

2:00 – 3:30 pm
 Friday, April 29
Concurrent Mini-Plenary Session
Diabetes and Obesity
Heather Dean, MD

Type 2 diabetes in children

Secondary prevention
 Primary prevention

Inuit and Indian Child Health
 IHS research conference
 May 2005

OUTLINE

What are current published guidelines?
SELECTED CHILDREN AT HIGH RISK
 What is prevalence of T2dm in children?
 significant health problem
 Why is screening recommended?
 latent phase occurs
 natural history known - in Manitoba
 screening test agreed: FBG
 gold standard test available
 treatment effective

CURRENT GUIDELINES

CPSM 2000 www.cpsm.mb.ca #923
 (closed Oct 2004)
ADA – 2000 www.diabetes.org
AAP – 2000 (endorsed ADA)
CDA – 2003 www.diabetes.ca
ISPAD none www.ispad.org
IDF/WHO 2003
CPS 2005 www.cps.ca
CPS (endorsed CDA)

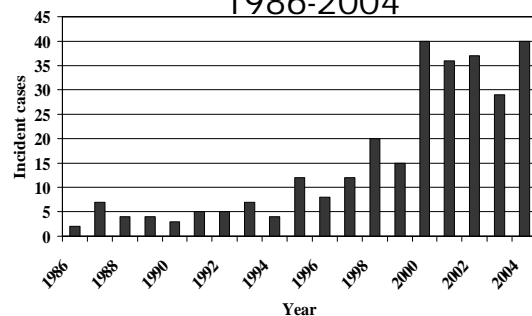
TYPE 2 DIABETES IN CHILDREN CDA 2003 RECOMMENDATIONS

Obese children ? 10 years of age should be considered for screening for type 2 diabetes every 2 years using an FPG test if they meet 2 of the following criteria:

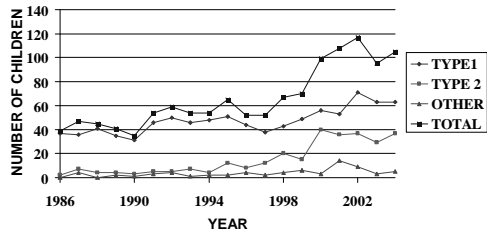
- member of a high-risk ethnic group
- family history of type 2 diabetes, especially if the child was exposed to diabetes in utero
- acanthosis nigricans
- PCOS
- hypertension
- dyslipidemia

"An OGTT may also be considered as a screening test"
[Grade D, Consensus].

Cases of type 2 diabetes referred to DER-CA 1986-2004



New-onset diabetes referred to DER-CA 1986-2004



Global phenomenon Population studies

<p>Japan: 7 million children 0.28/1000 (Kitagawa, 1998)</p> <p>US: NHANES III 0.06/1000 (Fagot, 2001)</p> <p>Taiwan 3 million children 0.08/1000 (Wei, 2003)</p> <p>Pima Indians 38-53/1000 (Dabelea, 1999)</p> <p>Australian aboriginal 13/1000 (Braun, 1996)</p> <p>Canada: Quebec no T2DM IFG 1.6%</p>	<p>CANADA STP, Mb 5-19y 11/1000 (36/1000)</p> <p>Sandy Lake, Ont 10-19y 24/1000* (40/1000)</p> <p>Interlake, Mb 7-19y 9.1/1000</p> <p>Island Lake, Mb 7-19y 6.7/1000</p> <p>Sandy Bay 4/1000*</p> <p>Quebec Cree Nation 0/400*</p> <p>Christian I., Ont 4-14y 0/115*</p> <p>(* <500 children)</p>
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Global Experience

- Type 2 in children and youth increasing worldwide
- Indigenous populations have greater risk
- Populations that have increased prevalence in adults are at higher risk
- In some populations the prevalence of type 2 diabetes in youth per 100,000 children exceeds that of type 1
 - Japan
 - Canadian FN

Metabolic Syndrome

Is it important to identify in children ?

- BP & lipids show longitudinal tracking in children
- Preclinical markers in children predict CVD in adults: BMI, lipids, BP
CRYFS in Finland (Raiakari, 2003)
PDAY (McGill, 2002)
Bogalusa (Srinivasan, 2002, Chen 2005)
- Surrogate markers of CVD are increased in obese children

Metabolic Syndrome in children

- NCEP adjusted for age & sex for children :
 1. BMI-SDS ≥ 2
 2. BP >95%ile (systolic or diastolic)
 3. Serum triglyceride >95%ile
 4. Serum HDL-c <5%ile
 5. IGT 2hr post glucose 7.8 - 11.1

****abnormal glucose is least common**

Metabolic Syndrome in children

Not all obese children have metabolic syndrome
~**20% in overweight teens**
(1% in normal weight children)

New Haven, CT: **50% with BMI-SDS > 2.5** [Weiss, 2004, NEJM] **ethnic differences: white>black or Hispanic

Southern California: 30% obese Hispanic youth with + FH T2dm [Cruz, 2004, JCEM]

NHANES: prevalence increased from 4% overall in 1988-1994 to 6% 1999-2000
[Cook, 2003 Arch Ped Adol Med; Duncan 2004 Diab Care]

Quebec: age 9,13,16y: **11.5%**

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- ≈ member of a high-risk ethnic group
- ≈ family history of type 2 diabetes, especially if the child was exposed to diabetes in utero
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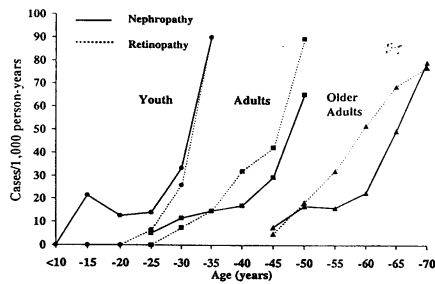
TYPE 2 DIABETES IN CHILDREN CPSM 2000 RECOMMENDATIONS

≈ All FN children ? 7 years of age should be considered for screening for type 2 diabetes every year using a FPG test if they have a family history of *early-onset* * type 2 diabetes, especially if the child was exposed to diabetes in utero

* Early onset T2dm = before age 30y

Microvascular Disease

(Krakoff 2002)



Morbidity and Mortality of Type 2 Diabetes in Youth

MANITOBA - 2001 (Dean 2002)

79/86 graduates located:

7 dead: 2 on dialysis (blind & infant with spina bifida), MVA, house fire, brain tumour, leukemia, sepsis

55 interviewed age 18-30,

– 3 on dialysis, 1 blind

– 33% pregnancy loss

NEPHROPATHY

- **PRIMARY RENAL DISEASE -10%**
 - CONGENITAL 4.5x higher in FN (Bulloch, 1996)
 - ACQUIRED 6x higher in FN (Bulloch, 1996)
 - IgA nephropathy 10x higher (Casiro, 1988; Donadio, 2002)
- **ASYMPTOMATIC BACTERIURIA**
- **OBESITY RELATED FSG**

What about the other CVD risk factors?

Other challenges in FN adolescents with T2DM

- CONGENITAL ANOMALIES (?folic acid)
- RETINOPATHY
- NAFLD-28%
- Social deprivation: poverty, isolation, substance abuse, depression & suicide, family burden of illness
- SMOKING
- TRANSITION TO ADULT CARE

Treatment of T2DM in children

Non-pharmacologic: Modification of lifestyle

Pharmacologic

Metformin with insulin resistance

#1 RCT (Jones, Diab Care 2002)

#2 RCT (Sellers&Dean, A2002)

No studies with other OHA in children

Glyburide insulin deficiency

Insulin: signs of insulin deficiency e.g. DKA, symptoms of hyperglycemia, A1c>9%

Prenatal and Early Infancy Risk Factors for T2DM

- pre-existing diabetes OR=14.4
- gestational diabetes OR=4.4
- breastfeeding >12 months OR=0.34
- SGA (OR=1.41) & LGA (OR=1.42)
- no significant assoc smoking, alcohol
(TK Young et al Arch Dis Child 2002)

Summary T2dm in children

- Many FN communities in Canada have no youth with T2dm
- Highest rate (1-4%) in some Oji-Cree communities may be related to additional genetic factors
- Unique features of T2dm without obesity in Oji-Cree require different strategies for screening and treatment

SUMMARY (cont'd)

- CPS guideline 2005 Indian & Inuit Health committee: selective screening (+FH) in all FN children \geq 10y using FBG
- Morbidity and mortality increased in early-onset tdm in Manitoba
- Current treatment and secondary prevention strategies are challenging
- Care givers need to understand the unique features of t2dm and metabolic syndrome in children (vs t1dm)
- Resource January 2005 Pediatrics & Child Health

SUMMARY (cont'd)

- CHILDREN ARE NOT SMALL ADULTS
- Longitudinal surveillance needed
 - Must document outcomes of early-onset t2dm: are they unique? Does puberty play a role?
 - Must differentiate microvascular vs macrovascular complications
 - Must differentiate t2dm vs t1dm
 - Must differentiate obese vs non-obese