



THE UNIVERSITY OF NORTH DAKOTA



The University of North Dakota

School of Medicine
& Health Sciences



Courtesy Univ Texas San Antonio

Diabetes Complications

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Risks for Complications in Diabetes

- Abnormal blood sugar
- Abnormal cholesterol
- Abnormal blood pressure

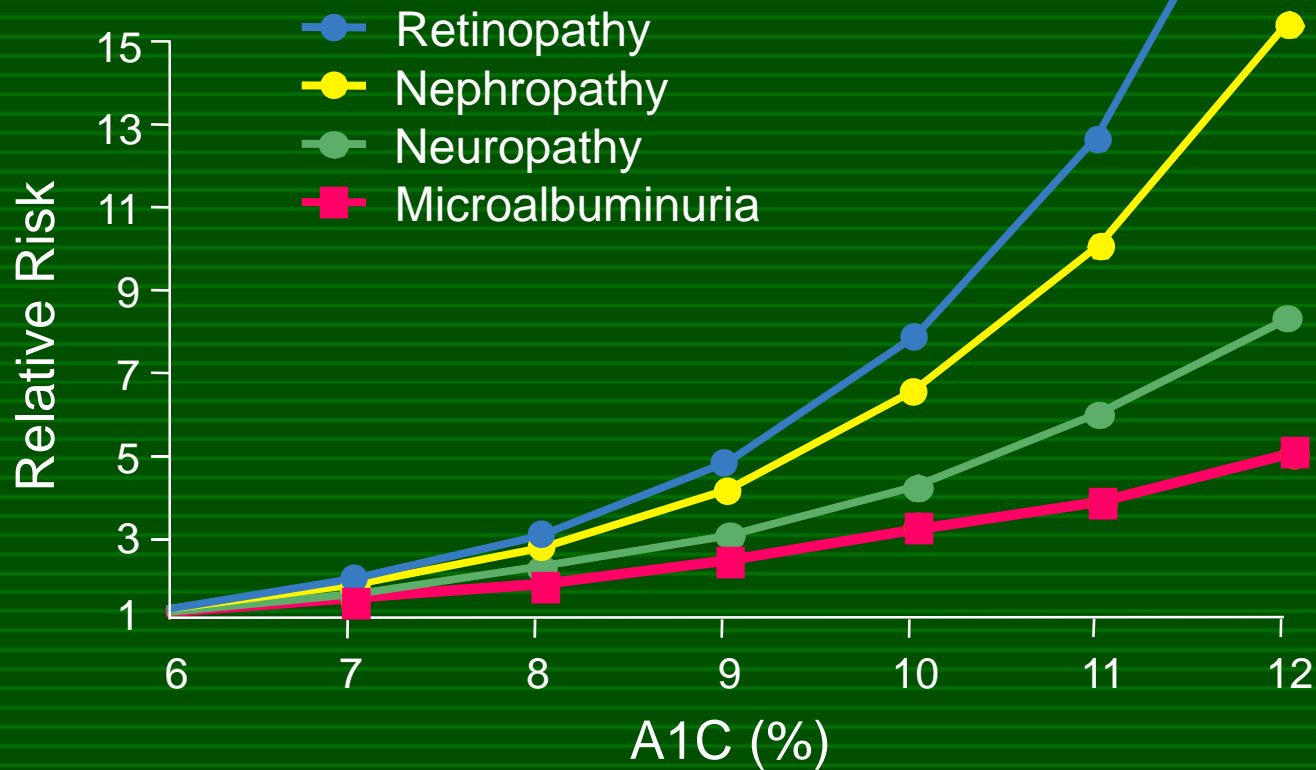
Avoiding Diabetes Complications

- Blood glucose control A1C <7%
- Treat cholesterol profiles to targets
 - Total cholesterol <200
 - Triglycerides <150
 - HDL (“good”) >40 men, >50 women
 - LDL (“bad”) <100, <70 high risk
- Treat blood pressure to target <130/<80

Diabetes Complications

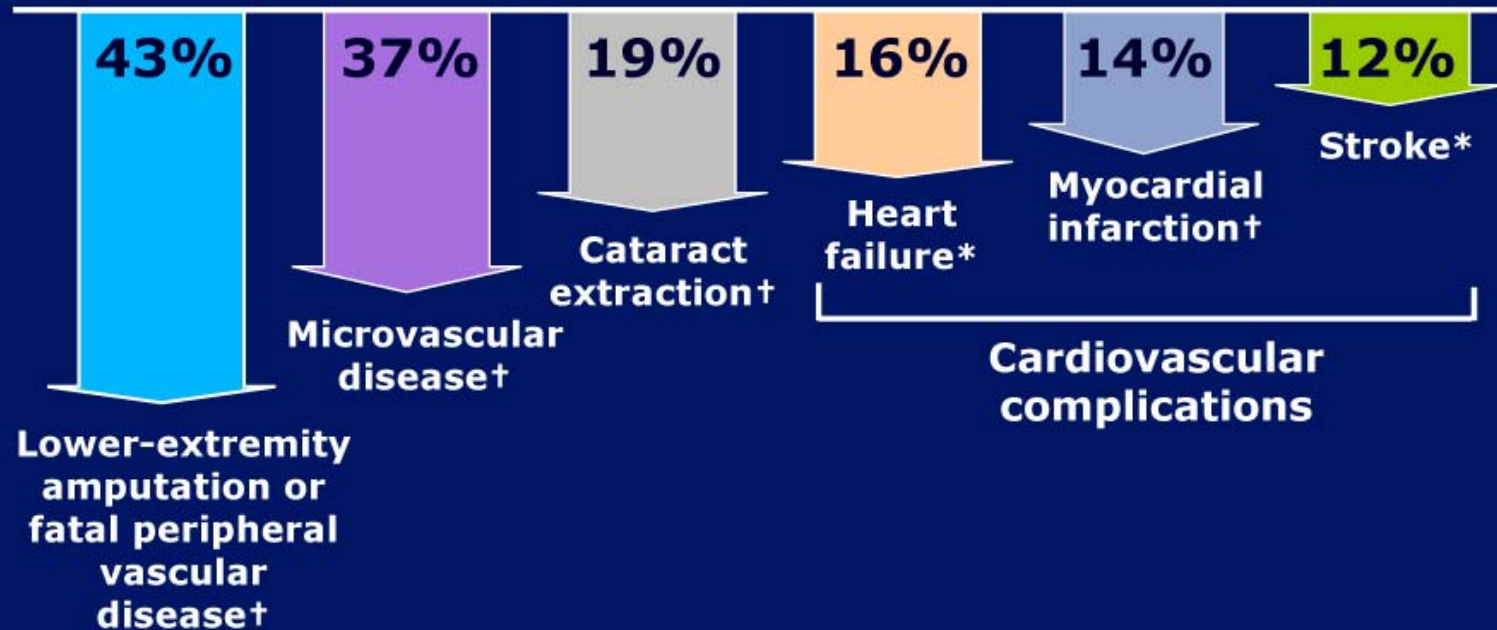
- Cardiovascular disease
 - Coronary Heart disease (CHD)
 - Stroke
 - Peripheral arterial disease (PAD)/amputation
- Eye disease (retinopathy)
- Kidney disease (nephropathy)
- Nerve disease (neuropathy)
- Diabetes deaths annually in the U.S. ~233,000

A1C and Relative Risk of Microvascular Complications: DCCT



Adapted with permission from Skyler J. *Endocrinol Metab Clin North Am.* 1996;25:243
DCCT Research Group. *N Engl J Med.* 1993;329:977

UKPDS: 1% A1C Decrease and Reduced Risk of Complications



* $P < .05$; † $P < .0001$.

UKPDS=United Kingdom Prospective Diabetes Study.

Stratton IM et al. *BMJ*. 2000;321:405-412.

Cardiovascular Disease

- Risk:
 - Stroke 2 to 4 times higher
 - Heart Disease 2 to 4 times higher
- ~75% of diabetes patients have high blood pressure (hypertension)
- ~75% of people with diabetes have a dyslipidemia (cholesterol disease)
- Heart disease and stroke ~65% of diabetes deaths

Cholesterol Targets in Diabetes

- Total Cholesterol <200
- Triglycerides <150
- HDL (good)
 - >40 for males
 - >50 for females
- LDL (bad)
 - <100
 - <70 for high risk

Commonly Used Anti-Cholesterol Medications

- Statins
 - Potent
 - Lower total cholesterol, LDL most effectively
 - Cut CVD risk by ~30%
- Fibrates
 - Target triglycerides
 - Often used in combo with Statins
- Niacin
- Omega-3 fish oils

Hypertension in Diabetes

- Target blood pressure <130/<80
- Reduces risk
 - Heart disease
 - Stroke
 - Kidney disease

Common Anti-Hypertensives

- ACEI: Lisinopril (Prinivil), Ramipril (Altace), others
- ARB: Valsartan (Diovan), Losartan (Cozaar), others
- Beta-Blockers: atenolol, metoprolol (Toprol), carvedilol (Coreg-mixed function), others

Common Anti-Hypertensives

- Calcium Channel Blockers- Amlodipine (Norvasc), Verapamil (Covera, Verelan), others
- Diuretics- Hydrochlorothiazide, others

Hypertension Medications

- ACEI and ARB medications are initial drugs of choice for HTN in DM
- Benefit of lowering blood pressure, reducing heart attack, stroke, and kidney disease

Diabetes and Cardiovascular Disease

- Aspirin Therapy is indicated for Diabetes Patients over the age of 35
- 81-325 mg daily depending on risk factors and co-morbidities
- CV risk reduction 15-50%
- Smoking cessation
- Meal planning

Diabetes and Cardiovascular Disease

- Death rates for cardiovascular disease in diabetes are declining in North Dakota
 - Men: CHD 8.7/1000 >> 6.5/1000
Stroke 1.2/1000 >> 0.75/1000
 - Women: CHD 6.1/1000 >> 4.4/1000
Stroke 1.4/1000 >> 0.5/1000
- Better recognition and treatment?

Journal Diab Compl March-April 2009

Diabetic Nephropathy

- Diabetic kidney disease
- Leading cause of kidney disease in U.S.
 - 44% of all new cases of kidney disease
- >46,000 patients start treatment for end stage kidney disease annually
- Most patient with end-stage disease will start on dialysis

Nephropathy: Avoidance

- A1C <7.0
- BP's <130/<80, weight reduction, avoidance of NSAIDS if possible
- Microalbumin screening
- Usually treated with ACEI or ARB, other BP meds if needed, dietary sodium and protein restriction

Diabetic Retinopathy

- Diabetic eye disease
- About 40% of persons with Diabetes have Retinopathy
- 12,000 to 24,000 new cases of blindness annually in U.S.

Retinopathy: Avoidance

- A1C <7.0, less glucose variability?
- Annual dilated eye exams by eye care professional
- Laser photocoagulation for overt retinopathy
- New medications on the horizon:
 - Ruboxistaurin (Arxxant)(PKC* inhibitor)-
just received FDA approval

*Protein Kinase C

Diabetic Neuropathy

- Diabetic nerve damage
- ~60-70% of patients with diabetes
 - Feet
 - Can also occur in hands, carpal tunnel syndrome, in the intestines, cardiac
- Neuropathy contributes to amputations

Neuropathy: Avoidance

A1C <7%

Neuropathy: Treatment

- Anti-seizure meds (gabapentin, pregabalin)
- Tricyclic anti-depressants (amitriptyline)
- Duloxetine-antidepressant with neuropathy indication
- Capsazin creme

Peripheral Arterial Disease

- Blockage of arteries in legs
- Contributing factor to amputations in diabetes:
 - ~60% of lower limb amputations occur in people with diabetes
 - ~71,000 lower limb amputations annually in people with diabetes
 - Amputation rate is 10 times higher in diabetes

Peripheral Artery Disease: Avoidance

- A1C <7%
- Treat same risk factors as heart attack and stroke
 - Treat to target blood pressure
 - Treat to target cholesterol
 - Daily aspirin

Peripheral Arterial Disease: Treatment

- “Bypass” surgery (usually femoral artery to popliteal artery)
- Medications
 - Aspirin daily
 - Clopidogrel
- Amputation for severe disease
 - Tissue death
 - Severe infection (“gangrene”)

Summary:

Reducing Diabetes Complications

- A1C < 7%
- Treat blood pressure to target of <130/<80
- Treat cholesterol profiles to target
- Low dose aspirin for appropriate patients
- Lifestyle changes
 - Meal Plan
 - Appropriate exercise plan
 - Smoking Cessation
- Proper and timely follow-up with providers