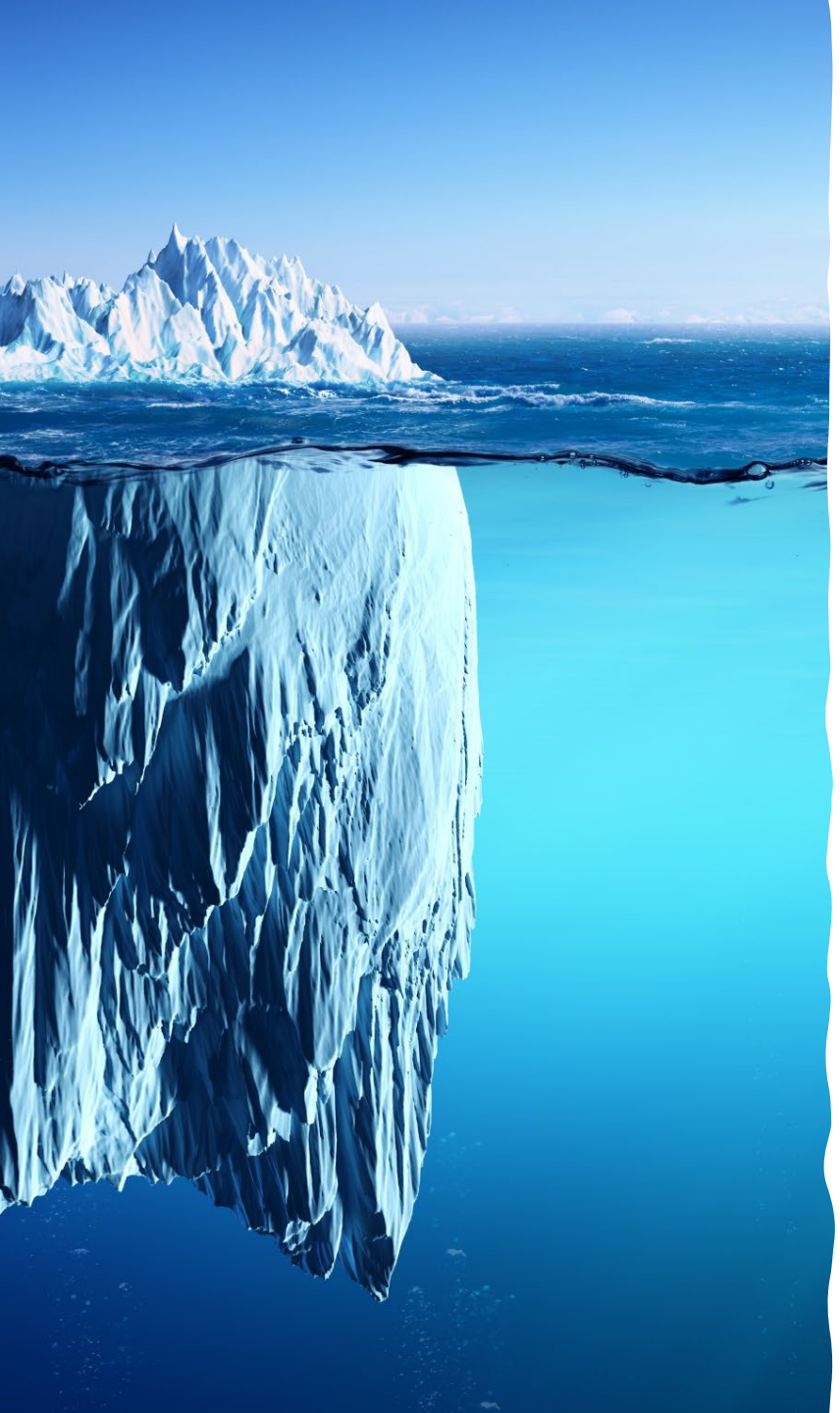

Early-Stage Type 1 Diabetes

ICD-10-CM Code Request

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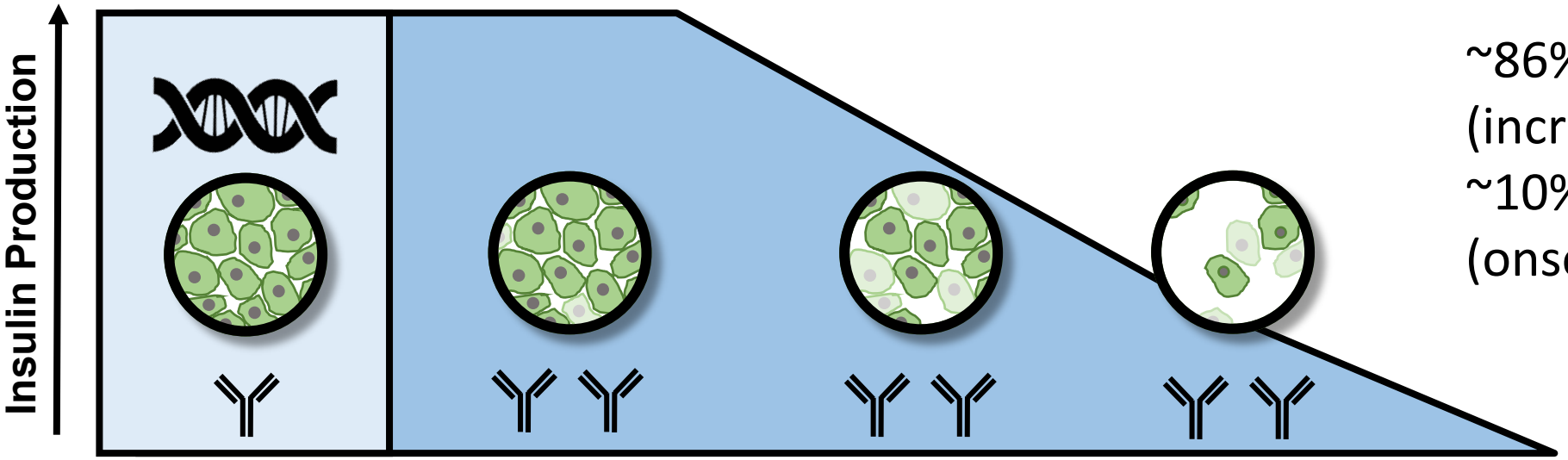
September 13, 2023

Barbara Davis Center for Diabetes
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

The Continuum of Type 1 Diabetes (T1D)

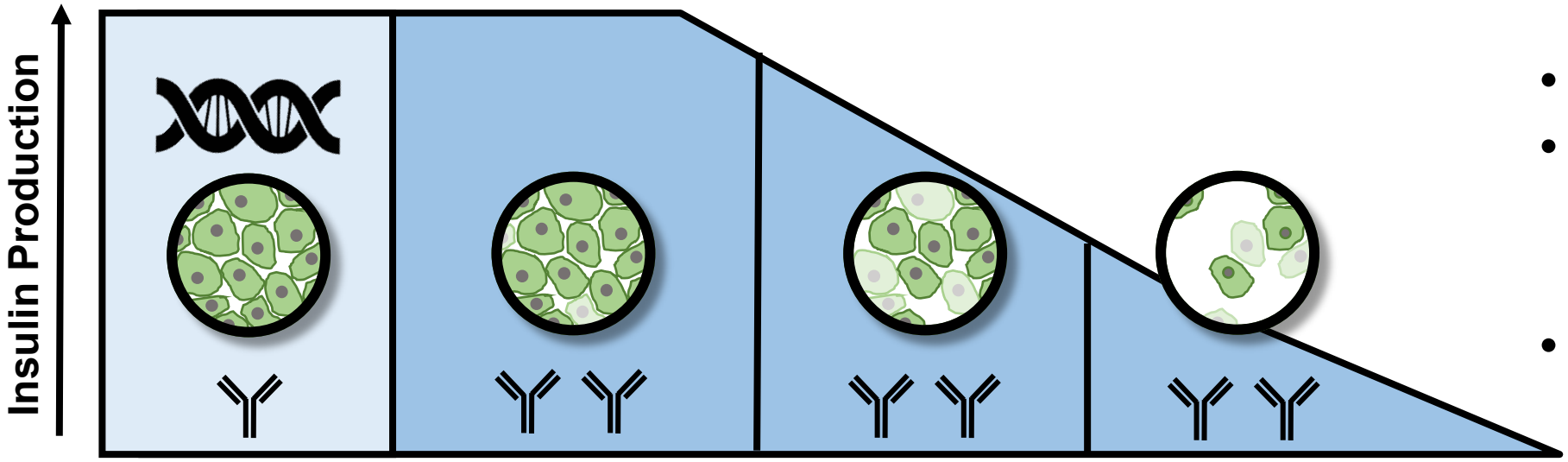


~86% of diabetes in youth
(increasing 3-5% per year)
~10% of diabetes in adults
(onset throughout adulthood)

- Autoimmune destruction of pancreatic beta cells
- Clinical symptoms preceded by period of islet autoimmunity
- Islet autoantibodies indicate immune activation
- Multiple islet autoantibodies:
  - >80% progress to clinical, symptomatic T1D in 15 years
  - Lifetime risk approaches 100%`

Atkinson and Eisenbarth, *Lancet* 2001; Ziegler AG, et al. *JAMA* 2013; Insel et al. *Dia Care* 2015; CDC.gov

Stages of Type 1 Diabetes



Genetic Risk + Immune Activation	Stage 1 T1D	Stage 2 T1D	Stage 3 T1D (ICD10: E10)
	• Multiple islet autoantibodies • Normoglycemia • Presymptomatic	• 1 or more islet autoantibodies • Dysglycemia • Presymptomatic	• Hyperglycemia by **Standard Diabetes criteria** • Symptoms

Early-Stage T1D

>50% in DKA
>80% hospitalized

Staging adopted by:

- American Diabetes Association (ADA)
- Endocrine Society
- International Society of Pediatric and Adolescent Diabetes (ISPAD)
- JDRF

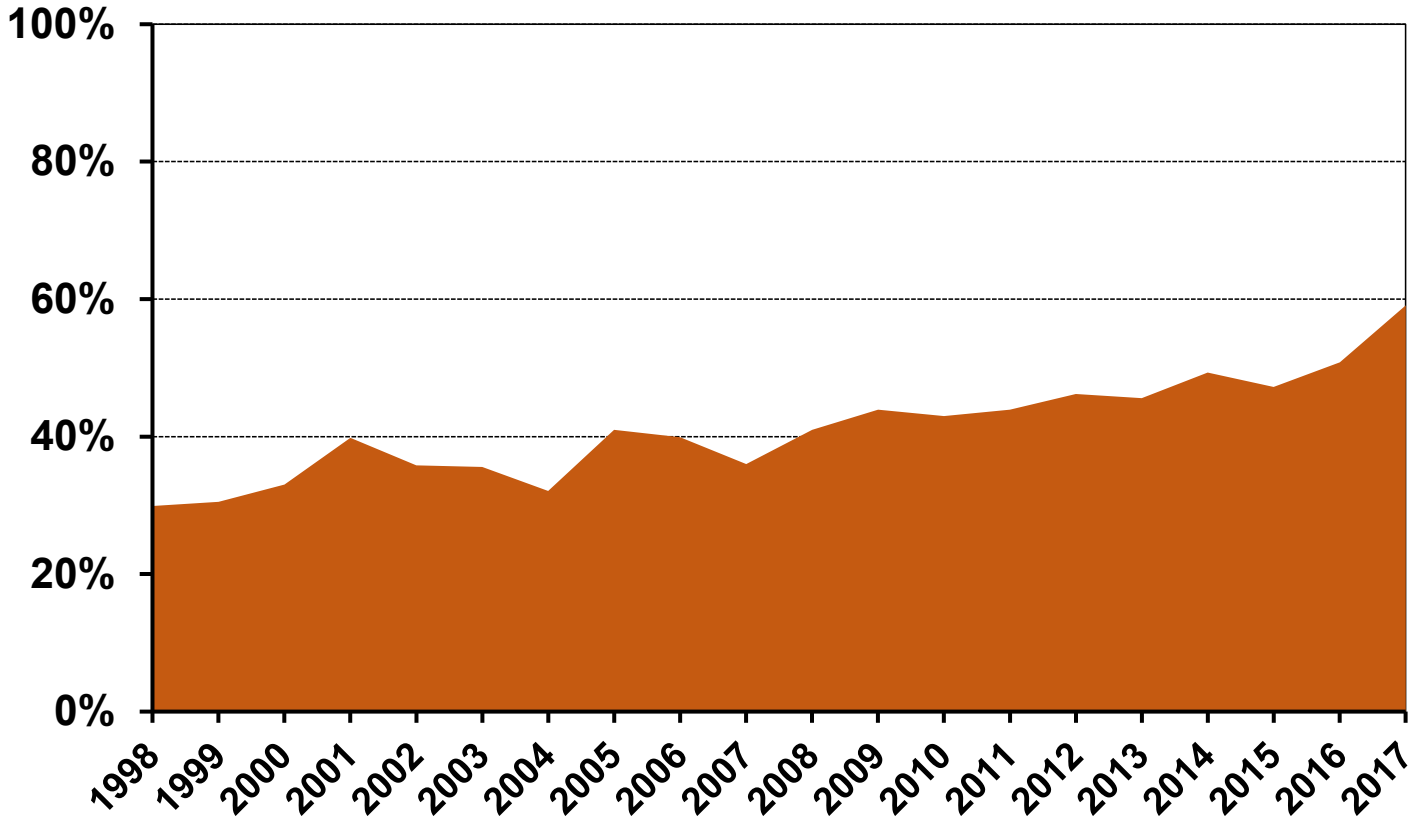
Early-Stage (Stage 1 or 2) on Pediatric Population Screening:

- 0.3% of 2-5 yo
- (Germany)
- 1.0% of 1-17 yo (Colorado)

Atkinson and Eisenbarth, *Lancet* 2001; Ziegler AG, et al. *JAMA* 2013; Insel et al. *Dia Care* 2015; Geno C and Rewers M ADA Scientific Sessions

Diabetic Ketoacidosis (DKA) at Diagnosis of T1D is increasing

Colorado 1998-2017, N=5,788



Risk of Brain Edema

- Acute neurological impact
- Permanent neurological damage

Risk of Mortality

Cost

- ED, hospitalization, PICU

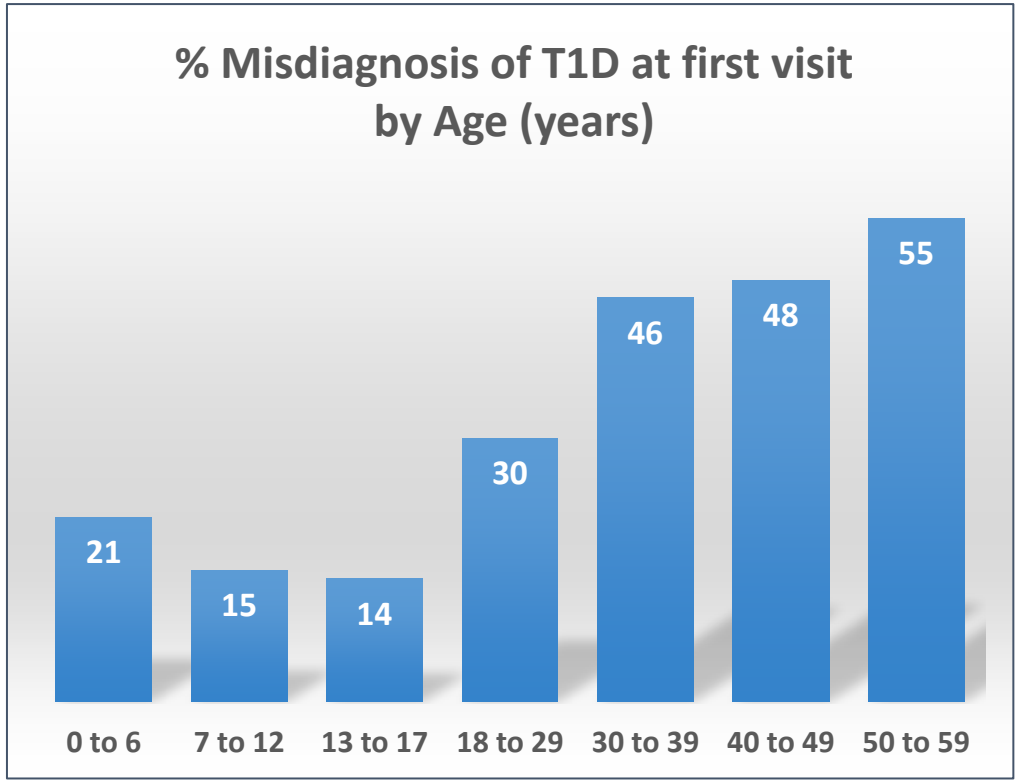
Trauma to the child and family

Long-term glycemic outcomes

Rewers A et al. *JAMA* 2015; *Adapted from* Alonso T et al. *Diabetes Care* 2019; Duca L *et al. Diabetes Care* 2017;
Slide courtesy M Rewers

Missed opportunities for diagnosis are common!

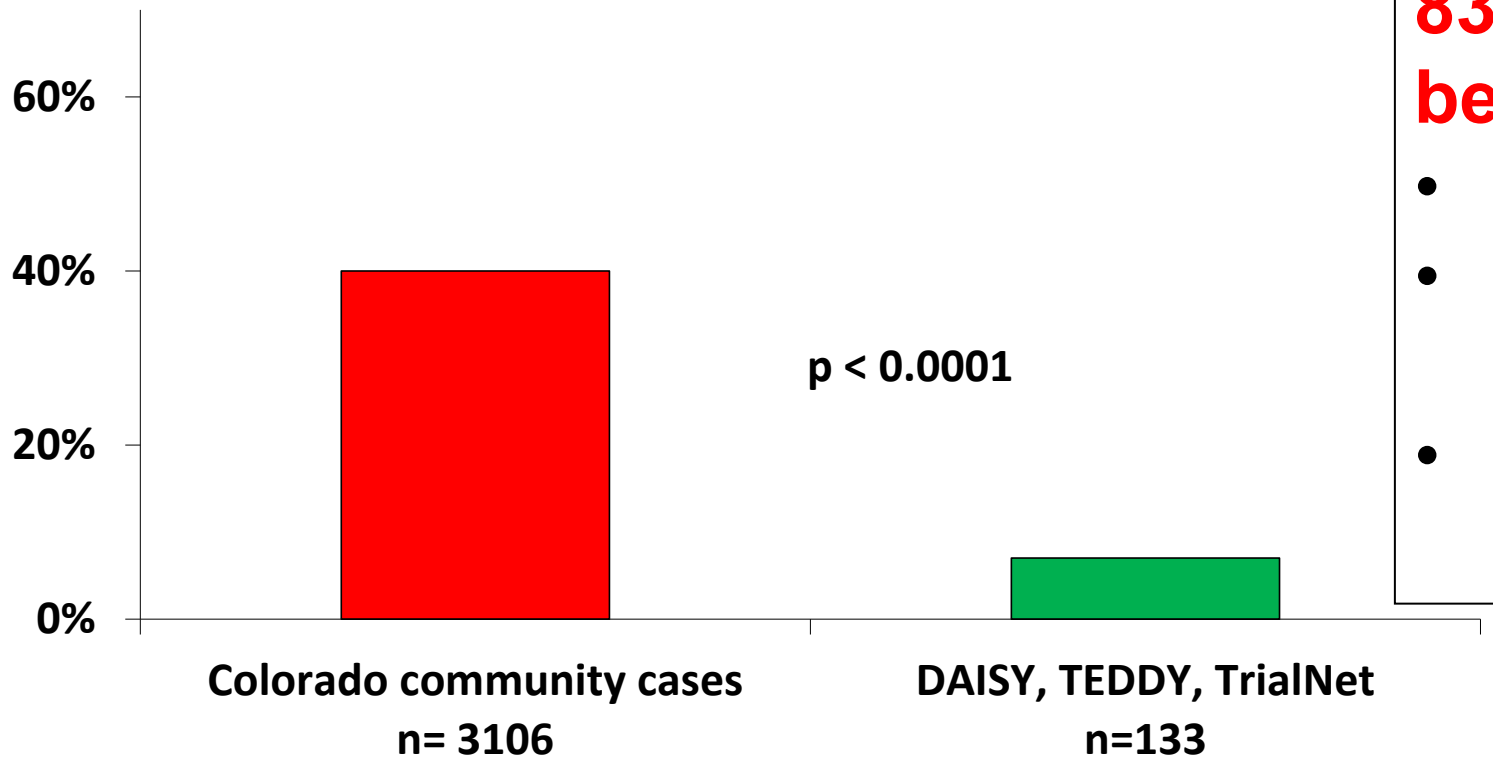
- Risk factors for DKA at diagnosis:
  - Young age
  - **Ethnic minority population**
  - **Limited or lack of insurance**
  - **Lower parent education**
  - **Lower family income**
  - **Rural address**
  - **Public insurance**
  - Existing mental disorders
- Initial symptoms may be nonspecific
- 25% were misdiagnosed at first visit
- Misdiagnosis associated with 18% increased risk of DKA



Muñoz et al. *Clinical Diabetes, 2019*

Why identify early-stage T1D?
DKA at T1D onset can be prevented

Prevalence of DKA **Colorado 1998-2012, N=3,439**



83% of DKA events could be prevented:

- Screen general population
- Provide education and monitoring
- Alert medical community to Early-Stage T1D

Rewers A et al. *JAMA 2015*

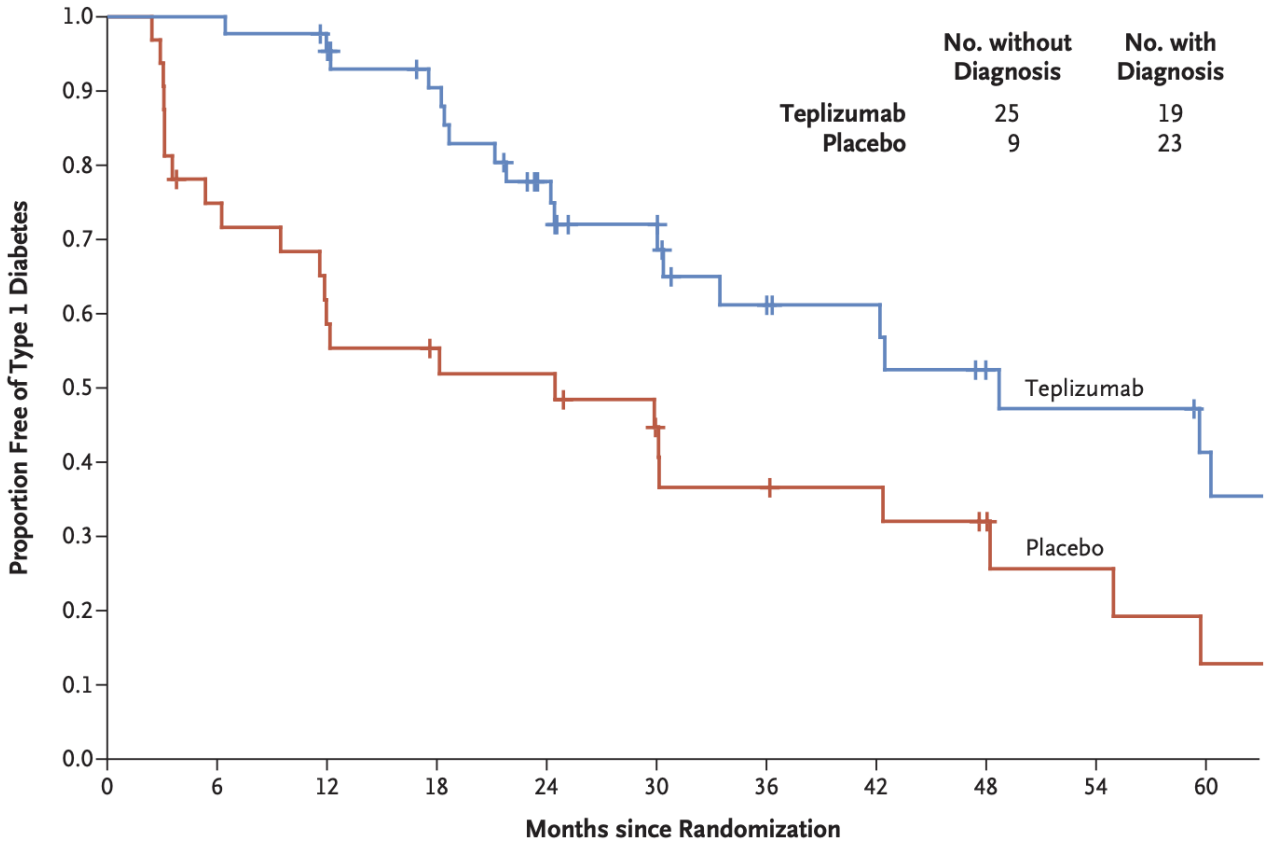
Why identify early-stage T1D?
Teplizumab delays onset of stage 3 T1D by 2 years

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 15, 2019 VOL. 381 NO. 7

An Anti-CD3 Antibody, Teplizumab, in Relatives at Risk for Type 1 Diabetes

Kevan C. Herold, M.D., Brian N. Bundy, Ph.D., S. Alice Long, Ph.D., Jeffrey A. Bluestone, Ph.D., Linda A. DiMeglio, M.D., Matthew J. Dufort, Ph.D., Stephen E. Gitelman, M.D., Peter A. Gottlieb, M.D., Jeffrey P. Krischer, Ph.D., Peter S. Linsley, Ph.D., Jennifer B. Marks, M.D., Wayne Moore, M.D., Ph.D., Antoinette Moran, M.D., Henry Rodriguez, M.D., William E. Russell, M.D., Desmond Schatz, M.D., Jay S. Skyler, M.D., Eva Tsalikian, M.D., Diane K. Wherrett, M.D., Anette-Gabriele Ziegler, M.D., and Carla J. Greenbaum, M.D., for the Type 1 Diabetes TrialNet Study Group*



- **First clinical therapy to modify course of T1D autoimmunity**
- **FDA approved Nov. 2022**
- **Infusions across the US**
- **Eligible: Stage 2 T1D (8yo and up)**

Herold et al, NEJM 2019

Stage 2 T1D is NOT equivalent to "Prediabetes"

Stage 2 T1D	Prediabetes (R73.03)
Islet autoantibodies (usually multiple) **AND** **Dysglycemia:** ➢ Impaired Fasting Glucose (IFG) 100–125 mg/dL (5.6–6.9 mmol/L) ➢ Impaired Glucose Tolerance on OGTT 2-h PG 140–199 mg/dL ➢ A1c: 5.7–6.4% ➢ A1c increase of ≥10% (Proposed: Intermediate OGTT value of >200 mg/dL)	**Dysglycemia:** ➢ Impaired Fasting Glucose (IFG) 100–125 mg/dL (5.6–6.9 mmol/L) ➢ Impaired Glucose Tolerance on OGTT 2-h PG 140–199 mg/dL ➢ A1c: 5.7–6.4%
➢ Education/monitoring of glucose to prevent DKA ➢ Medication: teplizumab (participation in prevention trials)	➢ Lifestyle modification with goal of weight loss ➢ Medication: metformin, semaglutide (others)

Standards of Medical Care in Diabetes. *Diabetes Care* (2023)

Why ICD-10-CM Codes for Early-Stage T1D?

- Stage 1 T1D is not adequately described by R76.8 (positive antibody test)
- Stage 2 T1D is dysglycemia but distinct from prediabetes (R73.03)
- Recognize the continuum of T1D begins before onset of insulin requirement
- Alert medical community to high-risk group
  - Progression from early to late stage can be rapid in young children
  - Historically marginalized groups are at higher risk of DKA
- Need for coding of those eligible for newly-approved therapy
- Differentiation from Type 2 Diabetes – Distinct pathophysiology and management
- Population screening will increase identification of early-stage population

Support: Leadership Diabetes Clinical and Research Organizations

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