

# How Sweet It Is: Caring for Diabetics Nearing the End of Life

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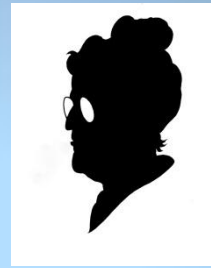
Attending staff, Henry Ford Hospital Palliative Medicine Service

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Palliative Care Collaborative:  
Eighth Annual Regional Conference  
Dearborn, Michigan

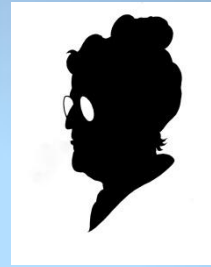
- I have no financial or other conflicts of interest related to this presentation. Any mention of off-label use of drugs will be clearly mentioned as such.

# Lisa Z.



- 80 year old lady with breast cancer metastatic to her brain, bones, lungs, and liver. Eating 50 % of her meals. PPS 50 %. Mild confusion.
- Pain 10/10 worst in her mid back and chest wall accentuated by movements.
- Medications: Morphine ER 30 mg po q 12 hours, Morphine 20 mg/ml. 10 mg po q 2 hours PRN, Senna 8.6 mg po BID, Glipizide 10 mg po AC breakfast
- Her husband is her caregiver.

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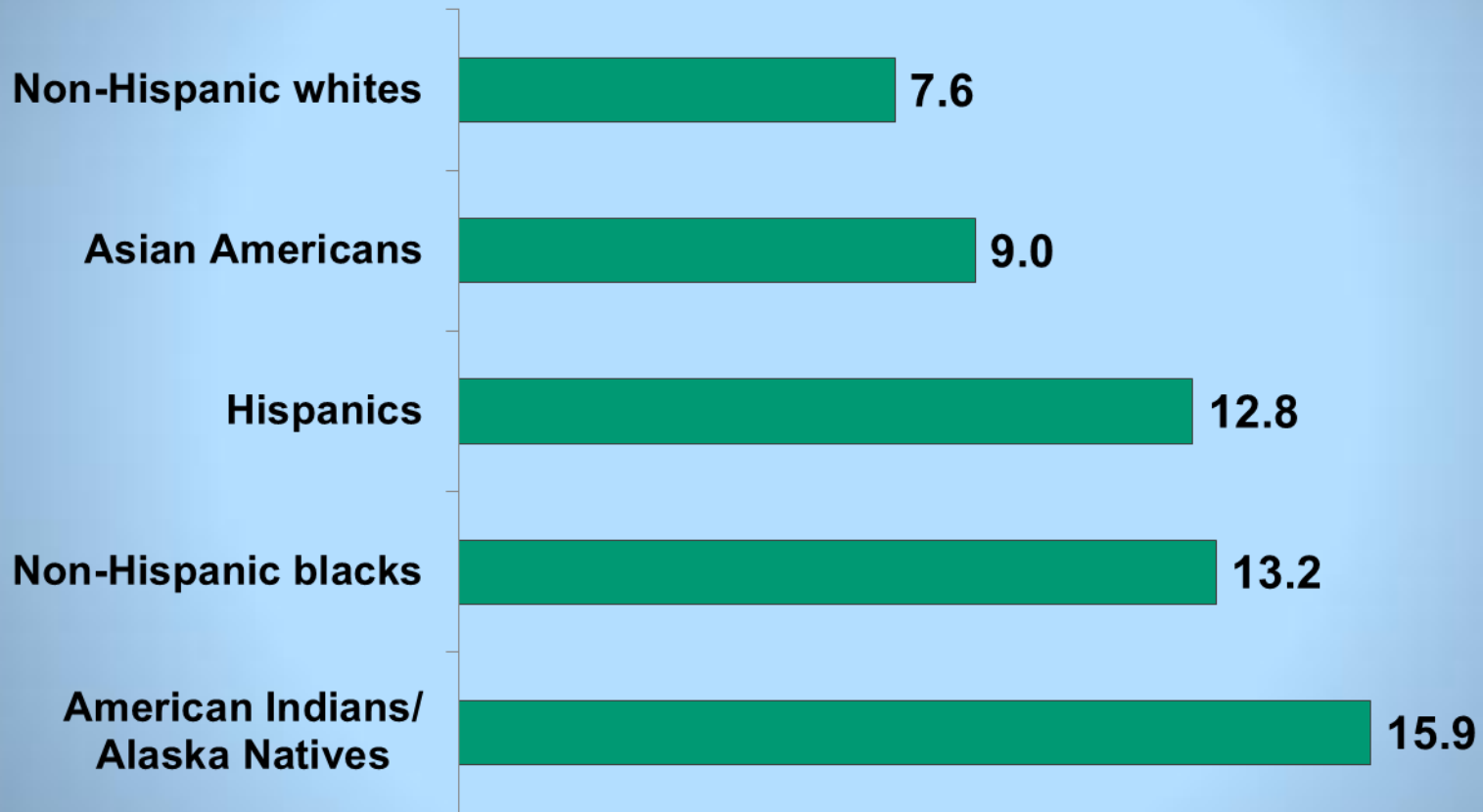


- You are asked to see her in Palliative consultation.
  - What would be a good RX to help her pain?
  - What are your feelings as you start this?
  - How do we treat her diabetes?

# Diabetes prevalence, United States 2012

- 9.3 % of the entire population
  - 0.25 % age under 20
    - 81 % of those type 1
    - 19 % of those type 2
  - 12.3 % age 20 and above
  - 25.9 % age 65 and over

# Age-adjusted\* percentage of people aged 20 years or older with diagnosed diabetes, by race/ethnicity, United States, 2010–2012



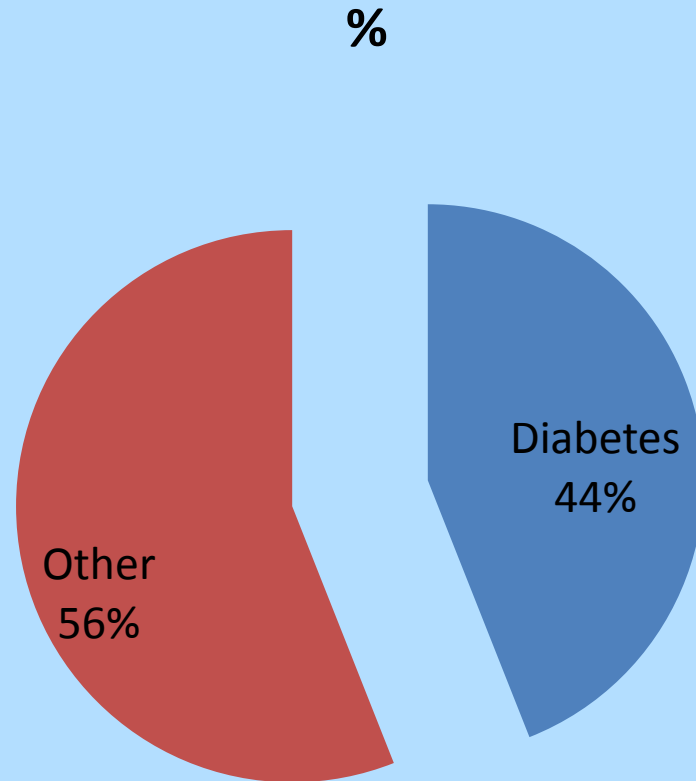
\*Based on the 2000 U.S. standard population.

Source: 2010–2012 National Health Interview Survey and 2012 Indian Health Service’s National Patient Information Reporting System.

# Diabetic complications

- Heart disease
  - Noted on 68 % of diabetics > 65 death certificates
- Stroke
  - Noted on 16 % of diabetics > 65 death certificates
- Amputations
  - More than 60 % of non traumatic limb amputations
- Kidney disease
- Blindness / visual impairment

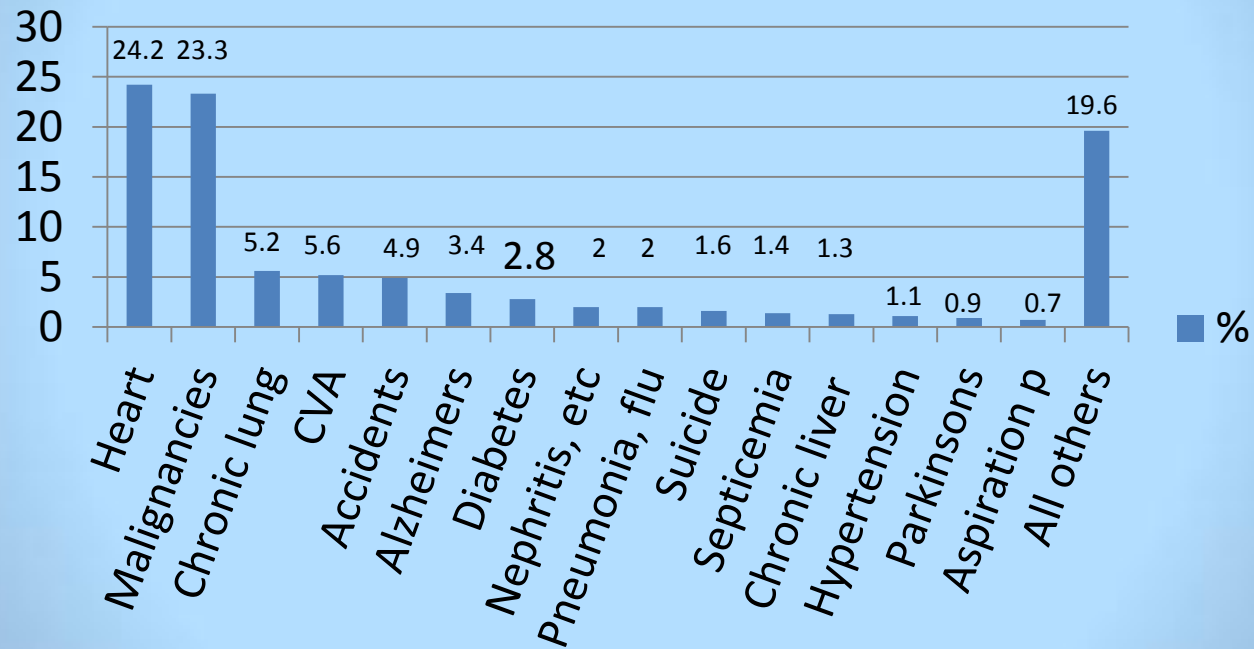
# Incidence of ESRD in US 2006



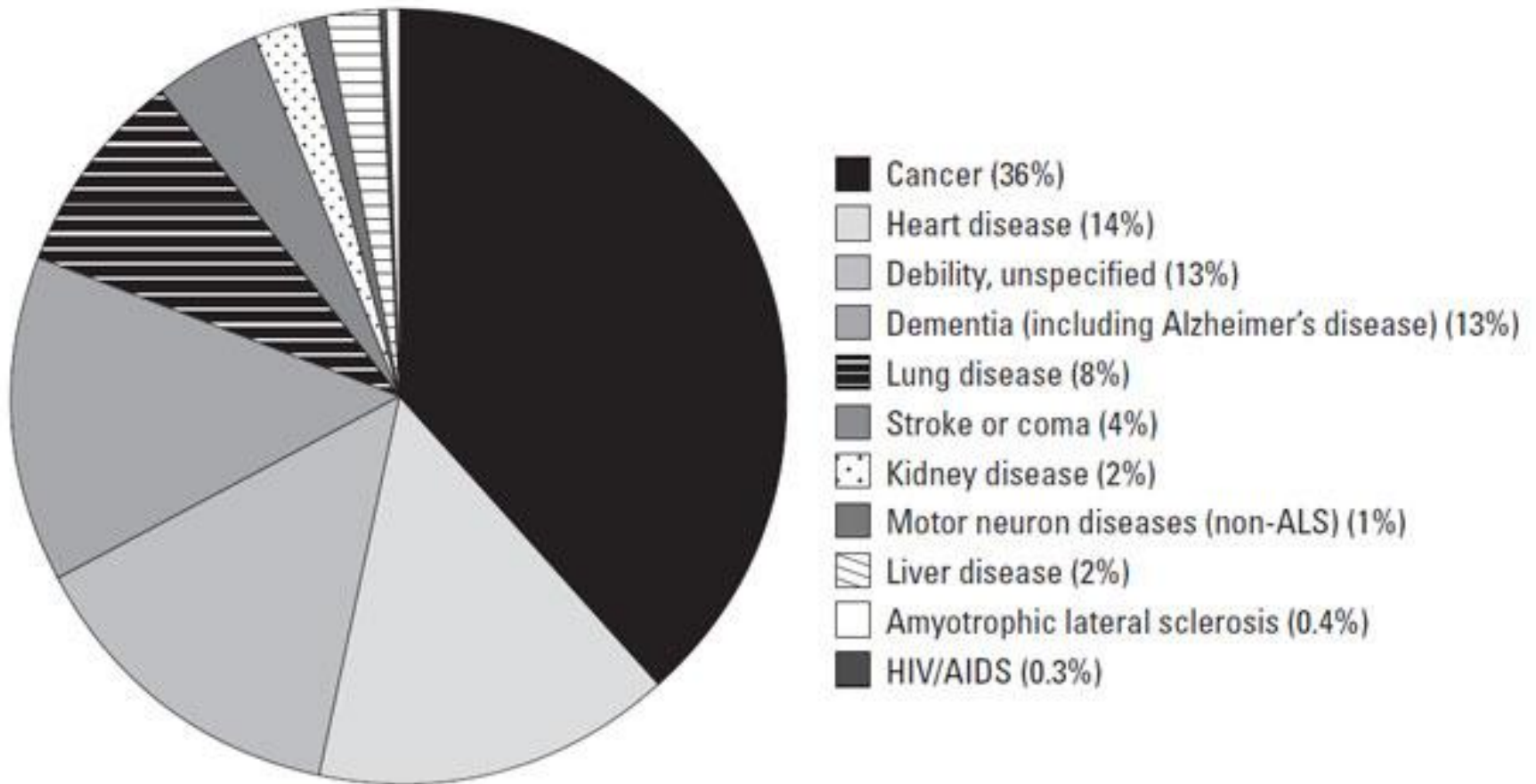
Burrows NR, Li Y, Geiss LS. Incidence of Treatment for End-Stage Renal Disease Among Individuals With Diabetes in the U.S. Continues to Decline. *Diabetes Care* January 2010 vol. 33 no. 1 73-77



## United States 2010, Causes of Death by Percent of Total Deaths



# Percentage of hospice admissions by primary diagnosis



CAUSE OF DEATH

36. PART I. Enter the chain of events - diseases, injuries, or complications - that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.

Approximate Interval Between Onset and Death

If **diabetes** was an immediate, underlying or contributing cause of death be sure to record diabetes in either Part I or Part II of the cause of death section, as appropriate.

a. Acute myocardial infarction

5 days

DUE TO (OR AS A CONSEQUENCE OF)

b. Arteriosclerotic cardiovascular disease

Unknown

DUE TO (OR AS A CONSEQUENCE OF)

IMMEDIATE CAUSE (Final disease or condition resulting in death)

c. \_\_\_\_\_  
DUE TO (OR AS A CONSEQUENCE OF)

Sequentially list conditions, **IF ANY**, leading to the cause listed on line a. Enter the **UNDERLYING CAUSE** (disease or injury that initiated the events resulting in death) **LAST**

d. \_\_\_\_\_

PART II. OTHER SIGNIFICANT CONDITIONS contributing to death but not resulting in the underlying cause given in Part I.

Type 2 diabetes

37. DID TOBACCO USE CONTRIBUTE TO DEATH?

- Yes  Probably  
 No  Unknown

38. IF FEMALE:

- Not pregnant within past year  
 Pregnant at time of death  
 Not pregnant, but pregnant within 42 days of death

# Types of diabetes commonly encountered in palliative care

- Type 1
  - Insulin lack
  - Immune mediated, usually
  - Onset in childhood, usually
- Type 2
  - Insulin resistance, relative insulin deficiency
  - 80 % obese
  - Onset as adults, usually
- Others
  - Pancreas damage (Chronic pancreatitis, cancer, cystic fibrosis)
  - Corticosteroid induced

# Classification of cause specific deaths in early onset (0-14 years) type 1 diabetes cohort, Finland

Cause of death	Number (%)
<b>Acute diabetic complications (DKA, hypoglycaemia, hyperosmolar coma)</b>	
Alcohol/drug related	15 (7)
Other	37(16)
<b>Total: Acute diabetic complications</b>	<b>52(23)</b>
<b>Chronic diabetic complications</b>	15 (7)
<b>Cardiovascular:</b>	
Acute myocardial infarction	18 (8)
Cerebrovascular disease	0
Other	10 (4)
<b>Infection (septicaemia, Pneumonia, myocarditis, Other infections)</b>	23 (10)
<b>Total: Chronic diabetic complications</b>	<b>66 (29)</b>
<b>Neoplasm</b>	11 (5)
<b>Sudden death</b>	7 (3)
<b>Suicide:</b>	
Alcohol/drug related	21 (9)
Other	15 (7)
<b>Accidents (not intoxications):</b>	
Alcohol/drug related	16 (7)
Other	23 (10)
<b>Other alcohol/drug related (alcoholic cirrhosis, alcohol/drug intoxications)</b>	10 (4)
<b>Other cause</b>	9 (4)
<b>All alcohol/drug related deaths</b>	<b>63 (27)</b>

n = 230, type 1 diabetics diagnosed between 1970 and 1989 who died between 1970 and 2007

# Question

**How closely should we  
control  
the blood glucose in a  
diabetic palliative patient?**

# Prognosis based treatment

Patient categories	Prognosis	Enteral intake	Examples
Active disease but relatively stable	Several months to more than a year	Fair with sporadic improvements or worsening	Dementia, severe cardiomyopathy, metastatic cancers
Impending death or organ or system failure	Several days to weeks	Declining calorie intake with anorexia	Fulminant liver failure due to hepatitis, bone marrow failure
Actively dying	Several hours to days	None	Massive intracerebral hemorrhage, obtundation, or agonal respirations

Angelo M, et al. An approach to diabetes mellitus in hospice and palliative medicine. *J Pall Med* 14;1, 2011

# Active disease but relatively stable

- Perfect control of glucose is not the goal
- Avoid hypoglycemia
- Avoid marked hyperglycemia



# Diet

- Needs to be discussed with patient and family
- Usually a regular diet will be well tolerated
  - Especially if appetite is poor
  - Better intake
  - Acceptable glucose control

# Diet

- “The imposition of dietary restrictions on elderly patients with diabetes in long-term care facilities is not warranted. Residents with diabetes should be served a regular menu, with consistency in the amount and timing of carbohydrate. (C)”

# One “advantage” of advanced illness

- Type 2 diabetes: insulin resistance
  - Obesity contributes to insulin resistance
  - With weight loss, diabetes may “disappear”



# Fingerstick glucoses, benefits

- Determine degree of control
- Monitoring for hypo and hyperglycemia
- Adjusting doses of hypoglycemic medications



# Sliding scale insulin coverage

- Frequently used in nursing homes
- 2008 study
  - Half of 9804 patients with diabetes admitted on SSI orders
  - After admission another 33% started on SSI
  - 83 % of patients remained on SSI through out their average 6 month stay

# Sliding scale insulin coverage monotherapy may be harmful

- Greater frequency of very high glucoses
- Greater risk of hypoglycemia



**High  
glucose**

# Basal / bolus insulin therapy

- Basal dose, long acting
  - Basal insulin shown to improve glucose control with less hypoglycemia
    - Insulin glargine (*Lantus*)
    - Insulin detemir (*Levemir*)
- Bolus doses, rapid acting
  - Before meals or for hyperglycemia
    - Lispro (*Humalog*)
    - Aspart (*Novolog*)
    - Glulisine (*Apidra*)

# Caution !!!





# Metformin

## Advantages

- Hypoglycemia is rare
- Oral



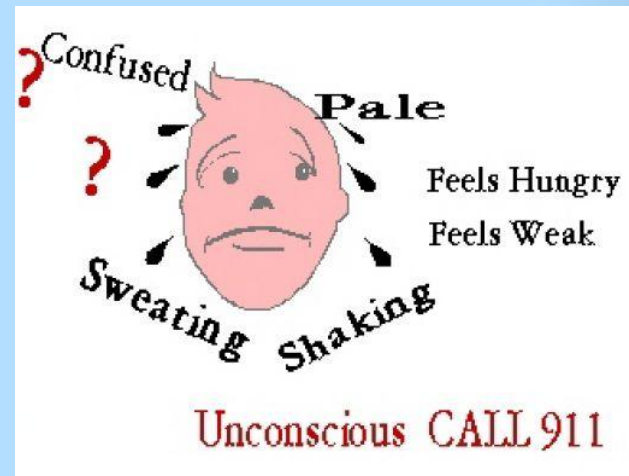
## Disadvantages

- Nausea is a common side effect
- Not used with renal insufficiency
- Not used with hepatic failure
- Not used in hypoxic states
  - CHF, emphysema



# Sulfonylureas

- Risk of hypoglycemia increased
  - Renal failure
  - Liver failure
  - Elderly
- Avoid glyburide
  - More likely to cause hypoglycemia than glipizide or glimepiride
  - On Beer list

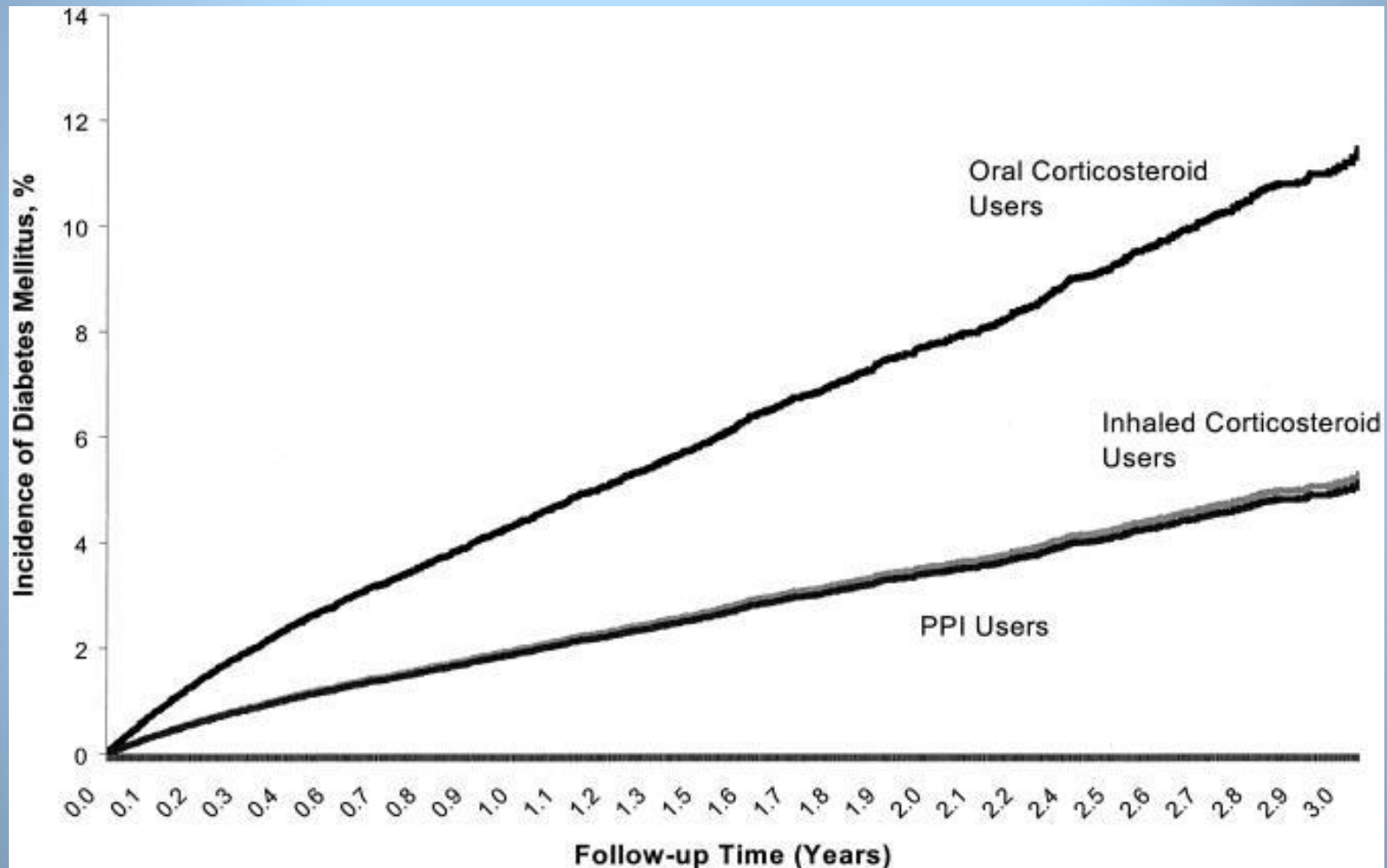


# Factors increasing risk of hyperglycemia with oral / IV corticosteroid use

- Higher dose
- Longer length of treatment
- Family history of diabetes
- Obesity
  
- Existing diabetes

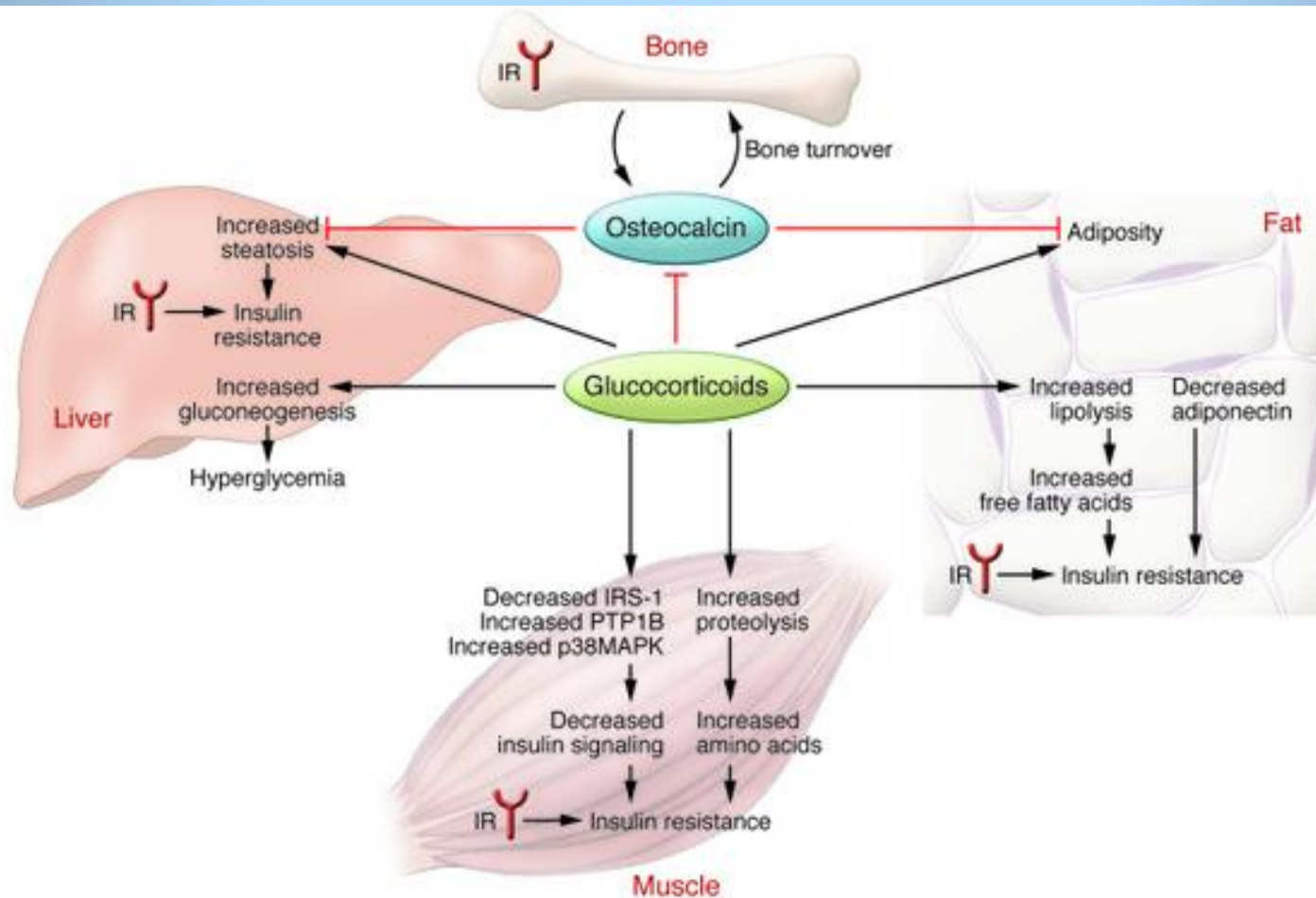


# Incidence of diabetes over time among study groups



Blackburn D, et al. Quantification of the Risk of Corticosteroid-induced Diabetes Mellitus Among the Elderly. *J Gen Intern Med.* 2002;17:717-720.

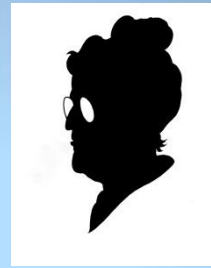
# Mechanisms of glucocorticoid induced insulin resistance



# Remember!

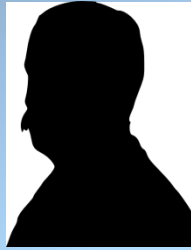
Monitor glucose and reduce  
doses of hypoglycemics  
when stopping corticosteroids!

# Lisa Z.

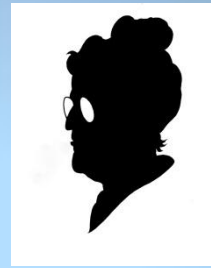


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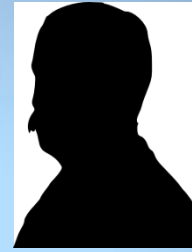
Lisa Z.



- Prescribe dexamethasone 4 mg po with breakfast and with supper daily.
- Initially continue glipizide
- Fingertstick blood glucoses AC and HS
  - Initially with sliding scale aspart coverage
    - 200-250: 2 units, 251-300: 4 units, 301-350: 6 units, 351-400: 8 units, over 400: 10 units. Notify hospice nurse if over 400 twice in a row.
    - Ultimately begin insulin glargine daily depending on amount of needed aspart and stop glipizide.



# Sam Z.



- Mrs. Z. had always taken care of her own diabetes in the past.
- She is unable to even remember if she has taken her medications now.
- Now Mr. Z. has to do finger stick glucoses, measure and inject insulin depending on the glucose levels, monitor for signs of hypoglycemia
- And ...

# Information needs of carers of people with diabetes at end of life

- Performing diabetes care tasks
- The focus of care
- Blood glucose management
- End of life stages
- Involving patients and carers in decisions about diabetes care

# Other needs of caregivers of very ill diabetics

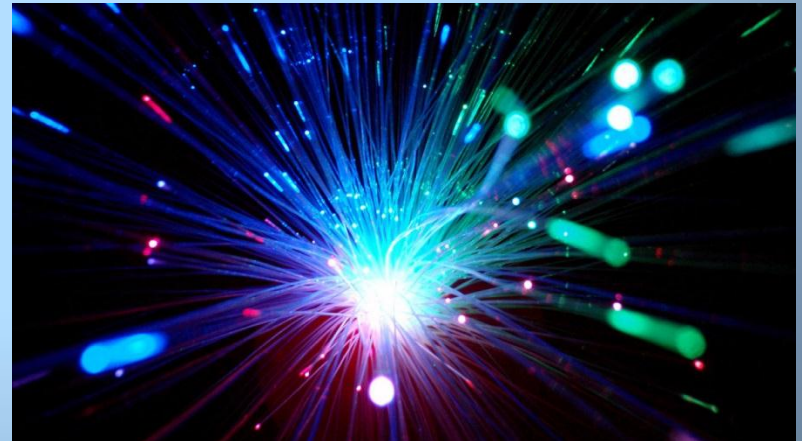
- Social support
  - Personal medical problems / disabilities
  - Cognitive impairment?
  - Financial / place of care
  - Respite care
- Spiritual support
  - Lack of time
  - Search for meaning
- Emotional support
  - Depression
  - Anxiety
  - Substance abuse
  - Decreasing ability to communicate with loved one

# Diabetic neuropathies

- Diabetic sensorimotor polyneuropathy
  - Chronic, symmetrical, length dependent
    - Painful diabetic polyneuropathy
    - Sensory neuropathy
- Diabetic autonomic neuropathy
  - Cardiovascular autonomic neuropathy
  - GI autonomic neuropathy
  - Erectile dysfunction
  - Bladder dysfunction
  - Sudomotor dysfunction

# Painful diabetic polyneuropathy

- Affects 3 to 25 % of patients
- Clinical diagnosis based on pain description
  - Burning, shooting, tingling
  - Often with allodynia and / or hyperalgesia
- Distal, symmetrical, often with nocturnal exacerbations
- Usually associated with sensory neuropathy



# Painful diabetic polyneuropathy treatment

- Tricyclic antidepressants
  - nortriptyline, amitriptyline, desipramine
- Anticonvulsants
  - gabapentin, pregabalin (*Neurontin, Lyrica*)
- SNRI antidepressants
  - duloxetine, venlafaxine (*Cymbalta, Effexor*)
- Opiates



# Cardiovascular autonomic neuropathy diagnosis

- Consider if unexplained tachycardia, postural fainting or dizziness, or poor exercise tolerance
- Parasympathetic function
  - Heart rate response to deep breathing, Valsalva maneuver, and postural change
- Sympathetic function
  - Blood pressure response to orthostatic change
- Medications, hydration, and activity may affect

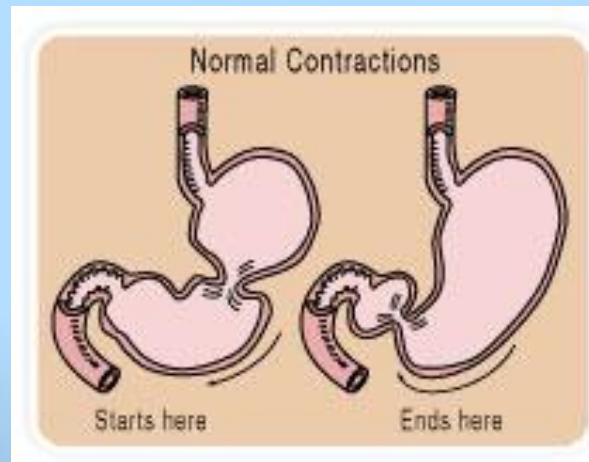
# Postural hypotension

- Always check postural blood pressures in diabetic patients
- Symptoms: Standing dizziness or syncope
- Postural drop of  $> 20$  mm Hg systolic or  $> 10$  mm Hg diastolic
  - Supine blood pressure may be high
  - Base antihypertensive use on standing pressure and symptoms
- Compression stockings, sodium, fludrocortisone, caffeine, midodrine, elevated head of bed



# Diabetic gastroparesis

- Abnormal gastroduodenal motility with delayed gastric emptying and no obstruction
- Symptoms
  - Early satiety, bloating, vomiting undigested food, heartburn, nausea, anorexia, erratic blood glucoses



# Diabetic gastroparesis etiology

- Causes are multi-factorial
  - Autonomic
    - Link with diabetic CAN is weak
  - Decreased interstitial cells of Cajal in gastric muscle
  - Fibrosis of gastric smooth muscle
  - Effect of hyperglycemia
    - Marked hyperglycemia  $>250$  mg/dl slows gastric emptying
      - Hypoglycemia speeds gastric emptying

# Other causes of gastroparesis

- Drugs
  - Opiates, anticholinergics, levodopa, alcohol, nicotine, beta blockers, calcium channel blockers
- Post op ileus, critical illness, gastroenteritis
- Connective tissue diseases
  - SLE, dermatomyositis, systemic sclerosis
- Endocrine or metabolic
  - Hypo or hyperthyroidism, Addison's, CRF or ESLD
- Irradiation, neoplasia, anorexia nervosa, HIV

# Diabetic gastroparesis treatment

- Low fat, low fiber diet
- Prokinetic drugs
  - Metoclopramide (*Reglan*)
    - Dopamine D2 receptor antagonist
  - Erythromycin
    - Motilin receptor agonist
  - Cisapride
    - 5-HT3 receptor antagonist, 5-HT4 receptor agonist



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# Impending death or organ system failure

- Decisions with patient / family regarding when to withdraw treatments
  - Stopping fingerstick glucoses
  - Stopping hypoglycemic medications
- Continue general comfort measures

# Actively dying

- All hypoglycemic medications and glucose monitoring is stopped
  - Continued education for family regarding the focus of care being comfort

# Summary

- Diabetes is common and often causes or contributes to death
  - Treat it along with the “primary” illness
  - Don’t forget to list it on the death certificate
- Strict control of blood glucose is not necessary and may be dangerous near end of life
- Give comprehensive interdisciplinary support to the patient and caregiver
- Be aware of diabetic complications & treat them to optimize quality of life



Any questions?

