

WELCOME

to

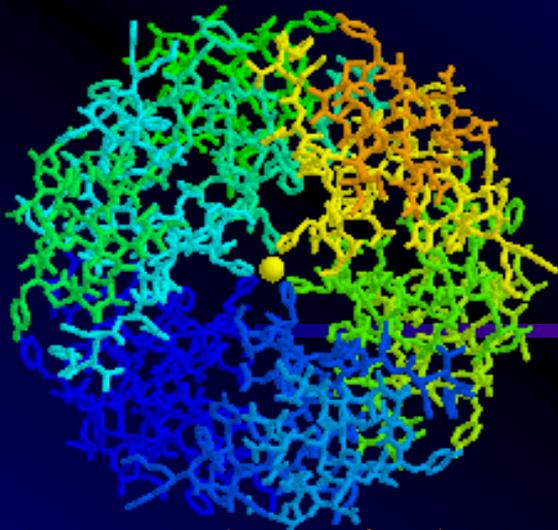


- Reminders:
 - Please activate mute until question and answer session
 - Nurses are eligible for 1.5, dietitians and others 1.0 hours with completion of the sign-in and evaluation
- New options:
 - You may now fill out the sign-in, pre-/post-tests, and evaluation on our website:
 - health.utah.gov/diabetes/ and click on the telehealth logo
 - E-mail to Betsi at bpatino@utah.gov



Utah Diabetes
Prevention & Control Program

UTAH DEPARTMENT OF HEALTH



Utah Diabetes Practice Recommendations

Diabetes Management for Adults

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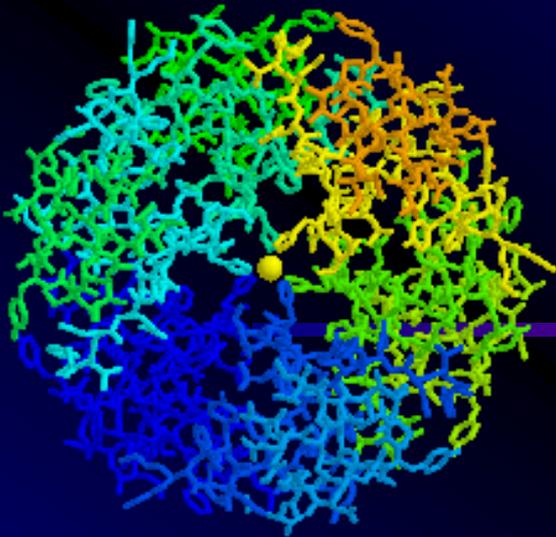
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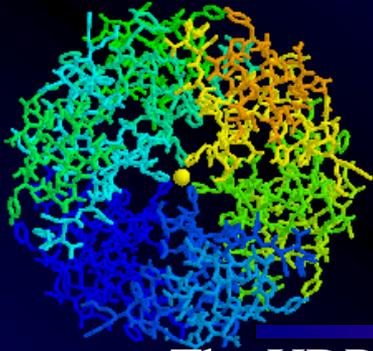
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Faculty Disclosures: No conflicts reported

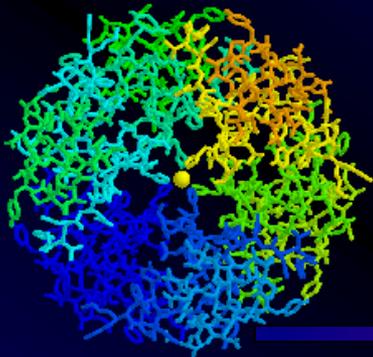


Introduction



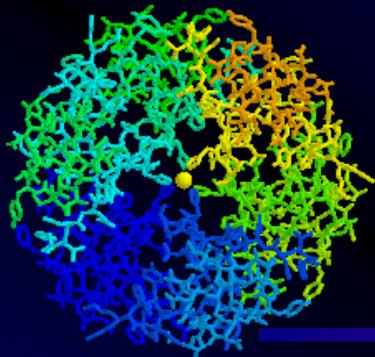
Purpose of the UDPRs

- The UDPRs were developed to provide the busy (often overwhelmed) medical provider with a single source, authoritative guideline for the management of diabetes and the conditions often encountered in a patient with diabetes
- This guideline for management of diabetes in adults addresses:
 - Appropriate therapeutic targets, frequency of assessment and other issues that may impact people with diabetes
 - Glucose
 - Blood pressure
 - Lipids
- There are other UDPRs which address:
 - Management of diabetes in children and adolescents
 - Treatment of hyperglycemia in inpatients
 - Hyperglycemia in pregnancy



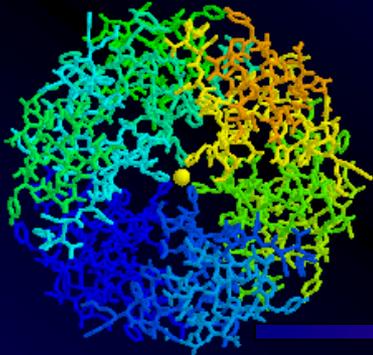
What's New -- 2011

- Diabetes screening protocol
 - Clarifies the role of A1C in diagnosis
- Cardiovascular disease
 - Addresses the controversy concerning ASA
- New insulin protocols for type 2 diabetes
- Updated medication summary
- New sections
 - Depression and vaccinations
- New tools
 - Active links, referral forms, CKD management, updated protocols for lipids, extensive references and blood pressure management



Key Treatment Targets

Measure/Test	Target	Frequency	Comment
A1C	<7.0%	Test at least semi-annually	As low as possible without significant hypoglycemia.
Blood Pressure	<130/80 mmHg	Check at each office visit	
LDL Cholesterol	<70-100 mg/dL (depending on presence of CVD)	Test at least annually	
HDL Cholesterol	Women: >50mg/dL Men: >40 mg/dL		
Triglycerides	<150 mg/dL		
Microalbumin/ Creatinine Ratio	<30 mg/g of creatinine	Test annually	If positive, repeat test one month apart. Use 2 out of 3 results.
Serum Creatinine	See comment	Annually	The serum creatinine should be used to estimate GFR, if <60 mL/min/1.73 m ² more frequent testing is required. www.kidney.org/professionals/kdoqi/gfr_calculator.cfm
Dilated Eye Exam	Normal	Annually	High risk should be tested more frequently; low risk may require less often.
Comprehensive Foot Exam	Identify level of risk	Annually	Visually inspect every visit if significant vascular disease, foot deformities, or loss of protective sensation is present, or if identified as high risk (see Appendix D).

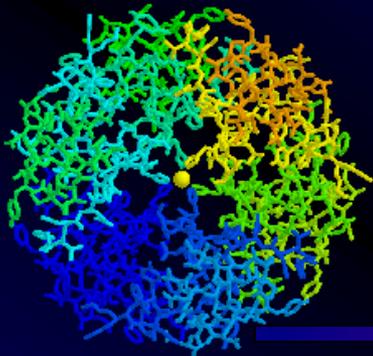


Case ver 1

You open the exam room door and find a patient you haven't seen in years. You are running late and secretly hope that this visit is routine.

John is 58 years old and wants to discuss several complaints (there goes the easy visit). John relates that he is “wearing out.” He is tired, his vision has blurred, and he is “living in the bathroom.” His sister was recently diagnosed with diabetes and suggested that he should see his doctor “just in case.”

Recorded vital signs: Wt 230 lbs; BMI 38 kg/m²; BP 146/97 mmHg; HR 88.



Case ver 1

You request a fingerstick glucose, POC A1C and dipstick UA

The results:

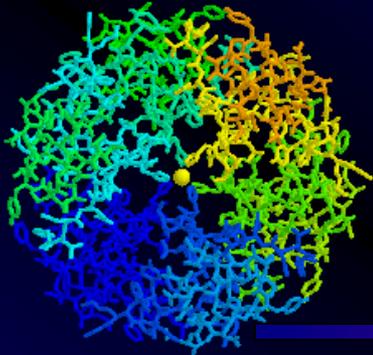
Random glucose: 355 mg/Dl

A1C: 11.4%

UA: Protein 1+; glucose 4+; ketones trace

You just got paged...

Is there an easy resource to help you?

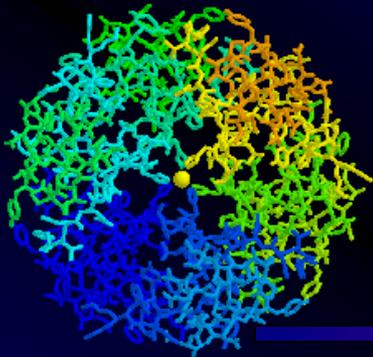


Case ver 2

You open the exam room door and find a patient you haven't seen in over a year. You are running late and secretly hope that this visit is routine.

John is 58 years old and has had diabetes and hypertension for many years. His medications include metformin, glimepiride, sitagliptin, lisinopril, and HCTZ.

He has wants to discuss several complaints (there goes the easy visit). John relates that he is “wearing out.” He is tired, his vision has blurred, and he is “living in the bathroom.”



Case ver 2

Recorded vital signs: Wt 230 lbs; BMI 38 kg/m²; BP 146/97 mmHg; HR 88.

You request a fingerstick glucose, POC A1C and dipstick UA

The results:

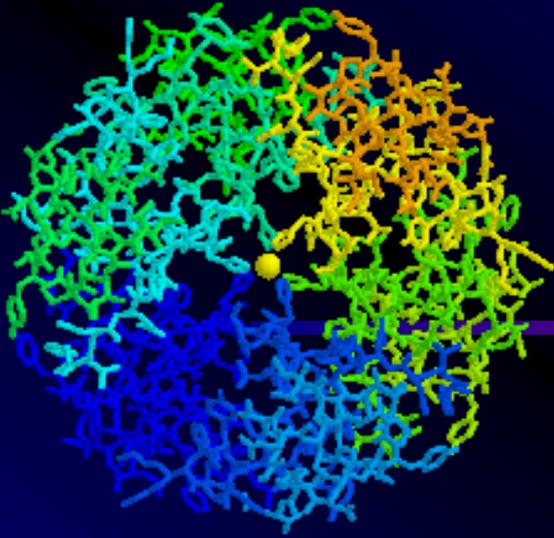
Random glucose: 355 mg/Dl

A1C: 11.4%

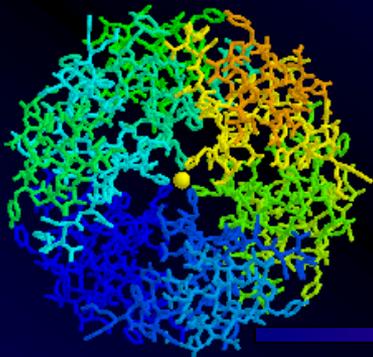
UA: Protein 1+; glucose 4+; ketones trace

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Is there an easy resource to help you?

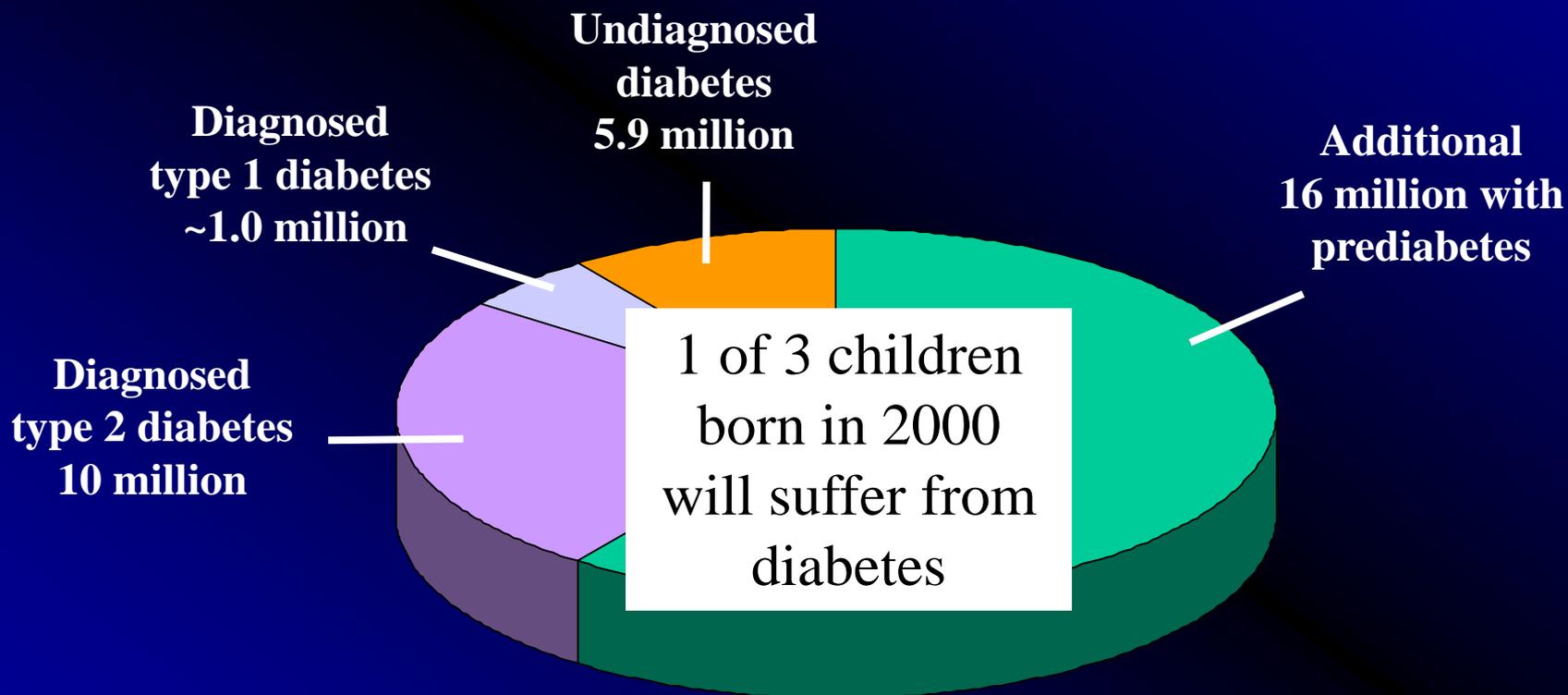


Diagnosis of Diabetes



Distribution of Glycemic Abnormalities in US

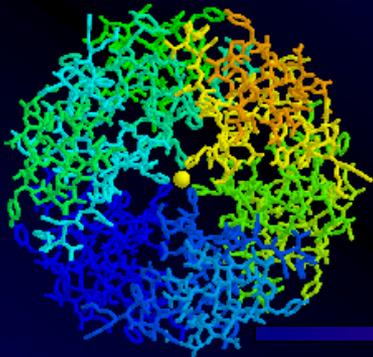
US Population: 275 million in 2000



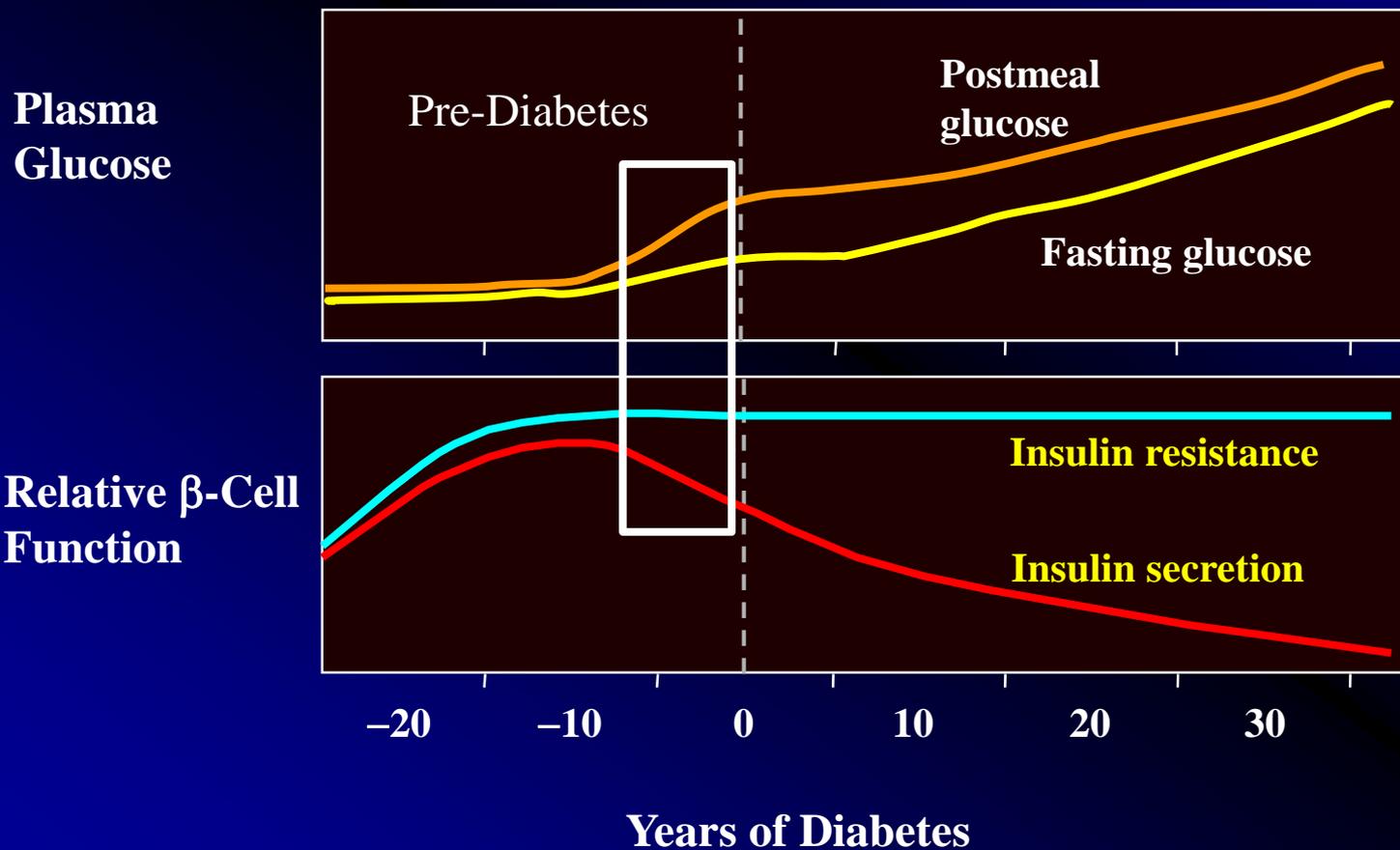
CDC. Available at: <http://www.cdc.gov/diabetes/pubs/estimates.htm>

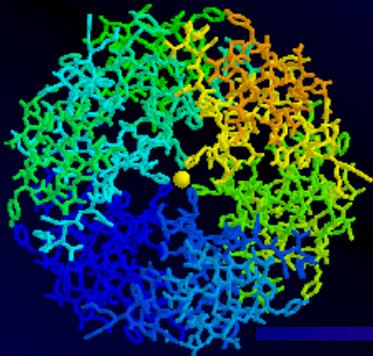
ADA. Facts and Figures. Available at:

[www.diabetes.org/main/application/commercef?origin=*.jsp&event=link\(B1\)](http://www.diabetes.org/main/application/commercef?origin=*.jsp&event=link(B1))

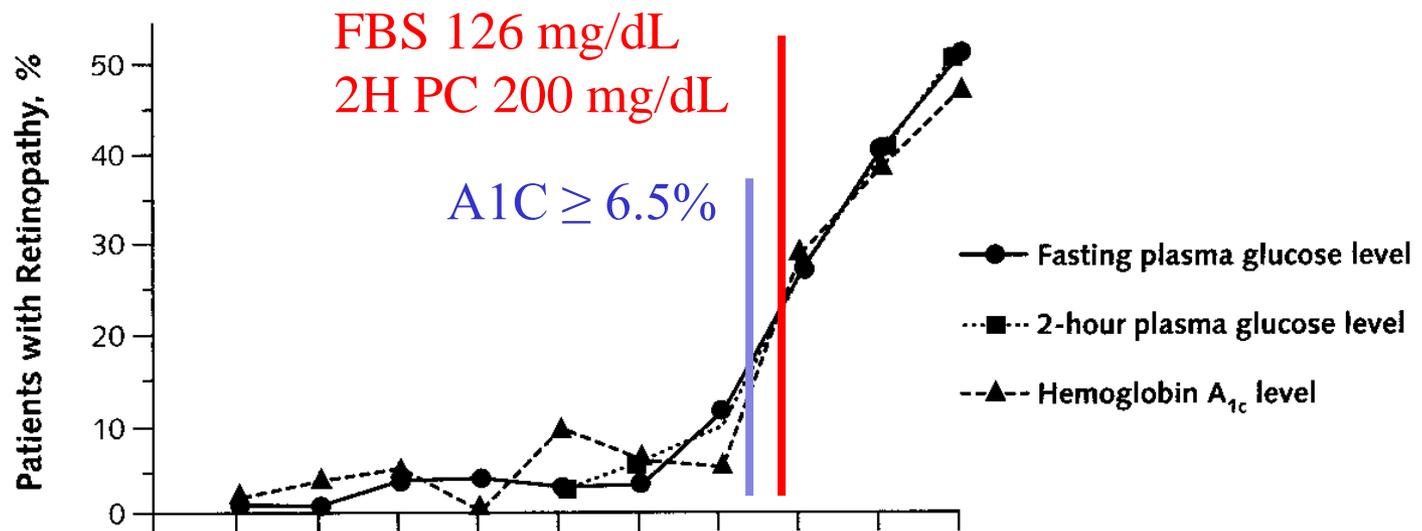


Natural History of Type 2 Diabetes



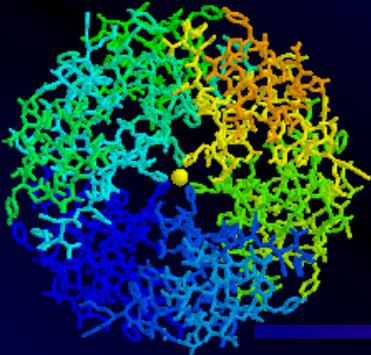


Prevalence of Retinopathy



Fasting plasma glucose level, <i>mg/dL</i>	57	79	84	89	93	99	108	130	178	258
2-hour plasma glucose level, <i>mg/dL</i>	39	80	90	99	110	125	155	218	304	386
Hemoglobin A _{1c} level, %	2.2	4.7	4.9	5.1	5.4	5.6	6.0	6.9	8.5	10.3

Diagnostic Criteria for Diabetes

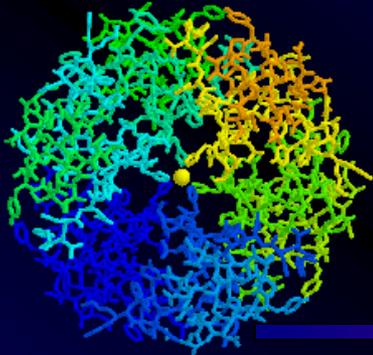


Diagnosis	FPG (mg/dl)	2 Hour Postglucose Load (75 gm OGTT)	Hemoglobin A1C (%)*
Normal	< 100	< 140	<5.7
Pre-Diabetes	100-125	140-199	5.7-6.4
Diabetes Mellitus**	≥ 126	≥ 200***	≥6.5

*Measured according to DCCT methodology

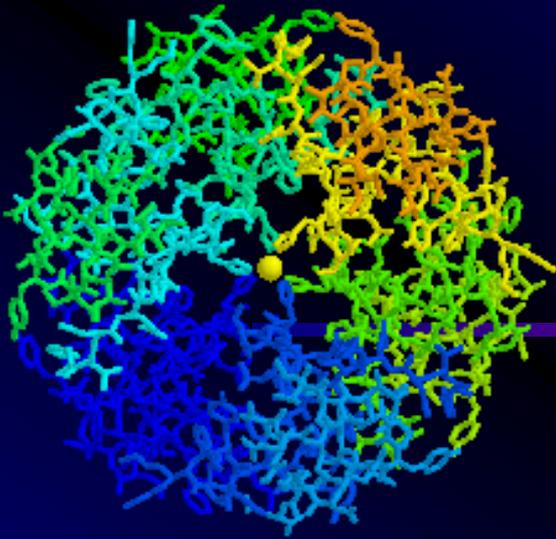
**Must be repeated on a separate day

***Or a random glucose ≥ 200 mg/dl with symptoms

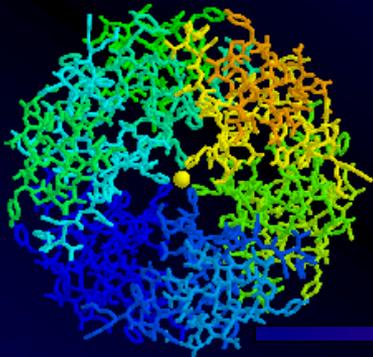


Pitfalls in the Diagnosis

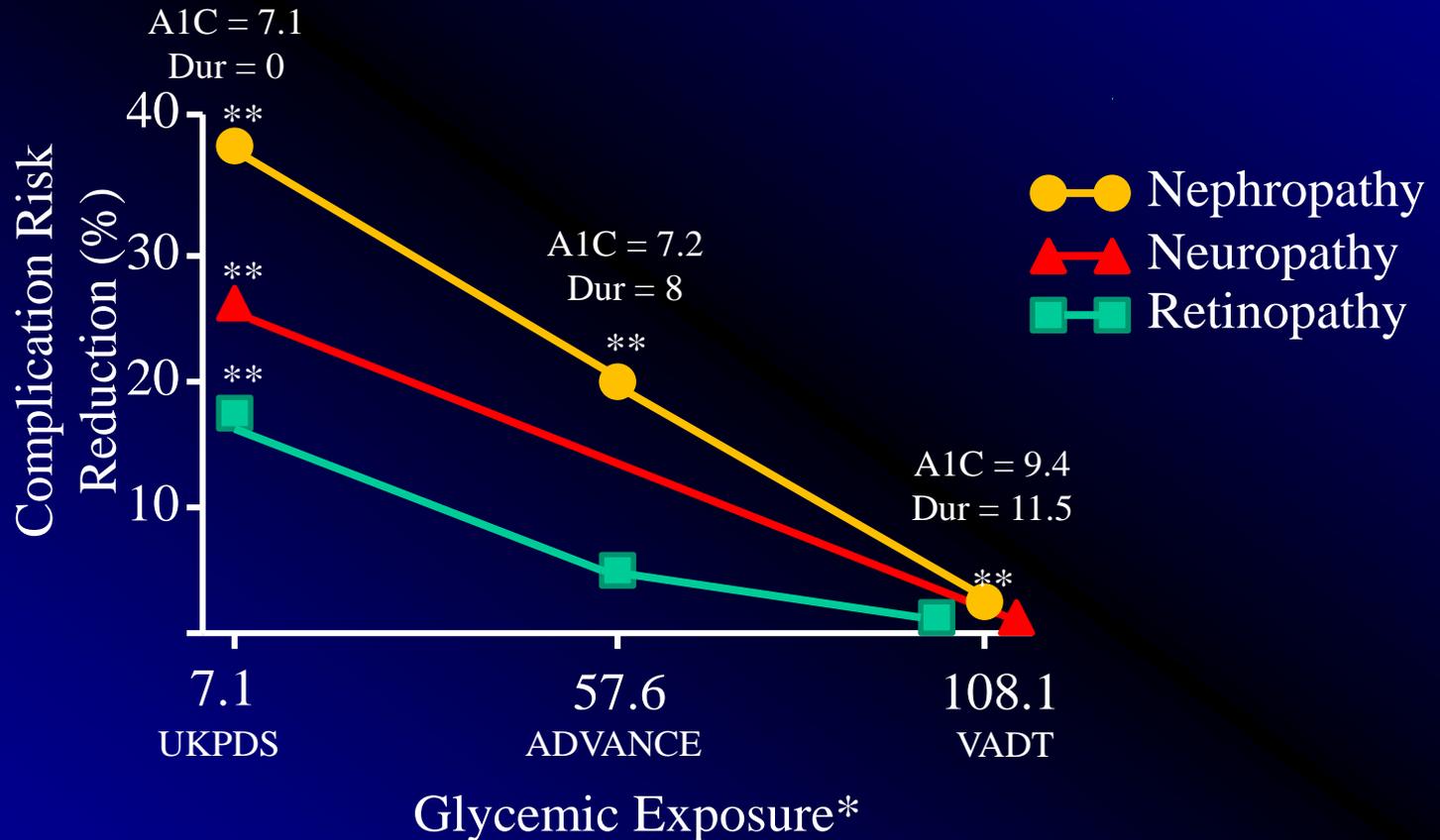
- Random glucose levels
 - Not standardized and rarely diagnostic
 - Use ICD code 790.29 (hyperglycemia) or 790.6 (abnormal chemistry) to justify repeating (DO NOT use 250.XX)
- Method of A1C measurement
- Don't rely on fingerstick determinations
- Repeat testing prior to a formal diagnosis
- Avoid prematurely labeling a patient



Glucose Control



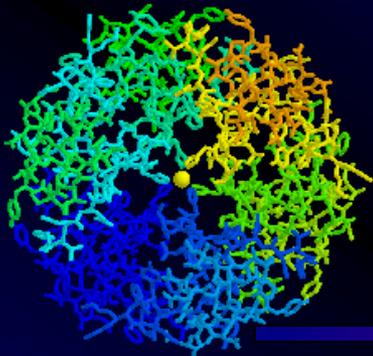
Pre-Study Glycemic Exposure and Microvascular Outcomes



*Glycemic Exposure = Duration of Diabetes x Study Entry A1C

** Statistically Significant

Wadwekar D, Jones RE. Focus: Diabetes in Women, 2011.

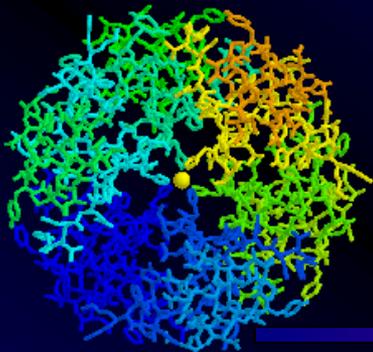


Glucose Targets

- A1C < 7.0% or lower without undue hypoglycemia
- Consider individualizing targets
- Nonglycemic effects on A1C
 - Anemia
 - Hemolysis
 - Erythropoietin
 - Transfusion
 - Pregnancy

Correlation of A1C with Estimated Average Glucose Levels [†]		
A1C (%)	Estimated Average Glucose (mg/dL) [†]	95% Confidence Intervals (mg/dL)
5	97	76-120
6	126	100-152
7	154	123-185
8	183	147-217
9	212	170-249
10	240	193-282
11	169	217-314
12	298	240-347

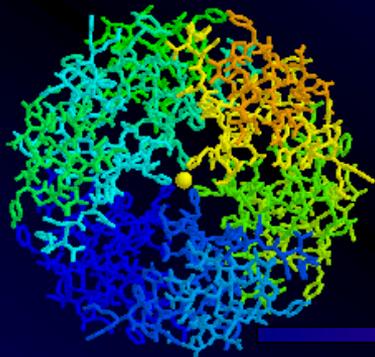
[†]Estimated Average Glucose = 28.7 x A1C – 46.7
1. Nathan DM et al. *Diabetes Care* 2008;31:1473-1478.



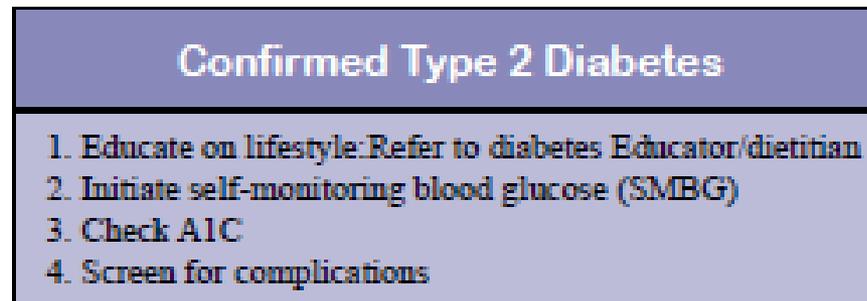
VA/DoD Guidelines

Major Comorbidity ^(d) or Physiologic Age	Microvascular Complications		
	Absent or Mild ^(a)	Moderate ^(b)	Advanced ^(c)
Absent >10 years of life expectancy	<7%	<8%	8-9% *
Present ^(e) 5 to 10 years of life expectancy	<8 %	<8%	8-9% *
Marked ^(f) <5 years of life expectancy	8-9% *	8-9% *	8-9% *

(d) Major comorbidity includes, but is not limited to, any or several of the following active conditions: significant cardiovascular disease, severe chronic kidney disease, severe chronic obstructive pulmonary disease, severe chronic liver disease, recent stroke, and life-threatening malignancy.

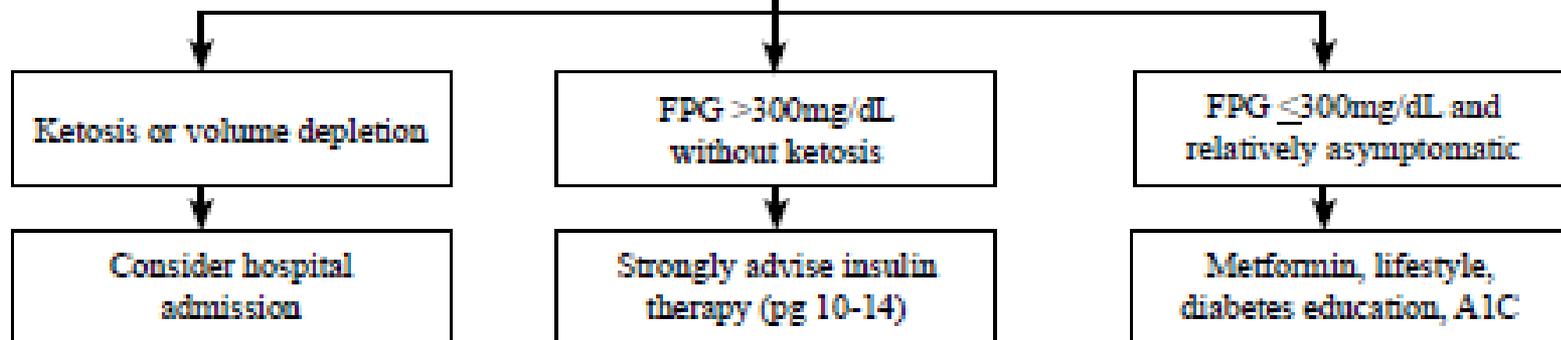


Initial Therapy

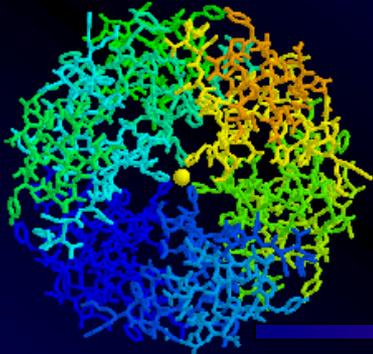


Note: Optimal control means A1C <7.0%; FPG 70-130 mg/dL.
If FPG is normal, but A1C is high, consider postprandial glucose (PPG) monitoring.

Initial Management



UDPRs Glycemic Algorithm



Diagnosis; initiate lifestyle modifications (education) and start metformin

Individually Assess Patient Characteristics

- Patient's Goals
- Fasting v Postprandial Target (A1C)
- Weight Effects
- Cost
- Relative Efficacy
- Age
- Cardiac, Renal and Hepatic Function

Possible weight increase
lowering (>1%), Principally

(or neutral), Lesser
Principally reduce PPG

Basal insulin
(most effective)

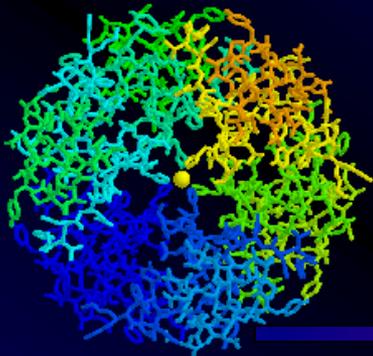
Incretomimetics
(most weight loss)

Sulfonylureas
(least expensive)

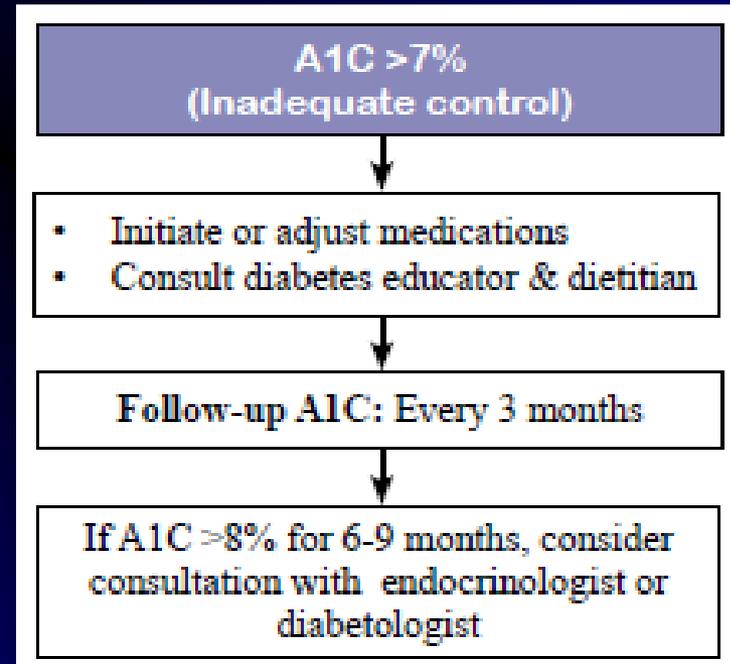
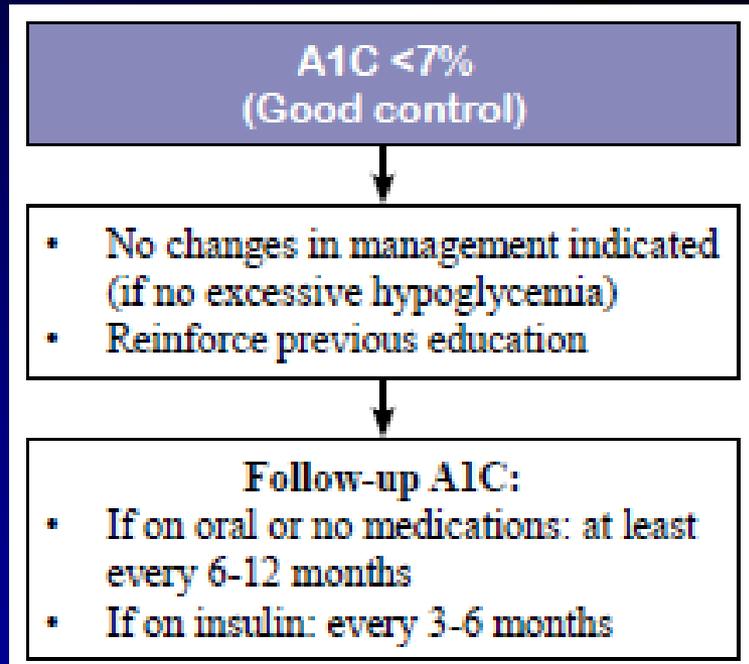
DPP-IV inhibitors
(least effective)

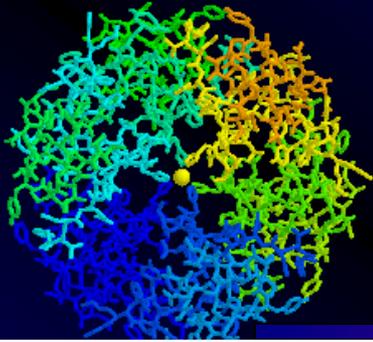
TZDs
(no hypoglycemia)

Not included:
Amylomimetics;
Meglitinides; AGIs



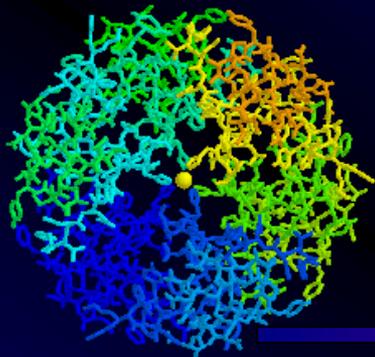
Using A1C Levels





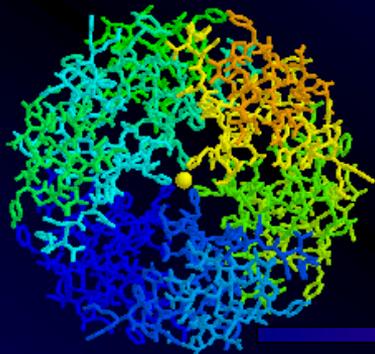
Effectiveness of Different Therapeutic Strategies

Intervention	Expected Decrease in A1C (%)	Advantages	Disadvantages
Tier 1: Well-Validated Core			
Step 1: Initial therapy			
Lifestyle changes to decrease weight and increase activity	1–2	Broad benefits	Insufficient for most in first year
Metformin	1–2	Weight neutral	Gastrointestinal side effects, contraindicated with renal insufficiency
Step 2: Additional therapy			
Insulin	1.5–3.5	No dose limit, rapidly effective, improved lipid profile	1–4 injections daily, monitoring, weight gain, hypoglycemia, high cost of analog insulin products
Sulfonylurea	1–2	Rapidly effective	Weight gain, hypoglycemia (especially with glibenclamide or chlorpropamide)
Tier 2: Less Well Validated			
Thiazolidinedione	0.5–1.4	Improved lipid profile and potential decrease in myocardial infarction (with pioglitazone)	Fluid retention, congestive heart failure, weight gain, bone fractures, high cost, potential increase in myocardial infarction (with rosiglitazone)
GLP-1 agonist	0.5–1.0	Weight loss	Two injections daily, frequent gastrointestinal side effects, long-term safety not established, high cost



Hypoglycemic Agents

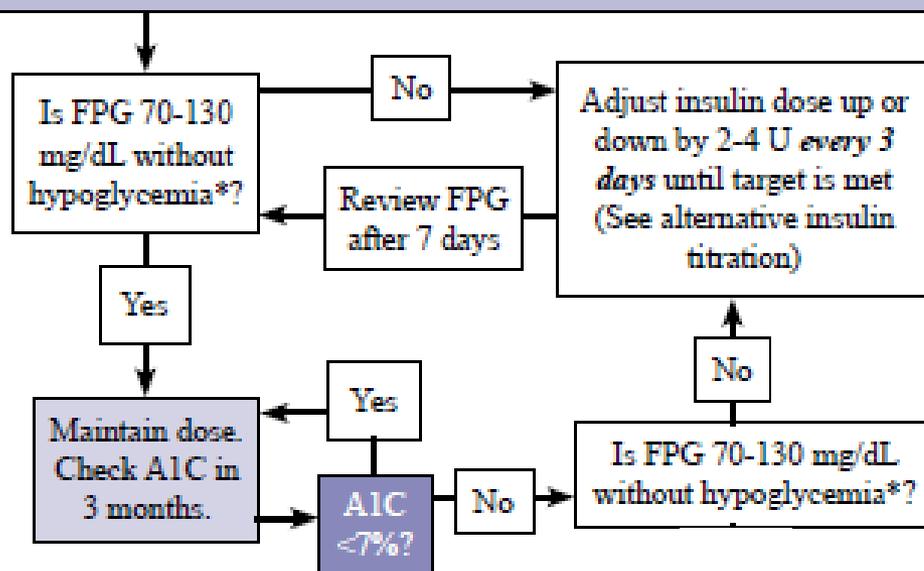
Medication Class	Expected A1C Lowering (%) ^{1,2}	Comments
Biguanides (metformin)	1.5	Contraindicated in renal, cardiac, and respiratory failure. Unless contraindications or side effects develop, metformin should be continued through pharmacological escalation
Sulfonylureas	1.5	Hypoglycemia, weight gain
Thiazolidinediones (pioglitazone)	0.8-1.0	Weight gain, edema, CHF (especially with insulin); There may be an increase in myocardial infarction with use of Rosiglitazone.
DPP-IV Inhibitors	0.5-0.9	Initially reduce sulfonylurea dose by 50%; do not use with GLP-1 analogs
GLP-1 Analogs	0.6	Generally associated with weight loss; not FDA approved for use with insulin although this combination is effective
Insulin	≥2.5	Most effective; hypoglycemia, weight gain

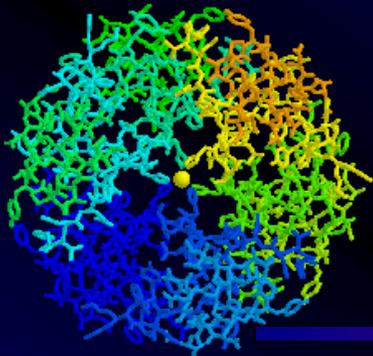


Initiating a Basal Insulin

Patient Requires Basal Insulin Therapy

- Optimize oral doses (metformin may be optimized up to 2000 mg/day in certain patients)
- Insulin starting dose: 10-15U or 0.2 U/kg of detemir (HS), glargine (AM, PM, or HS), or NPH (HS)
- Teach injection technique and *self-management for hypoglycemia* (refer to diabetes educator for insulin start)
- Have patient report FPG after 2-3 days

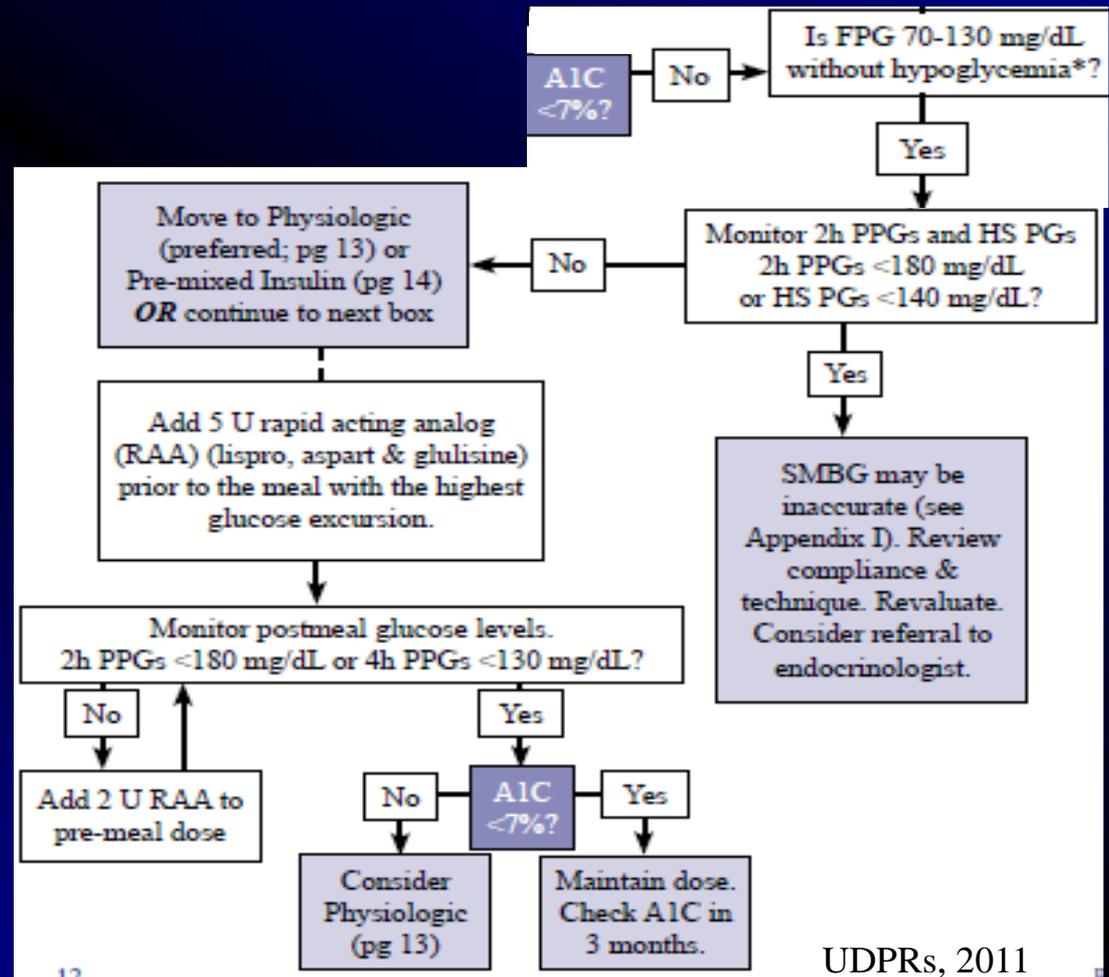


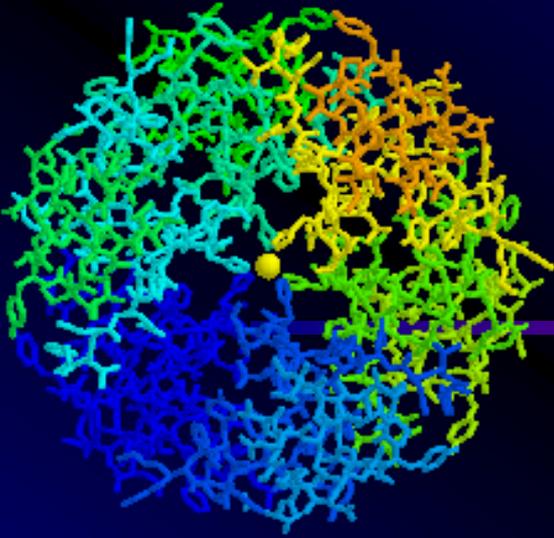


Adding a Prandial Insulin

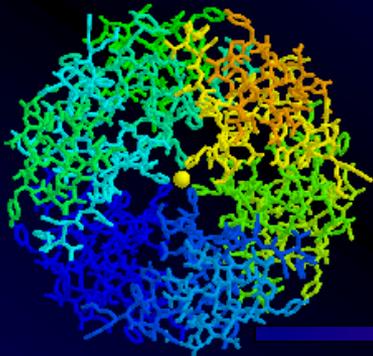
- Role of Premix

- Premixed insulins provide both a basal and prandial insulin in a fixed combination
- Premix regimens do not encourage meal flexibility and are associated with more weight gain and hypoglycemia
- Easier and requires less patient involvement





Reducing Cardiovascular Risk

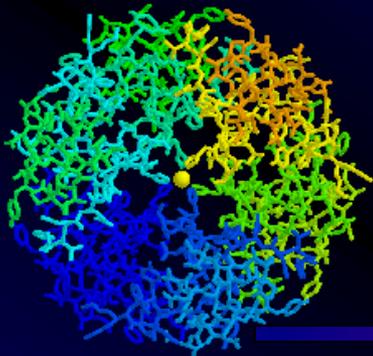


Case ver 1

John has aggressively adopted lifestyle modifications and has been adherent with his medications. His A1C is 6.3%, blood pressure is 126/78 mmHg, and his lipid profile has improved. His sister just had an MI and he is frightened.

Circumstance	Total Cholesterol (mg/dL)	Triglycerides (mg/dL)	HDL Cholesterol (mg/dL)	LDL Cholesterol (mg/dL)
At diagnosis of diabetes	230	568	32	?
Current	203	220	38	121

John is prescribed a statin but develops fatigue, weakness and myalgias. What next and are there other measures to reduce the risk of CHD? Should he be screened for CHD?

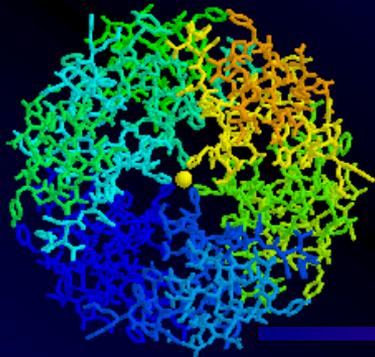


Case ver 2

John has aggressively adopted lifestyle modifications and has been adherent with his medications. His A1C is 7.3%, blood pressure is 126/78 mmHg, and his lipid profile has improved. His sister just had an MI and he is frightened.

Circumstance	Total Cholesterol (mg/dL)	Triglycerides (mg/dL)	HDL Cholesterol (mg/dL)	LDL Cholesterol (mg/dL)
6 months ago	230	568	32	?
Current	203	220	38	121

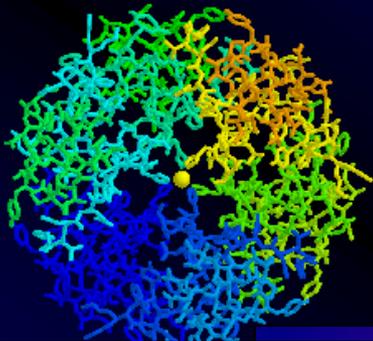
John is prescribed a statin but develops fatigue, weakness and myalgias. What next and are there other measures to reduce the risk of CHD? Should he be screened for CHD?



Multifactorial Interventions

Table: Interventions to Reduce Cardiovascular Risk in Diabetes

	Relative Risk Reduction
Statins	$\geq 20\%$
Antihypertensive therapy	$\geq 20\%$
Glycemic control	10-15%
Aspirin:	
2° prevention	20%
1° prevention	Approximately 10%
Smoking cessation	7-47%
ACE-inhibitors/ARBs	Unknown
Beta-blockers:	
Post-MI, 1 st 2y	30%
Stable coronary heart disease	Unknown



Aspirin Use

Aspirin is *reasonable* if:

- $>10\%$ 10-year CVD risk*
or for
- Most men age > 50 years and women age > 60 years who have one or more of the following risk factors:
 - Smoking
 - Hypertension
 - Albuminuria
 - Dyslipidemia
 - Family history of premature CVD

Aspirin may be *considered* if:

- 5-10% 10-year CVD risk*,
or for
- Men age > 50 years or woman age > 60 years with no risk factors
or for
- Men age ≤ 50 years or women age ≤ 60 years with \geq one of the risk factors noted above

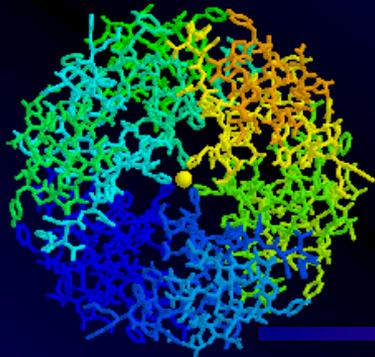
Aspirin is *not* recommended for adults with:

- $<5\%$ 10-year CVD risk*
or for
- Men age < 50 years and women age < 60 years who have none of the above risk factors

ASA Dosage
Recommendation:
75-162 mg/day

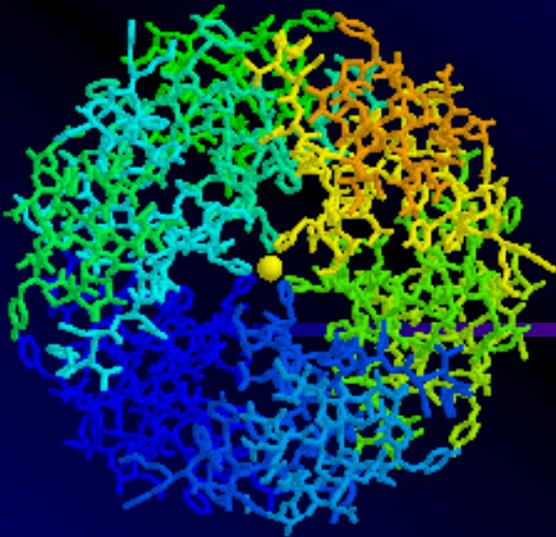
*10 year CVD risk may be calculated at:

http://zunis.org/FHS_CVD_Risk_Calc_2008.htm

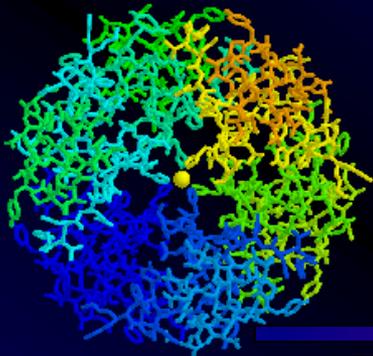


Screening for CHD

- There is little evidence that screening for CHD in asymptomatic patients with diabetes has any positive effect on outcomes
- Patients with atypical (or typical) symptoms or an abnormal ECG should be screened
 - Stress echo is cost effective
 - Cardiology referral
- Aggressively treat CV risk factors and reassess them at least annually



Hypertension

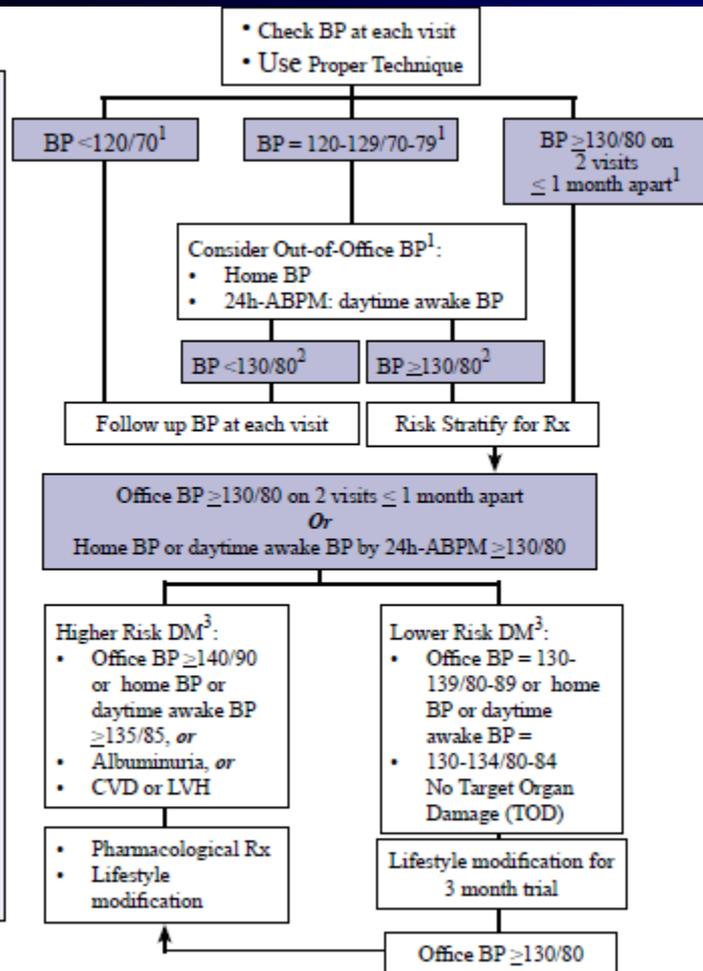


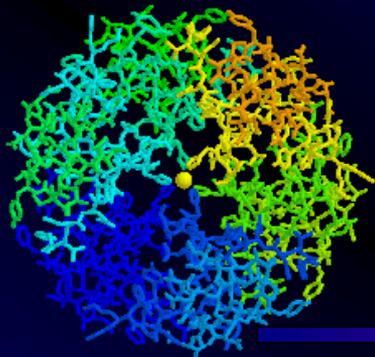
Diagnosing Hypertension

A Note on Proper Technique

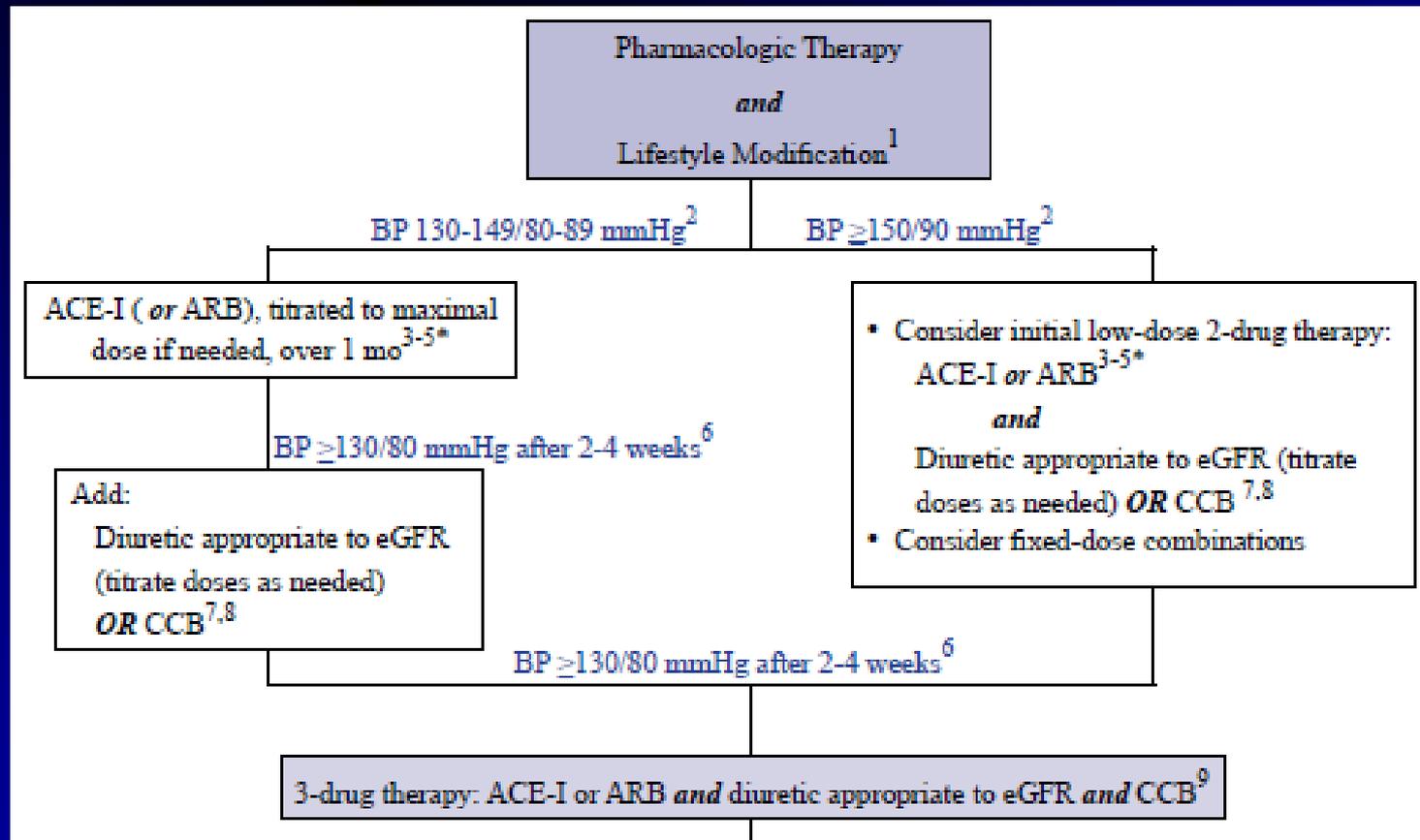
Most errors in BP measurement technique falsely elevate BP. Use of proper technique may lower BP by 10/5 mmHg:

1. Rest 5 minutes, seated, back supported, feet flat on the floor
2. No conversation
3. Correct cuff size (based on cuff bladder): 50% of adults require a large adult cuff
4. Cuff placed at mid-sternal level with the bladder center over the brachial artery
5. Deflate the cuff $\leq 2-3$ mmHg/sec
6. If the first measured BP is $\geq 130/80$ mmHg, repeat it twice at 1 minute intervals; ignore the first reading, which tends to be falsely high, and average the last two readings to better approximate usual BP.
7. Measure standing BP to detect orthostatic hypotension that may limit therapy.

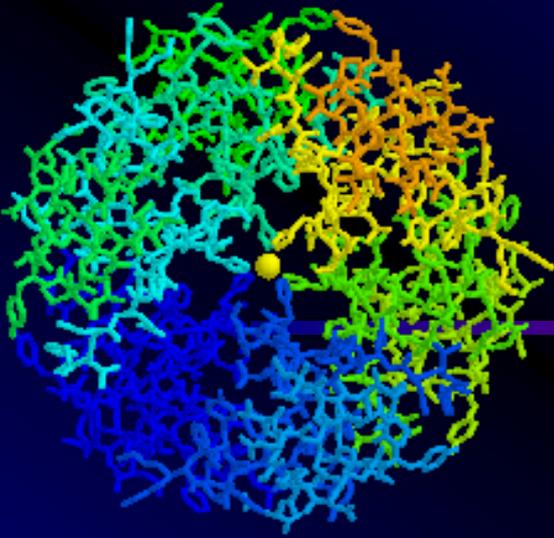




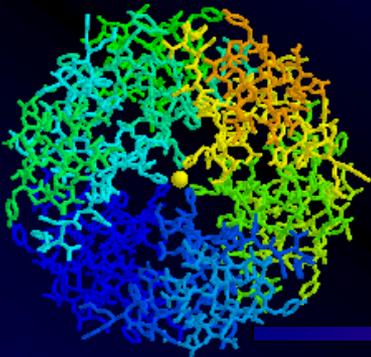
Treating Hypertension



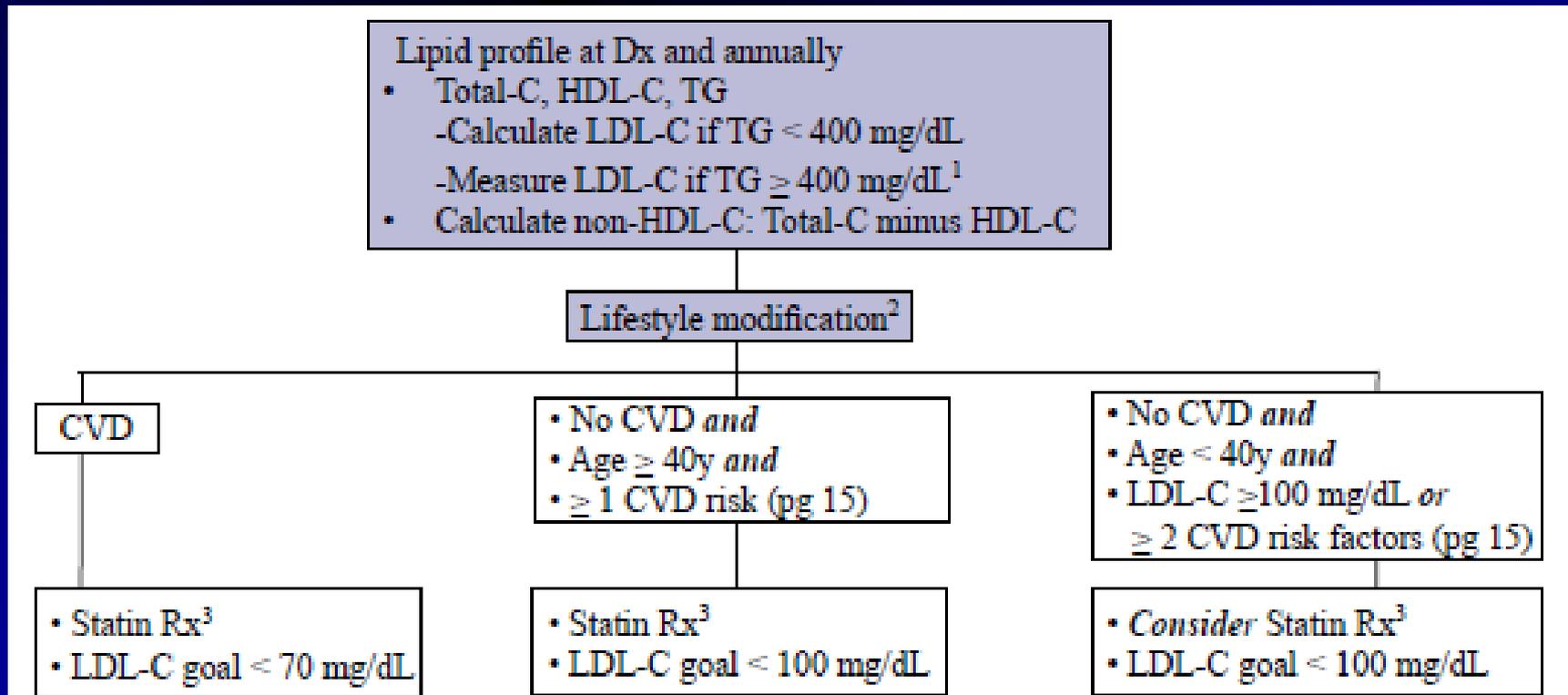
Algorithm Continues



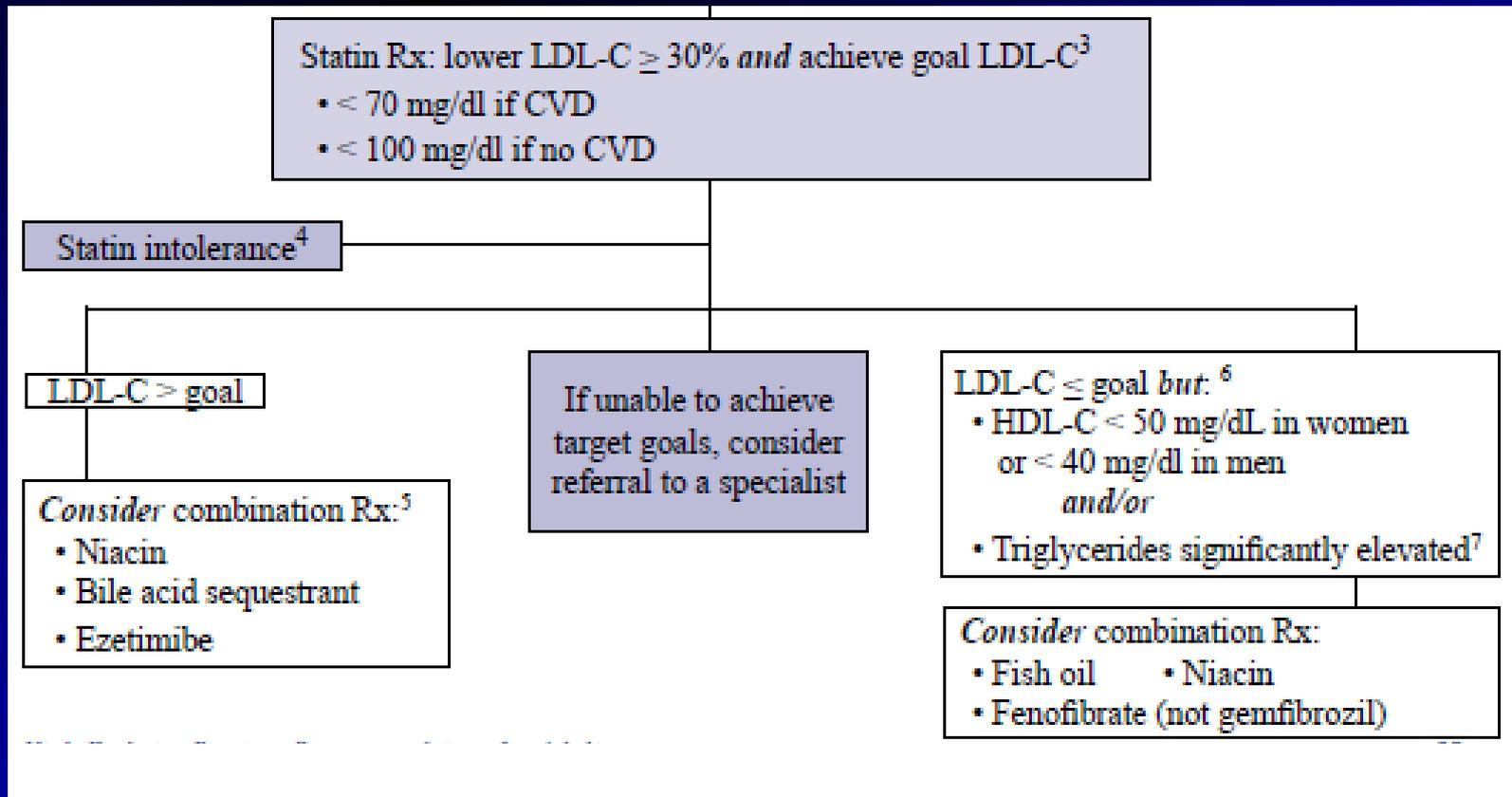
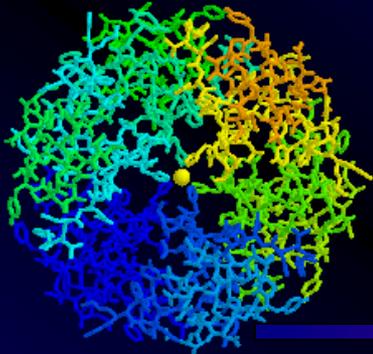
Diabetic Dyslipidemia

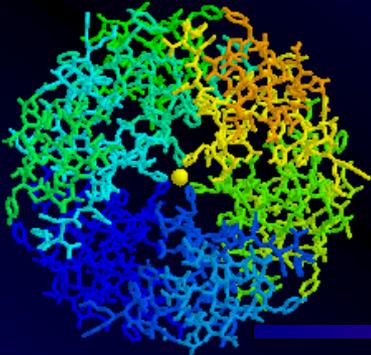


Managing Lipids: Who To Treat



Managing Lipids: Therapies

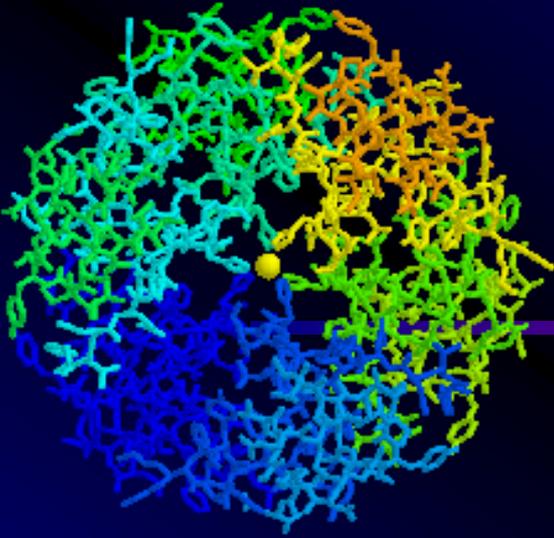




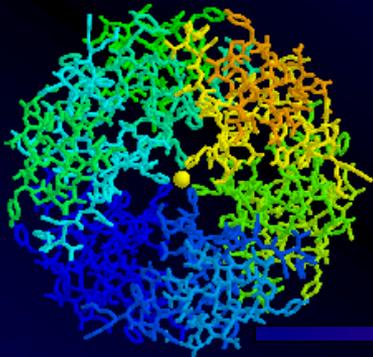
Managing Lipids: Statin Intolerance

- Statin intolerance may occur in up to 5-10% of patients
- Options:
 - Trial of a different statin (fluvastatin, pravastatin, rosuvastatin)*
 - Rosuvastatin 1-3 times per week*
 - Gemfibrozil (not fenofibrate) especially if triglycerides are elevated, HDL is low and LDL is minimally increased
 - Niacin often in combination with bile acid sequestrants*
 - Ezetimibe (no outcomes data)

*These regimens may lower LDL 20-30%

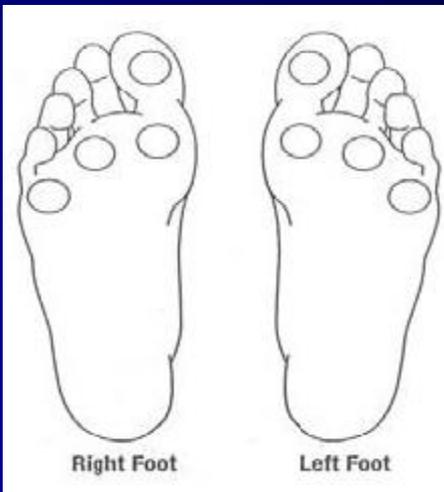


Assessing Complications



Foot Examination

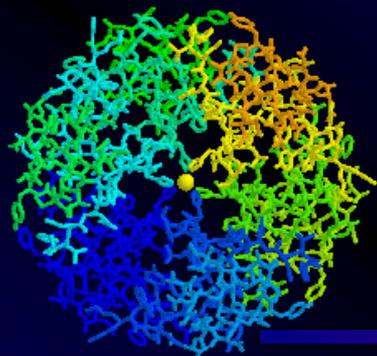
- Visual inspection
 - Deformities, pressure points, ulceration
- Vascular assessment
- Neurologic evaluation
 - Protective sensation
 - Monofilament
 - 128C tuning fork



Detect LOPS: Vibration Sense

1. Patient closes eyes
2. Apply 128Hz TF to wrist
3. Ask pt to distinguish vibration from pressure so pt knows what to expect
4. Apply TF perpendicularly to dorsum of great toe proximal to nail bed
5. Apply TF 3 times to each great toe: 2 times with vibration, one time with pressure
6. Ask the pt: "Pressure or vibration?"
7. Sensate: Correctly identifies $\geq 2/3$ applications

Diabetes Metab Res Rev 2008; 24 (Suppl 1): S181



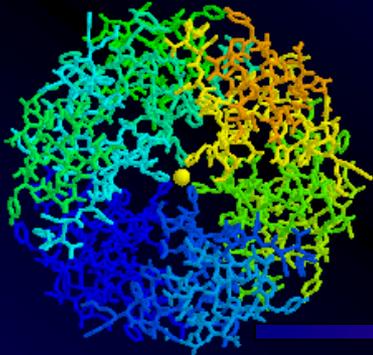
Foot Care: Risk Stratification

Table 1: Foot Ulcer Risk Management

Risk Level	Definition	% Ulcer/y	Education	Visual Inspection	Podiatry
3	Prior amputation or ulcer	20-30 %	DM educator Test knowledge	q visit	q 1-2 mo Insoles ± shoe gear; Vasc Surg if PAD
2	PAD ± LOPS	6%	DM educator Test knowledge	q visit	q 2-3 mo Insoles ± shoe gear; Vasc Surg if PAD
1	LOPS ± Deformity	4%	Enhanced pt education Footwear advice	q visit	q 3-6 mo Insoles ± shoe gear
0	No LOPS, PAD, or deformity	<2%	Basic patient education	annual exam*	Not needed

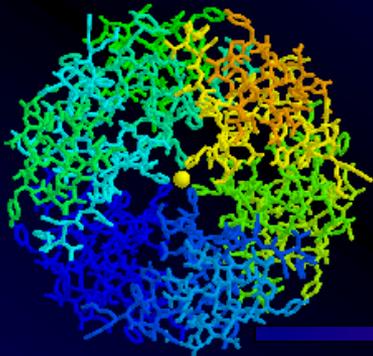
Diabetes Care: 2008 31:1679

*see appendix D



Microalbumin Screening

- Screen yearly
 - Microalbumin/creatinine ratio and serum creatinine
- False positives
 - UTI, hyperglycemia, exercise, hypertension, fever
- When to treat
 - Screening tests are positive (ratio > 30) on 2 or more occasions
 - eGFR < 60 mg/min/1.73 m²
 - ACE-I vs ARB
- Caution: women of reproductive age



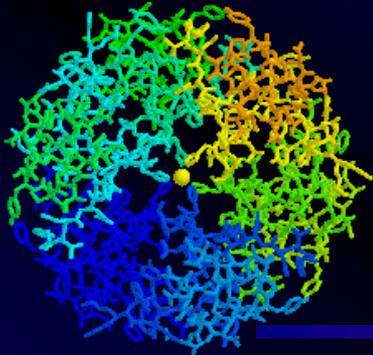
Retinopathy

Recommended Eye Examination Schedule for Type 1 and Type 2 Diabetes

Type of Patient	Minimum Routine Follow-up
<p>Type 1 patients (adults and children 10 years old and older) should have a dilated eye exam by an optometrist or ophthalmologist within five years after diagnosis. (Some evidence suggests that microvascular complications may develop before age 10 among those diagnosed as infants and toddlers.)</p> <p>Type 2 patients should have a dilated eye exam shortly following diagnosis of diabetes.</p>	<p>Annually for most patients with non-proliferative diabetic retinopathy (NPDR) or microaneurysms</p> <p>Biennially for patients in good control, prior normal exam and with advice of an eye care professional</p> <p>More frequent examination is required if NPDR is progressing</p>
<p>Pregnancy: Women should have a dilated eye exam when planning pregnancy if possible, and also during the first trimester. (Does not apply to women with gestational diabetes since they are not at increased risk for diabetic retinopathy.)</p>	<p>First trimester, with continued close follow-up and for one year postpartum. Patients with diabetes who become pregnant may experience accelerated diabetic retinopathy and should be monitored closely by an ophthalmologist.</p>
<p>Patients with any type of macular edema, severe non-proliferative diabetic retinopathy (NPDR) or any proliferative diabetic retinopathy (PDR)</p>	<p>Refer promptly to an ophthalmologist experienced in the treatment of diabetic retinopathy.*</p>
<p>Patients with vision loss from diabetes should be encouraged to pursue visual rehabilitation.</p>	<p>Refer to an ophthalmologist or an optometrist who is trained or experienced in low-vision care.</p>

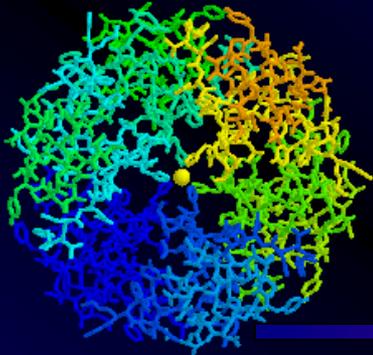
*Do not delay referral to an ophthalmologist until PDR develops. Early referral is very important for patients with type 2 diabetes and severe NPDR, since laser photocoagulation at this stage is associated with a 50% reduction in risk of severe visual loss and vitrectomy.

Source: ADA Clinical Practice Recommendations, *Diabetes Care* 2011;34 (Suppl 1).



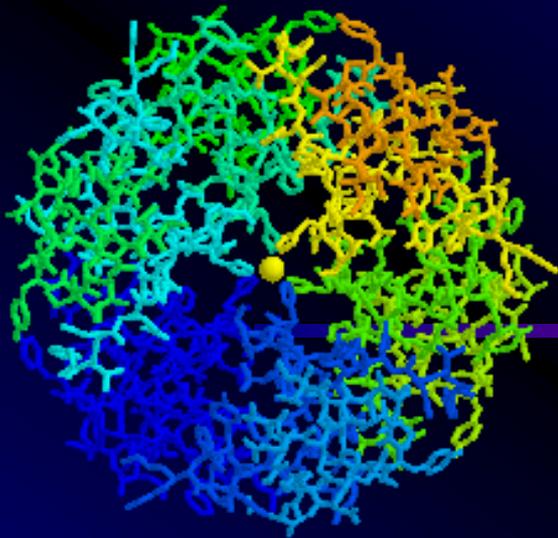
Diabetes and Depression

- Prevalence 8-27% in people with diabetes
- Twice as common in people with DM as in the general population
- Undiagnosed depression leads to:
 - Poorer glycemic control
 - Less adherence to medications and SMPG
 - More missed appointments
 - 2 times risk of foot ulcer
 - Increased resource utilization

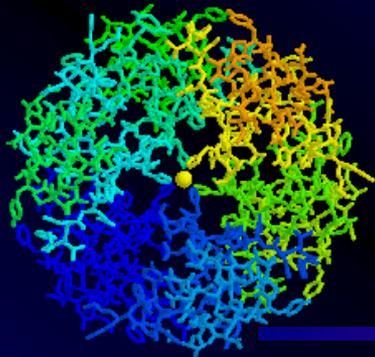


Screening for Depression

- PHQ-9 screening tool has been validated in people with diabetes
- Simple screening questions:
 - “Over the past 2 weeks have you felt down, depressed or hopeless?”
 - “Over the past 2 weeks have you felt little pleasure or interest in doing things?”
- Appropriate therapy may help improve glycemic control and quality of life



Appendices



UDPR Appendices

- Comprehensive foot examination form
- Foot care information for patients
- Medication summaries
- CKD management
- Referral form for eye examination
- Tobacco quit line information
- Healthy eating tips for patients
- Glucose monitoring
- State certified self management programs, topics covered and when to refer patients
- Vaccination guidelines
- Diabetes and depression

