



## Neonatal Diabetes

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## Objectives

- Identify and define neonatal diabetes
- Describe the difference between transient and permanent
- Review the complexity of transition to pump and use of diluted insulin
- Explain the barriers of transitioning patient from hospital to home
- Discuss how to apply new knowledge to future care of new neonatal diabetic patient and family centered care



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## Conflicts of Interest Disclosure

No conflicts of interest related to the content of this presentation



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## Neonatal Diabetes

- Hyperglycemia requiring insulin treatment that presents within the first 6 weeks to 3 months of life
- A rare condition
  - 1 in 215,000- 500,000
- May be caused by several different genetic mutations
- Two categories

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## What's the difference?

### Transient Neonatal Diabetes (TND)

- More than half of the population of neonatal diabetes
- 70% of the TND caused by 6q24
- Resolves by 18 months of age
- Possible development of diabetes in later life
- Need for subcutaneous insulin

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## Transient Neonatal Diabetes (TND)

### 6q24 imprinted genes can occur in three ways

1. 40 %: Paternal Uniparental Disomy (UPD) of Chromosome 6 (paternal x2 copies)
2. 40%: Duplication of genetic material on the copy given by father (paternal duplication on 1)
3. 20% : impaired silencing of maternal copy of the genes (maternal hypomethylation)

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## Permanent Neonatal Diabetes

- No resolution
- Clinical manifestations at time of diagnosis
  - IUGR, hyperglycemia, severe dehydration, FTT
- 5 genes involved: KCNJ11, ABCC8, INS, GCK, PDX1
- KCNJ11 & ABCC8 respond to oral sulfonylureas, other require insulin
- Pancreatic enzyme replacement therapy



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## Diagnostics

### Neonatal Testing

Neonatal Diabetes Mutation Analysis CPT 81479  
(\$3000.00)

5841 S. Maryland Ave Rm G701 MC 0077  
Chicago, Illinois 60637

University of Chicago-Genetic Services Laboratory  
([ucgslabs@genetics.uchicago.edu](mailto:ucgslabs@genetics.uchicago.edu))

1-888-824-3637

3-10 ml EDTA/ purple tube



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## MM Case Study

Newborn- 3/18/15

C/S for breech presentation at 39 wks

Birth weight: 5 lb 14 oz

estimated birth wt: 7 lb, no growth after 34 weeks

Day 3 of life: POC Glucose ranges 14-78 mg/dl

Hypothermia

Septic workup and Antibiotics

D 10 infusion for 48 hours



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## MM Case Study

3/24/15- discharge Day 6 of life

- prior to discharge POC glucoses: 54, 53, 53

3/25/15- presented to ED with poor PO and difficult to arouse

- POC glucose: 455
- Sunken fontanel
- Ph: 7.34
- Ammonia: 83



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## MM Case Study

- Episodes of apnea in ED
- Subsequent POC glucose 531/ 555
- Respiratory Failure
  - Intubation
  - Admission
  - Septic work up
  - Antibiotics
- 0.5 units of insulin subcutaneous x1



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## Let the Work Begin!!!!

- Transitioned to insulin drip: 0.01 unit/kg/hour (total of 0.6 Units of basal insulin per day)
- Bolus insulin based on sliding scale every 3 hours with feeds via IV
- Blood sugar less than 100: 0 units
  - 101-200: 0.015 units
  - 201-300: 0.025 units
  - 301-400: 0.035 units
  - More than 400: 0.045 units



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## Next Steps

Responded well to insulin, not going to start Sulfonylureas

**How do we transition off of the insulin drip?**



**What small doses do you need, sweet baby!!**


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## Insulin Pump Therapy

- ✓ Need an insulin pump with small basal and bolus increments
- ✓ Need to be able to dose across the room if baby sleeping

What pump would you pick?  
Omnipod/ANIMAS/Tandem/Medtronic

- What about a glucose meter?


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## Lets teach

- ✓ Inpatient nursing policy: Patient's Pump
- ✓ Parent education
- ✓ PICU Plan of Care:
  - Discharge date goal
  - Staffing plan (consistency)
  - In-service on insulin pump (RNs need to have basic knowledge)
  - Diabetes Treatment Center involvement




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## Let's do this

Where do you get diluted insulin for home use?

Insulin pump orders: Animas PING insulin pump: Humalog insulin dilution 1:10 which means it is 10 units of insulin per 1 ml.

Basal insulin: actual insulin dose will be 0.005 units per hour ( for total amount of 0.12 units over 24 hours), this will **equates to 0.05 on the insulin pump,**  
**Insulin on Board: 3 hours.**

Bolus insulin through Animas insulin pump every 3 hours for feed: 20 % immediately and remaining 80% over 30 minutes.

Blood sugar	Actual dose of insulin	Dilute insulin from pump (1:10)
Less than 120	0	0
121-200	0.02	0.20
201-300	0.05	0.50
301-400	0.06	0.6
More than 400	0.07	0.7

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## Discharge Barriers



- Diluted insulin
- Education to father
- University of Chicago labs- who pays?
- Weight checks- Home health nursing
- Coordination of appointments
  - Pulmonologist/Gastroenterologist/ Endocrinology visits

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## Finally HOME



- Daily contact with endocrine office- LOG BOOK
- Nurse Navigator Home Visit
- Weight Checks
- Blood sugar checks with each feed
- Updating on call physician with plan
- Parental support- hypoglycemia treatment

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## Who is this Nurse Navigator anyway?

- ✓ Communicate with in-patient hospital staff to facilitate post hospitalization follow up/ transition of care
- ✓ Coordinate education and facilitates initiation of treatment planning and all care
- ✓ Develops and implements case management plans to maximize healthcare outcomes and facilitate wellness
- ✓ Educates families/ patients on chronic disease management, medications, and need for scheduled follow up appointments
- ✓ Assess patient via telephone or in person, applying critical thinking skills to facilitate proper level of treatment



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## Take-aways from this sweet baby

- Know the right people in the right places to have a loaner pump
- Assessing readiness to learn of parent, important to ensure that parent can absorb new knowledge
- Coordinating and communication with all parties involved is key ( ie PICU, DTC, parents)
- Asking the “what ifs” and eliminating potential barriers will help the family feel confident on discharge



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## Follow Up

- MM neonatal testing came back
  - Positive for 6q24 TND, maternal hypomethylation, parents had genetic testing
  - No increased risk for future siblings above general population
- MM is now off insulin after 5 months, blood sugars 80-110s
- follow up every 3 months
- Random blood sugar checks



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## References

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