques that we have adopted to keep staff within limits
MIBG Therapy Prep:

- The role of the technologist begins before the patient arrives
- Radiation safety precautions that begin with our preparations have resulted in lower radiation exposure rates to technologists, staff, and families.
Day 0: Room/Hot Lab Preparation

- Hot lab wrapped
- All supplies needed for both QC and dose draw are assembled
- Infusion pump is charged and tested with saline dose to ensure accurately dose delivery
Day 0: Room Preparation
Day 0: Room Preparation
Day 1: Patient Prep

- Education (patient, family, healthcare providers)
- Port accessed if not CVL, PIV placed if needed
- Foley catheter
- NG tube
Day 1: Pretreatment

- SSKI Loading Dose
- 0.1mg/kg Zofran 30 minutes before administration
- Anxiolysis medication if needed
Day 1: Dose Prep

• The dose is drawn and QC is performed

• Dose transported on cart with lead shielded infusion pump and L-Block
Day 1: Dose Administration

• Infuse I-131 MIBG dose @ 20ml/hr over 90 minutes
• Follow-up with NS flush @ 60ml/hr over 30 minutes

• Patient dose is usually 18mCi/kg
• Doses have ranged from 187 mCi to 1206 mCi
Day 1-8: Monitoring

- Physicist takes 1m measurements of patient at start and after 90 minutes
- Daily measurements thereafter
- When patient reaches exposure rate <7 mrem/hr at 1 meter patient is discharged
Discharge

• Patient is discharged when exposure readings are below 7 mR/hr
  • Typically day 3 or 4
Post Therapy Scan

- Upon discharge, immediately before patient leaves the hospital
- Takes advantage of large dose to see full extent of disease
Therapy Room Cleanup

Waste and contaminated items stored in long term storage for decay.
Results: Technologist Dose

• Exposure dose to the tech during preparation/draw:
  – Range: 0.001-0.049 microSv per MBq administered

• Exposure during administration:
  – Range: 0.001-0.027 microSv per MBq admin
Results: Technologist Dose

- Average exposure is comparable or lower than published data from other facilities
Unexpected Challenges

• Problems with Foley catheter or urine pump

• Infusion pump issues

• Projectile vomiting

• Troubleshooting with pediatric population
What Can We Do to Protect Ourselves?

- Rotate technologists administering
- Paired technologist teams
- Time, Distance, Shielding
- Monitor
- EDUCATE!