Growing Old with (type 1) Diabetes through Space and Time

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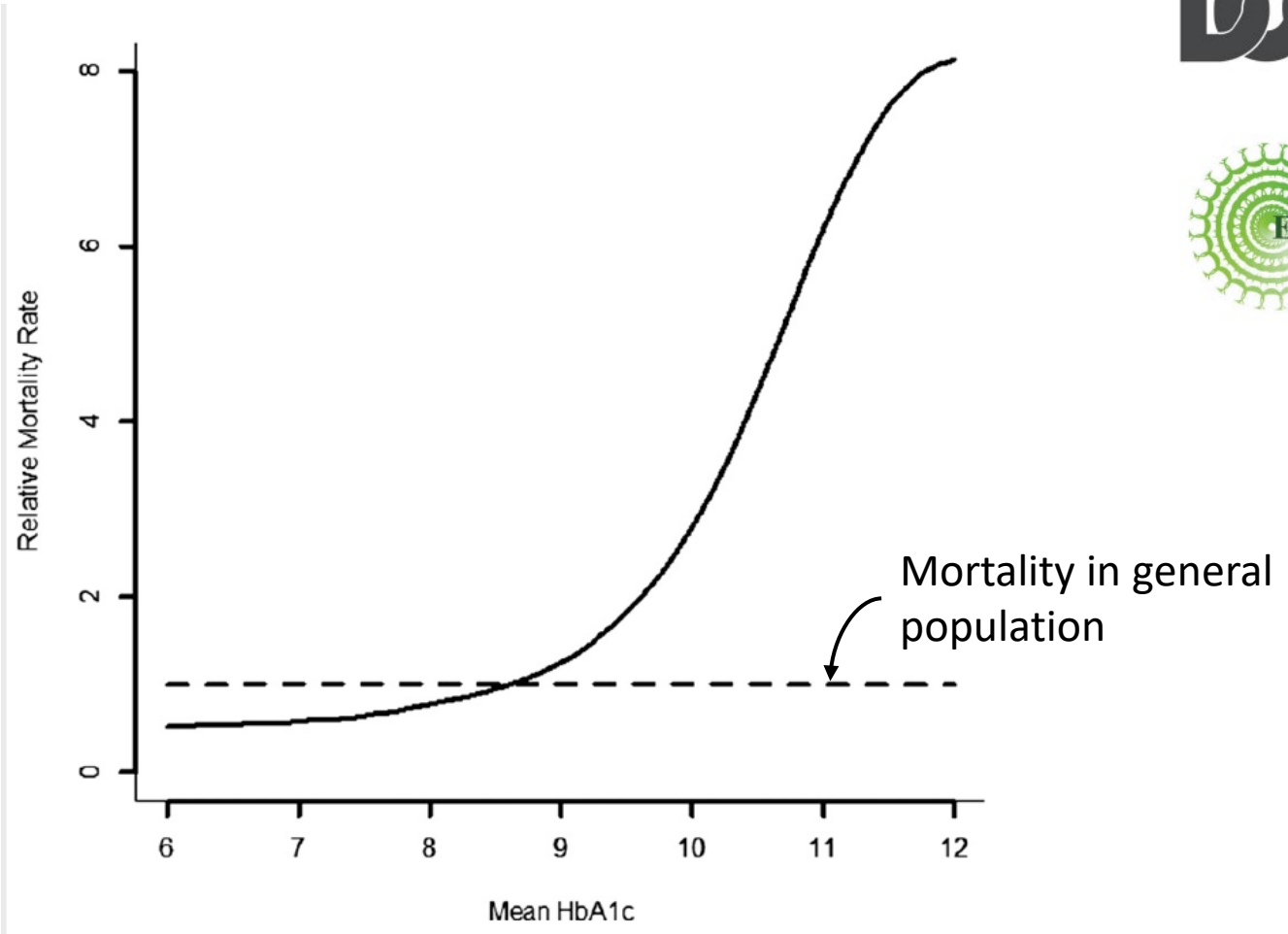
Why Are We Having This Discussion?

- DCCT: 1441 subjects treated with intensive (A1C 7%) vs. conventional (A1C 9%) therapy, ended in 1993.
  - Microvascular complications reduced by 50-60% but no change in cardiovascular disease
  - A reduction of cardiovascular mortality shown in 2005 even though study ended in 1993 (A1C's ~8% in all patients 1993-2005)
- Question 1: does this improved diabetes control impact mortality?

Yes-Improved Control Results in Longer Life Spans

On average, mortality increased with A1C over time above 9%



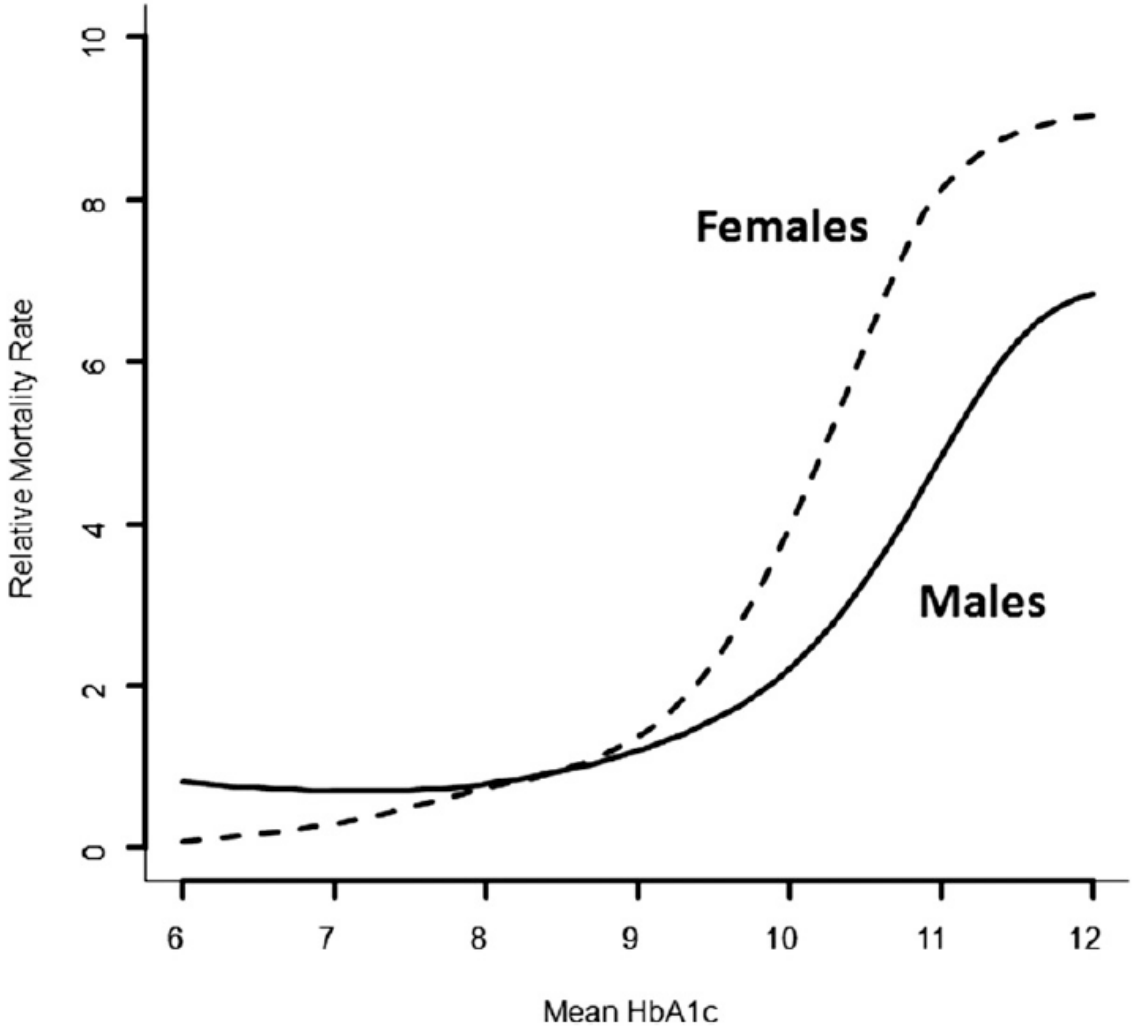
Diabetes Control and Complications Trial

EDIC EPIDEMIOLOGY OF DIABETES INTERVENTIONS AND COMPLICATIONS

Diabetes Care 2016;39:1378–1383

Why do Men do better Than Women (in every study)?

The bigger point: in this study, for those with average HbA1c levels *below 9%* for many years, lifespan was no different than the general population for both men and women



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What is the Reason for T1D Mortality (DCCT/EDIC)?

- Cardiovascular disease: 22.4%
- Cancer: 19.6%
- Hypoglycemia/DKA: 17.8%
- Accident or suicide: 16.8%

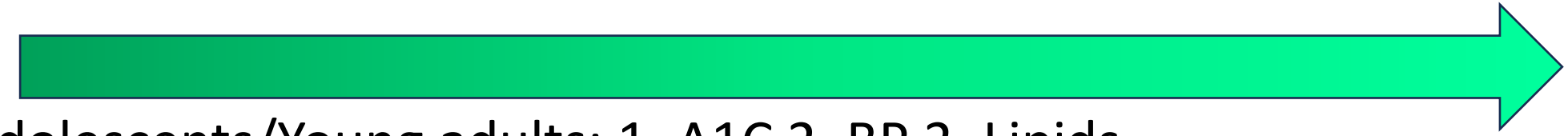
Cardiovascular disease is much lower than in previous eras, renal disease mortality is almost non-existent.

What is the significance of this with treating older adults with T1D?

JAMA. 2015;313(1):45-53.

How We Focus Our Treatments in T1D Based on Age

- Children: 1. A1C



- Adolescents/Young adults: 1. A1C 2. BP 2. Lipids

- Adults (childhood-onset): 1. BP 1. Lipids 2. A1C

Still, It Is Difficult to Get People to Be Less Aggressive with their Diabetes Control!

- 73 y/o retired physician, T1D X 62 years
- Had severe hypo with Tresiba/Novolog/Afrezza
- A1C 5.8%
- I convinced him to go to Control IQ
- First visit to see me: A1C 6.1%, and “I’m still fighting lows all day which I’m ok with.”

Highest CGM Reading

360

Average CGM Reading

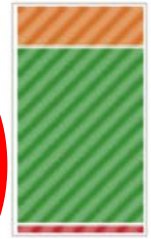
138

Lowest CGM Reading

42

Time in Range

Above Target	17%	> 180 mg/dL
Target Range	81%	70 - 180 mg/dL
Below Target	2%	< 70 mg/dL



Number of Days CGM in Use

27.2 days

Control-IQ™ Technology

Average Reading		138 mg/dL
Time in Use	97%	**29** d **6** hr,
Control-IQ Set to Off	0%	**0** min.
CGM Inactive[1]	1%	**8** hrs. **45** min.
Pump Inactive[2]	1%	**9** hrs. **22** min.
Avg. Sleep & Exercise		
Daily Sleep		**14** hrs. **52** min.
Weekly Exercise Events		**1** times

Average Daily Insulin Summary

Basal	22%	14.15 u/day
Food Bolus	65%	41.25 u/day
Correction Bolus	6%	3.52 u/day
Control-IQ Auto Bolus	7%	4.19 u/day

Device Settings

Pt Profile				Active at the time of upload
Start Time	**Basal Rate**	**Correction Factor**	**Carb Ratio**	**Target BG**
Midnight	0.650 u/hr	1u:24 mg/dL	1u:3.2 g	110 mg/dL
5:00 AM	0.680 u/hr	1u:20 mg/dL	1u:1.6 g	110 mg/dL
11:15 AM	0.600 u/hr	1u:22 mg/dL	1u:3.2 g	110 mg/dL
6:00 PM	0.620 u/hr	1u:20 mg/dL	1u:3.2 g	110 mg/dL
Calculated Total Daily Basal	15.3 units			

Duration of Insulin: 5:00 hours | **Carbohydrates:** On | **Max Bolus:** 20 units

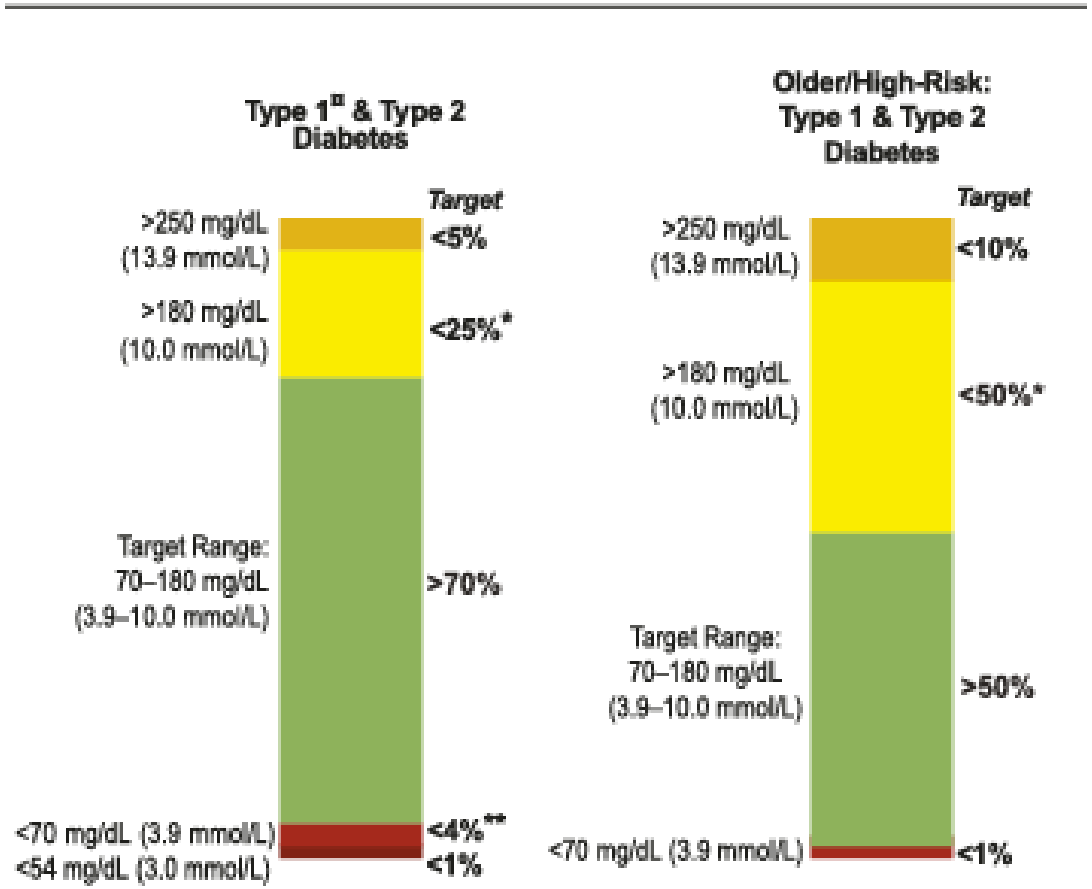
Human behavior can still make an AID system dangerous, but one needs to appreciate when it is appropriate to not try for near-normal blood sugar control-it isn't necessary!

What Are the Healthcare Targets For Adults With Type 1 Diabetes Over 40 Years Old?

- LDL-cholesterol?
- Blood pressure?
- HbA1c?
- Time in Range if over 40 years old?
- Time in Range if over 80 years old? Time Below Range if over 80 years old?

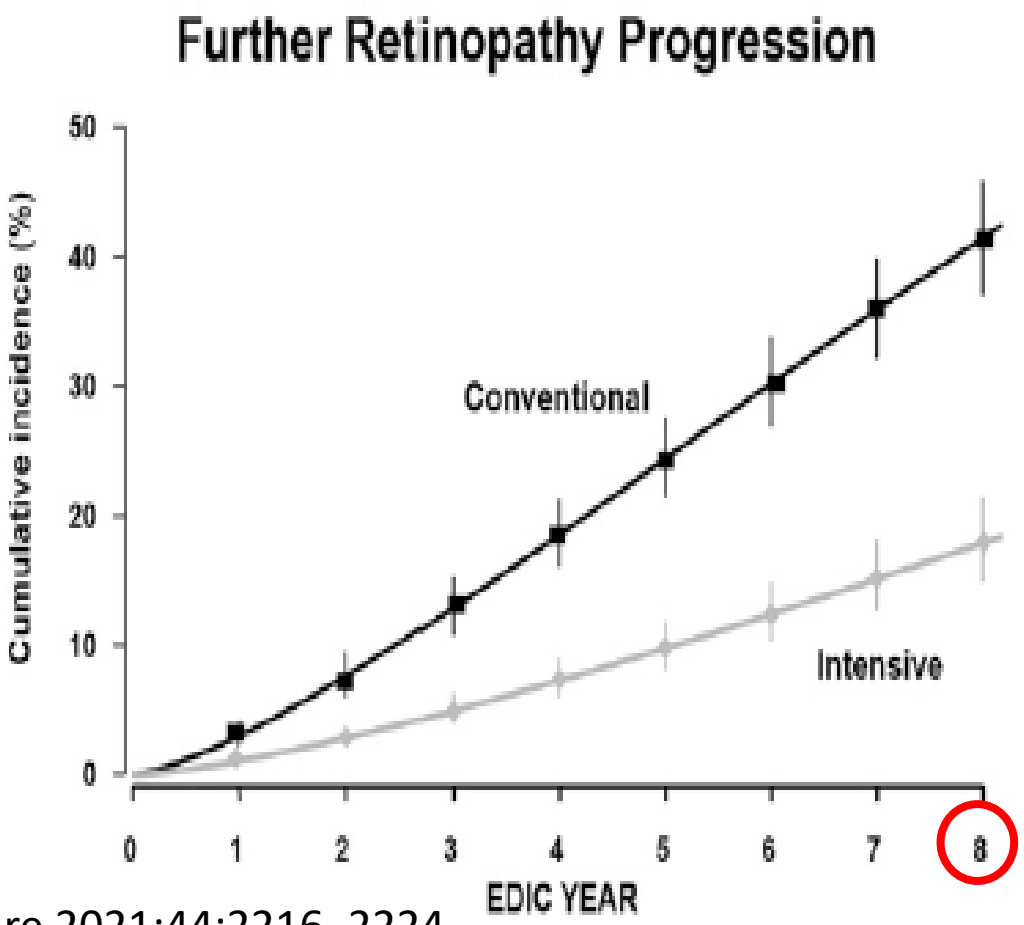
HbA1c and CGM Targets

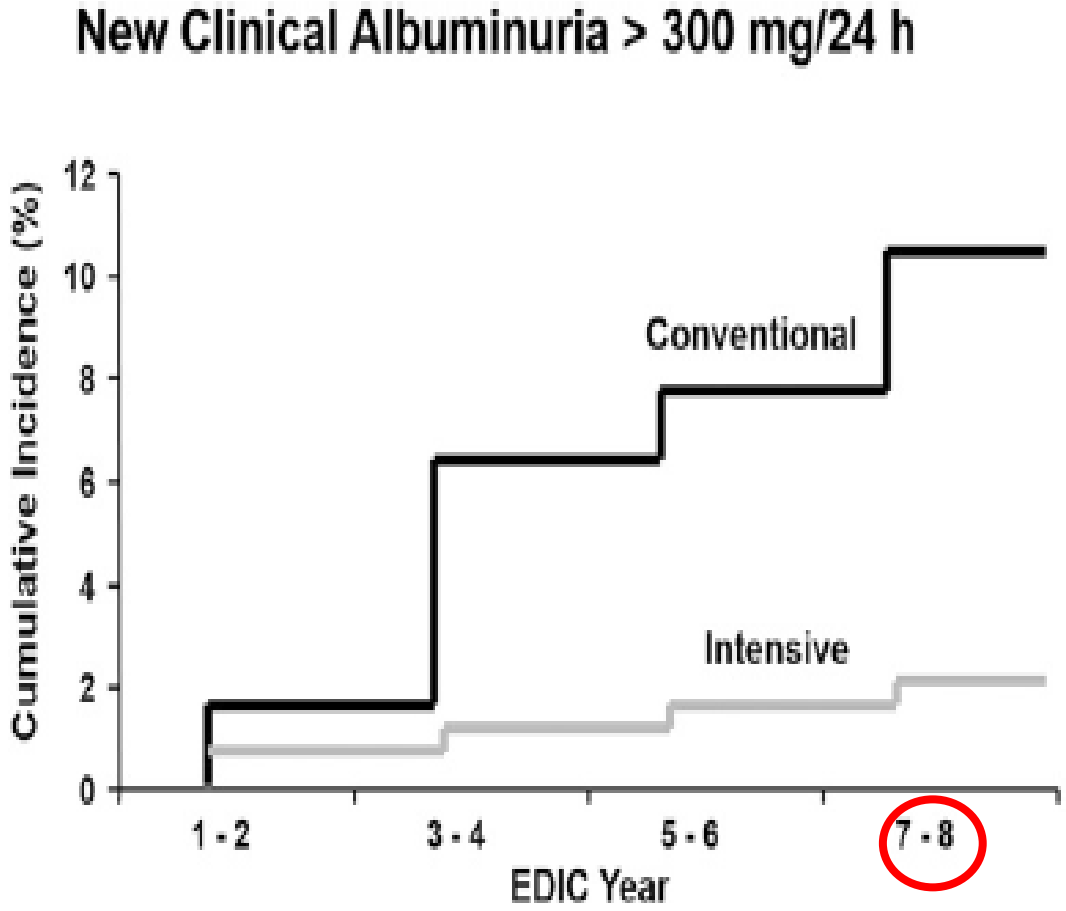
Older adults who are otherwise healthy with few coexisting chronic illnesses and intact cognitive function and functional status should have lower glycemic goals (such as A1C <7.0–7.5%, while those with multiple coexisting chronic illnesses, cognitive impairment, or functional dependence should have less-stringent glycemic goals (suchasA1C<8.0%)



Diabetes Care Volume 46, Supplement 1, January 2023
DiabetesCare2019;42:1593–1603

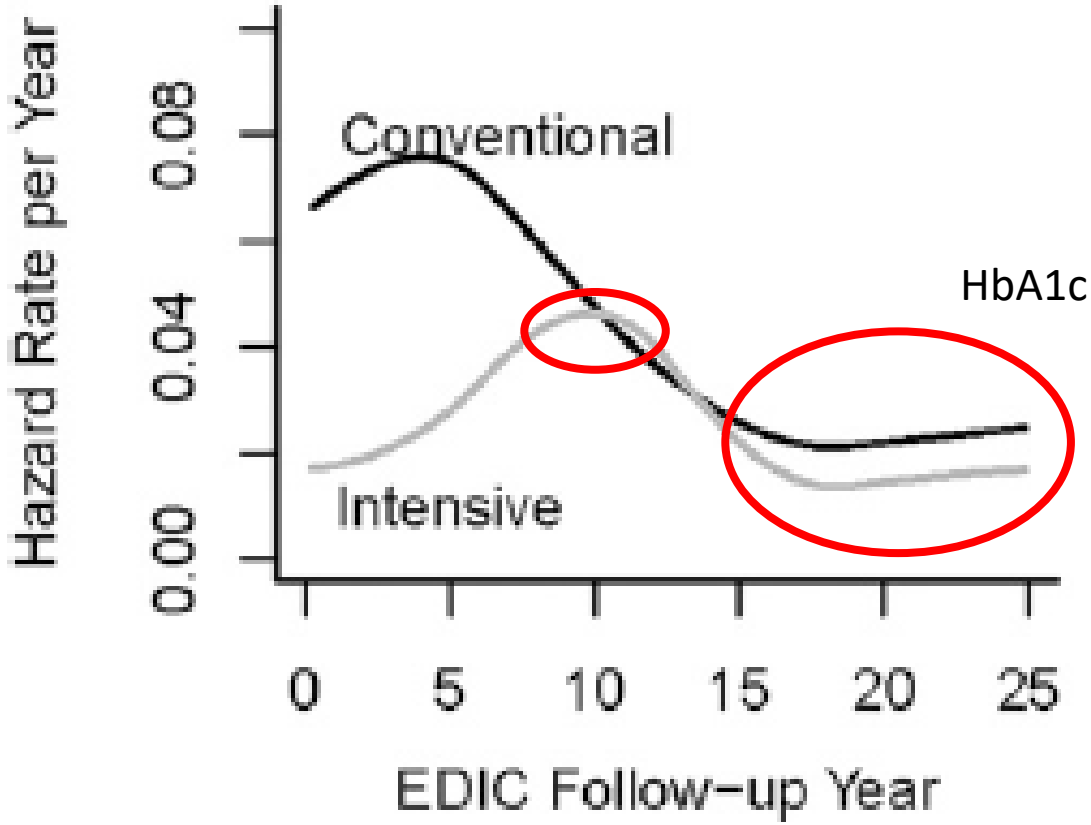
Understanding Metabolic Memory vs. Metabolic Amnesia





Diabetes Care 2021;44:2216–2224

Metabolic Amnesia: Retinopathy Progression



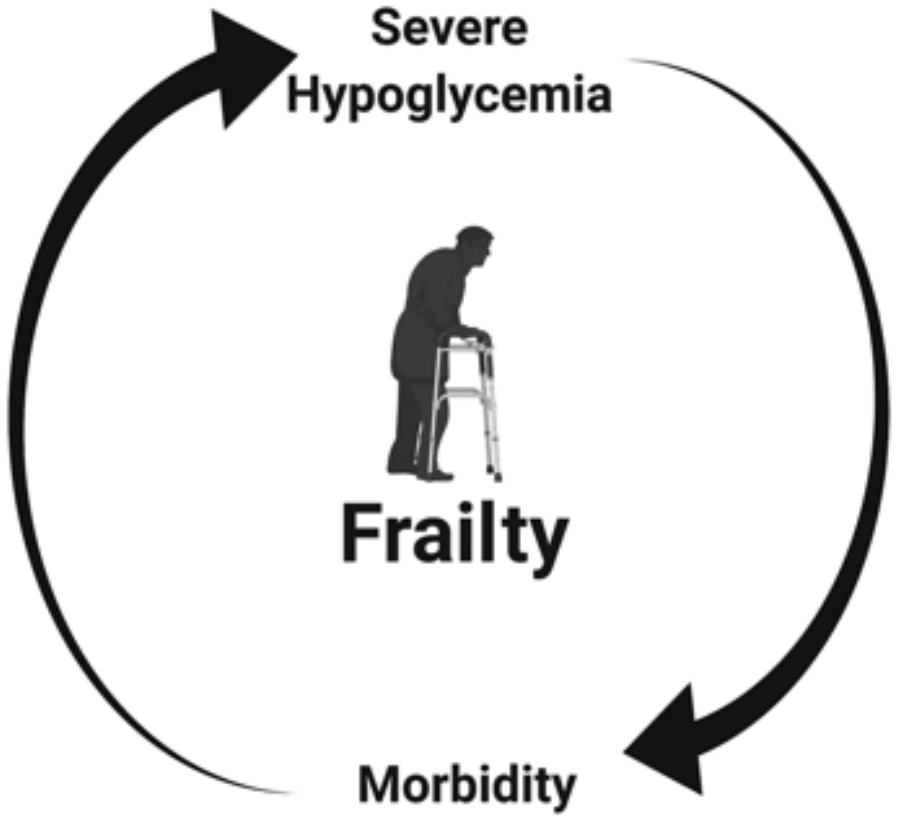
HbA1c levels still in the 7's!

Diabetes Care 2021;44:2216–2224

The Real Enemy to Older Adults with T1D

Severe Hypoglycemia, Cognitive Impairment, and Frailty

Severe Hypoglycemia ⇄ Cognitive Impairment



Looking Back, The Most Important Changes That Resulted in Longer Lifespans for T1D

And Why Seniors Do So Well Today

Normal Aging

- Cognitive impairment: faster and more severe in older T1D?
- Practical issues:
  - Medication (including insulin) adherence
  - Running out of insulin in pump (or pen!)
  - Defending hypoglycemia with routine activities

Non-Traditional Diabetes Complications Seen in Older Adults with T1D

- Osteoporosis
  - More common in T1D-many potential mechanisms
  - Poor glucose control and kidney disease both independent predictors
  - Recommend: screening all women around the time of menopause

Non-Traditional Diabetes Complications Seen in Older Adults with T1D

- Eyes
  - Cataracts, glaucoma, macular edema
- Obesity-related problems (new to T1D)
  - Arthritis, sleep apnea (2023: easier to get bariatric surgery than a GLP-1 for T1D)
- Diabetic cheiroarthopathy
  - Frozen shoulder, trigger finger, carpal tunnel, Dupuytren contracture
  - T1D Exchange: 31% with at least one, more common with greater age (Endocr Pract. 2019;25:138-143)
  - Less related to HbA1c

Older Adults with T1D-Additional Challenges

- Much related to cognitive function of both the person with T1D and the spouse
- Spouse may have additional responsibilities to ensure safe medical care
- Often the person with T1D is the primary caregiver of the spouse without diabetes!
- Important to appreciate when additional assistance required
  - Other family members often are required for assistance
  - Knowing when to ask for help: assistance at home or skilled nursing

My Experience with Skilled Nursing, Assisted Living, and Nursing Homes with T1D

- Rarely I have seen outstanding care
- In general, our system is not able to manage T1D in these environments or even in the hospital.
- The secret to good care: much assistance from family

My Concerns Moving Forward

- “Geriatric T1D” is new-a good thing!
- However, minimal research on this population, in addition to the fact minimal knowledge about T1D by geriatricians
- Few endocrinologists have large numbers of this population
- My belief: seeing this population in a typical 15- or 20-min visit is not sufficient. One truly needs an entire team with adequate time. Currently this doesn’t exist.
- One exception

Geriatrics

No matter your age, if you have type 1 or type 2 diabetes, Joslin's team can help you thrive and reach your healthcare goals.

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Young Adult Care

Pregnancy

Geriatrics

Kidney Care

Behavioral Health

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Your Care Team

Education Programs and Classes