Prevention and Delay of Type 2 Diabetes in Children and Adults with Impaired Fasting Glucose (IFG) and/or Impaired Glucose Tolerance (IGT)

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BMI Body mass index (kg/m^2)
FPG Fasting plasma glucose
OGTT 1.75g/kg to max 75g Oral glucose tolerance test
PCP Primary care provider

Screening[1]:

1. **General population;** BMI ≥25
   Individuals ≥45 years
   Baseline and q 3 years
2. **High risk population ≥18 years;** BMI ≥25
   Baseline and yearly
3. **Children and youth at risk**
   Baseline at age 10 and q 2 years
   - Overweight BMI (≥85th %'ile for age and gender and ≥ two risk factors)

Risk Factors:

- 1st degree (and/or 2nd degree in children) relative with diabetes
- Hx of gestational diabetes or delivery of a baby weighing >9 lbs
- High-risk ethnic group
- Hypertension
- Dyslipidemia
- Polycystic Ovary Syndrome
- Metabolic[2] and/or Insulin Resistance[3] Syndromes
- Vascular disease
- Acanthosis nigricans

TESTING[1,4,5]: FPG Recommended: (if abnormal confirm X 1); however 2-hr OGTT acceptable in adults and should be used for diagnosis in children[6] (routine measurement of insulin levels is not recommended)

NORMAL
FPG <100 mg/dL;
2-hr OGTT <140 mg/dL

Rescreen Based on Risk Factors

Continue Aggressive Management of Modifiable Risk Factors and Appropriate Lifestyle Intervention

Diagnosis: IFG
FPG ≥100 and <126 mg/dL and/or
IGT 2-hr OGTT
Glucose ≥140 and <200 mg/dL

Diagnosis: Type 2 Diabetes
FPG ≥126 mg/dL and/or 2-hr OGTT ≥200 mg/dL—
Refer to Texas Diabetes Council Algorithms

Initial Intervention: Lifestyle[7,8]
Weight Loss: 5–10% if BMI ≤40; 10–15% if BMI >40
Exercise/Physical Activity: ≥30–60 minutes per day
Hypocaloric diet: Deficit 250–1000 Kcal per day ± Meal Replacements
Behavior Modification: Nutrition/Family Counseling
Regular Follow-up by PCP

6 months

Successful Outcome
Normal FPG and/or 2-hr OGTT Lifestyle Maintenance—
Continue Physical Activity and Weight Loss/Maintenance

Reassess yearly
FPG and/or 2-hr OGTT

Abnormal—
Consider Drug Therapy[9]

Normal—
Continue Lifestyle Intervention

6 months

Unsuccessful Outcome: Children
Abnormal 2-hr OGTT—Intervention and Continue Lifestyle
Refer to Pediatric Endocrinologist or Obesity Specialist

Unsuccessful Outcome: Adults
Abnormal FPG and/or 2-hr OGTT—Consider Adding Drug Therapy[9] to Lifestyle Intervention

Metformin[8,10]	**Orlistat[11]**	**Acarbose[12]**
Contraindicated in Renal Disease, Liver Disease, CHF	Contraindicated in Chronic Malabsorption, Cholestasis	Contraindicated in Gastrointestinal Disease

Reassess FPG and/or 2-hr OGTT every 6 months
Abnormal—Re-evaluate Lifestyle and Medication Regimen
Normal—Continue Current Therapy

Footnotes:

1. American Diabetes Association: Clinical Practice Guidelines 2004. Screening for type 2 diabetes. *Diabetes Care*. 2004;27(suppl 1):S11-4; Diabetes Care. 2005;28(suppl 1):S4-S36.
2. National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA*. 2001;285(19):2486–97.
3. American College of Endocrinology position statement on the insulin resistance syndrome. *Endocr Pract*. 2003;9(3):237-52.
4. American Diabetes Association: Clinical Practice Guidelines 2004. The prevention or delay of type 2 diabetes. Diabetes Care. 2004;27(suppl 1):S47-54; *Diabetes Care*. 2005;28(suppl 1):S4-S36.
5. Edelstein SL, Knowler WC, Bain RP, et al. Predictors of progression from impaired glucose tolerance to NIDDM: an analysis of six prospective studies. *Diabetes*. 1997;46(4):701-10.
6. Sinha R, Fisch G, Teague B, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. N Engl J Med. 2002;346(11):802-10. Erratum in: *N Engl J Med*. 2002;346(22):1756. Correction of dosage error in abstract.
7. See Texas Diabetes Council algorithms for treatment of exercise, weight loss, and nutrition.
8. Knowler WC, Barrett-Connor E, Fowler SE, et al. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002;346(6):393-403 (dose of metformin 850 mg twice daily).
9. No medication is currently FDA-approved for prevention of type 2 diabetes in adults, but a number of studies provide evidence for drug treatment.
10. Metformin is as effective as lifestyle intervention in individuals <age 45 or those with BMI ≥35; metformin is nearly ineffective in individuals ≥age 60 or those with BMI <30 (DPP evidence).
11. Torgerson JS, Hauptman J, Boldrin MN, et al. XENical in the prevention of diabetes in obese subjects (XENDOS) study: a randomized study of orlistat as an adjunct to lifestyle changes for the prevention of type 2 diabetes in obese patients. *Diabetes Care*. 2004;27(1):155-61 (dose of orlistat 120 mg three times daily with food).
12. Chiasson JL, Josse RG, Gomis R, et al. Acarbose for prevention of type 2 diabetes mellitus: the STOP-NIDDM randomised trial. *Lancet*. 2002;359(9323):2072-7 (dose of acarbose 100 mg three times daily with food).