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ISPAD 2024: Nuevas perspectivas

27 de noviembre 2024

Este evento está dirigido a profesionales de la salud de Argentina, facultados para prescribir

MAT-AR-2402203 – V1.0 – 11/2024

AGENDA

18 a 18:05	Bienvenida y presentación de agenda	Carolina Salvioli
18:05 a 18:20	Nuevos horizontes en diabetes tipo 1	Liliana Trifone
18:20 a 18:35	Experiencias Internacionales en implementación de la detección temprana de la diabetes	Carolina Martinez Mateu
18:35 a 18:55	Puesta al día en terapias automatizadas	Marcela Raggio
18:55 a 19:15	¿Qué hay de nuevo en diabetes tipo 2?	Adriana Roussos
19:15 a 19:35	La educación a través de las distintas etapas de la diabetes	Florencia Grabois
19:35 a 19:45	TRIVIA ¿Qué sabemos de las insulinas de 2da generación?	Carolina Salvioli
19:45 a 20	Q&A - Cierre & Conclusiones	Todo el panel

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Disertantes

Liliana Trifone

- Médica Pediatra SAP
- Especialista en Nutrición UBA
- Especializada en Diabetes
- Ex Jefa de Nutrición y Diabetes Hospital de Niños R. Gutiérrez
- Directora de Posgrado en Nutrición Pediátrica UBA

Carolina Martinez Mateu

- Médica pediatra
- Especialista en Nutrición Infantil
- Equipo Multidisciplinario de Diabetes Hospital J. P. Garrahan
- Docente de la Carrera de Especialistas en Nutrición Pediátrica de Universidad de Bs As.

Marcela Raggio

- Médica pediatra
- Especialista en nutrición infantil (UBA)
- Magister en Diabetes (USAL)
- Médica de staff Nutrición infantil Htal Universitario Austral y HMIT (Hospital Materno Infantil Tigre)
- Coordinación Módulo de pediatría Maestría diabetes SAD
- Docente Maestría de diabetes Universidad Austral

Adriana Roussos

- Médica pediatra
- Especialista en Nutrición.
- Jefa Sección Nutrición y Diabetes, Hospital de Niños R. Gutiérrez, CABA.
- Docente adscripta UBA, Pediatría.
- Docente de posgrado UBA, USAL, Barceló.

Florencia Grabois

- Médica pediatra
- Especialista en Nutrición Infantil UBA
- Docente de medicina Infantil UNCO
- Educadora Certificada en Diabetes UNSAM
- Hospital Provincial Neuquén
- Comité de Pediatría SAD
- Comité de Educación SAD

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Nuevos Horizontes en Diabetes tipo 1

#ISPAD50

Dra Liliana Trifone

consulta.ltrifone@gmail.com

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Trifone Liliana

- Médica Pediatra SAP
- Especialista en Nutrición UBA
- Especializada en Diabetes
- Ex Jefa de Nutrición y Diabetes Hospital de Niños R. Gutiérrez
- Directora de Posgrado en Nutrición Pediátrica UBA

Conflictos de interés:

- Disertante: Elli Lilly, Novo Nordisk, Sanofi, Medtronic
- Asesor: Sanofi, Elli Lilly, Novo Nordisk
- Investigación: Sanofi, Novo Nordisk, Medtronic

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Inteligencia Artificial en Diabetes

Tratamiento de la Diabetes

Esperanza y promesas por delante

VISIÓN INNOVADORA
DE LA DT1

Detección de DT1
Nuevas
Pautas de seguimiento

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CGM vs OGTT

Cambio de Paradigma

Consenso y nuevas guías de monitoreo

Revolucionando el Cuidado
De la DT1
Terapias de Vanguardia

Nuevos Biomarcadores en
Predicción de DT1

TERAPIA CELULAR EN DT1
HACIA PRÁCTICA CLÍNICA

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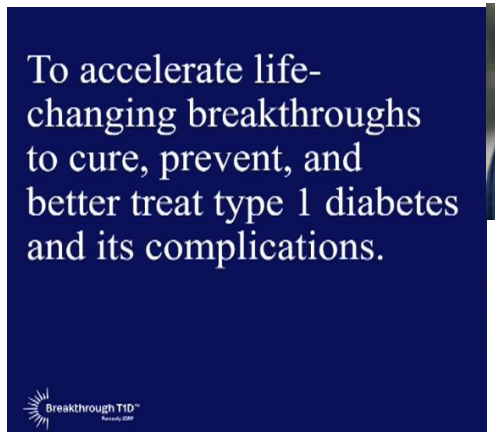
Simposio conjunto **Breakthrough T1D** (anteriormente JDRF)-ISPAD: Tratamientos para la diabetes tipo 1 (DT1):
Esperanza y promesas por delante




Sanjoy Dutta


Loredana Marcoveccio


Tabitha Randall

Prevención e Intervención en Diabetes tipo 1


Michaels Rickets


Chantal Mathieu

Cell Therapy for T1D: Gearing up toward Clinical Practice


Colin Dayan


Kimberly Simmons

Hay una oportunidad de tratamiento para cada estadio de la DT1

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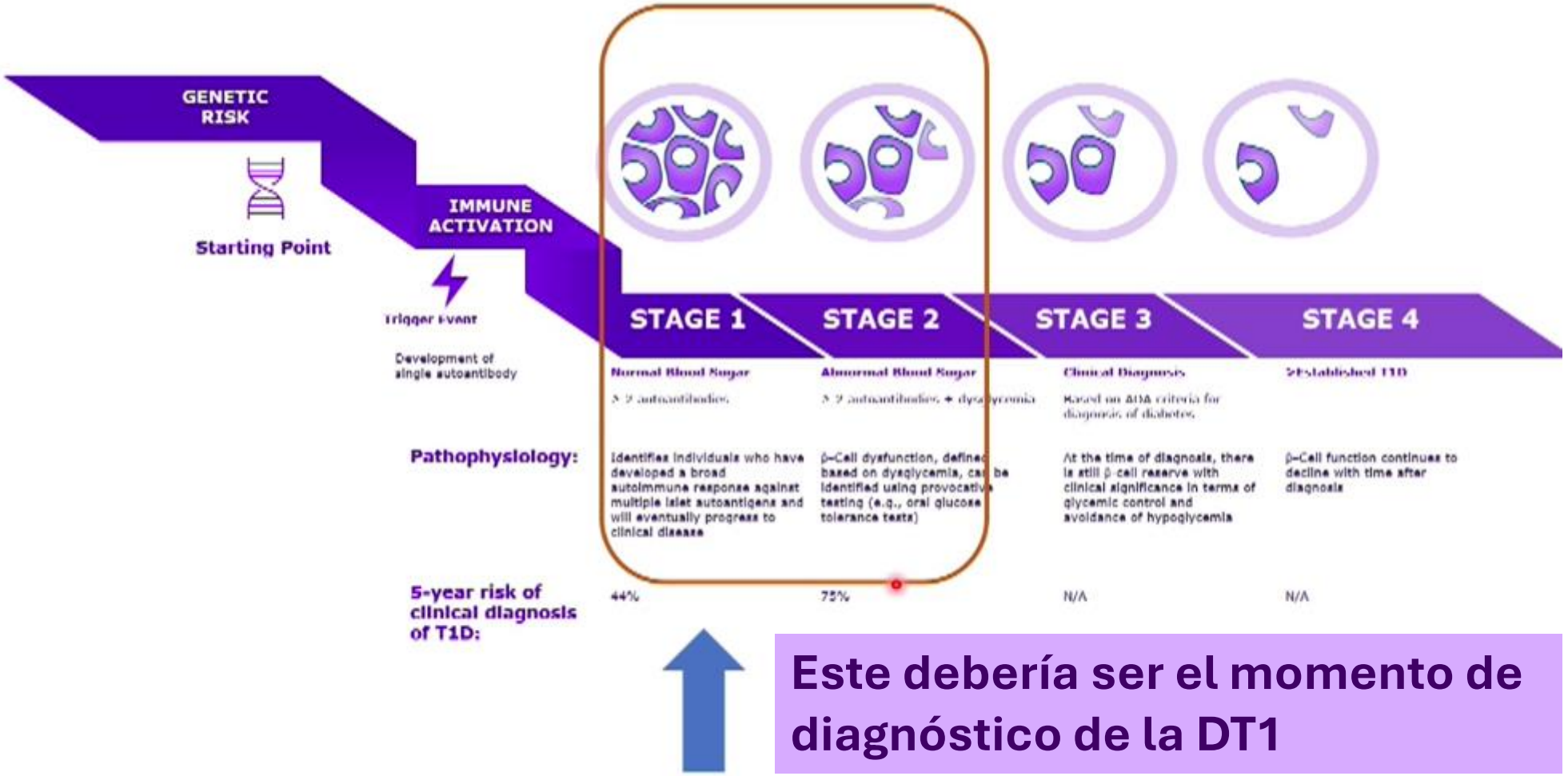
DT1: Tiempo de cambio

Chantal Mathieu



Este debería ser el momento de diagnóstico de la DT1

Sims EK, et. al. Diabetes 2022;71:610–3; Besser RE, et al. Pediatr Diabetes 2022;23:1175–87

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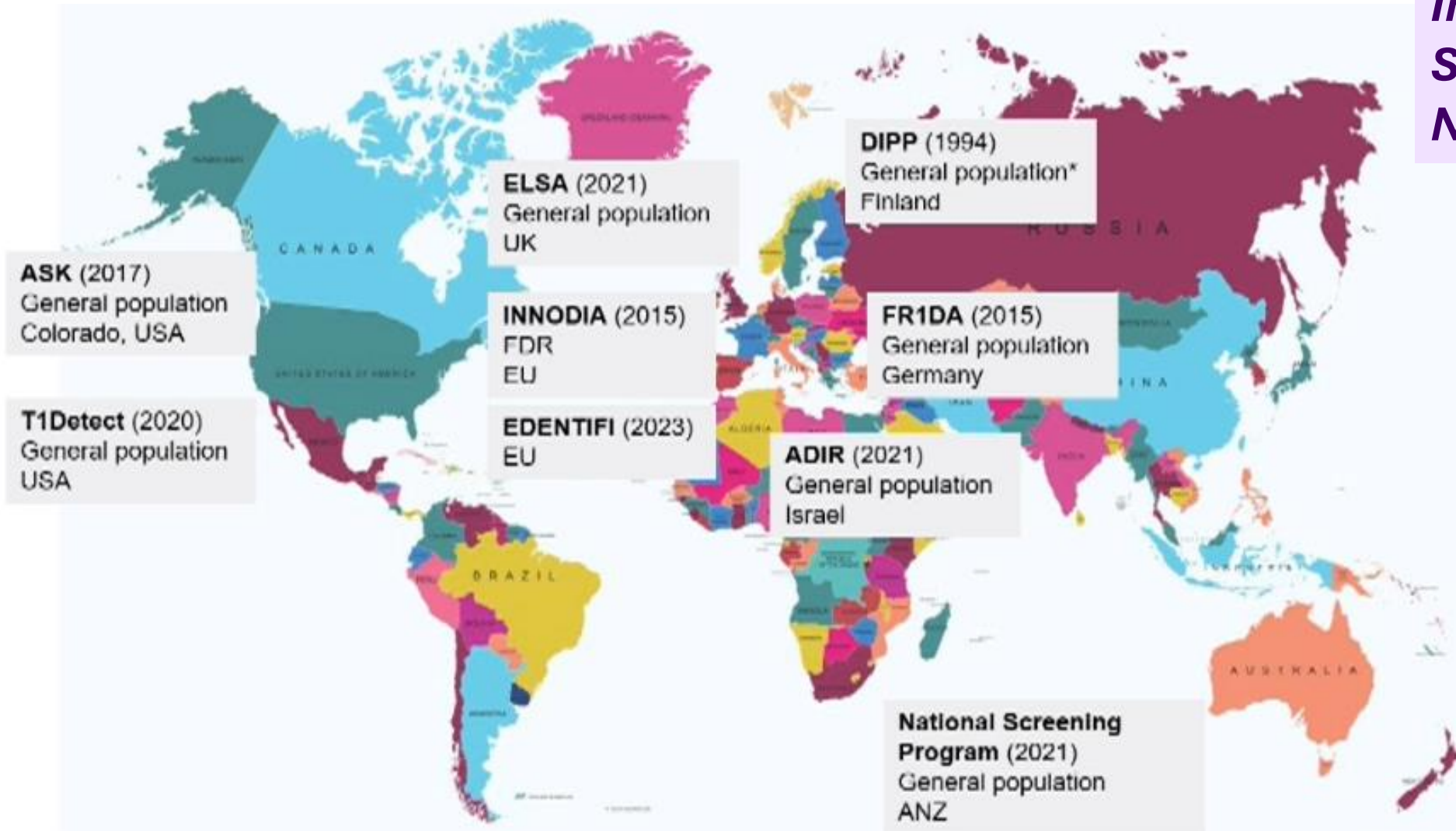
La detección temprana de la DT1 tiene beneficios inmediatos y a largo plazo

Iniciativas de Screening a Nivel Mundial



JDRF

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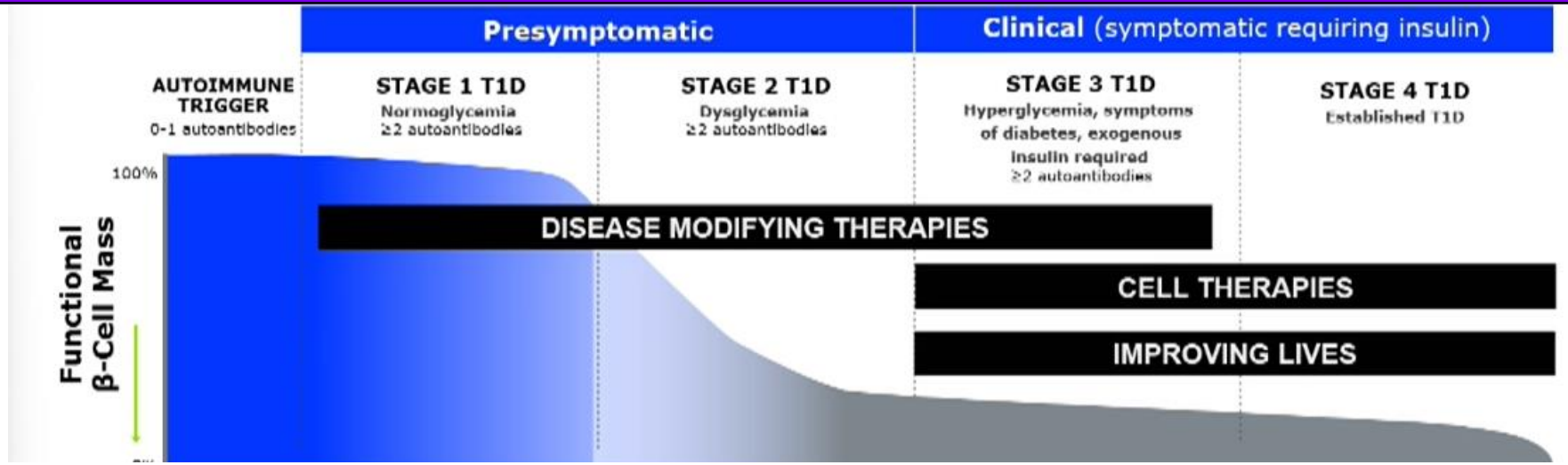
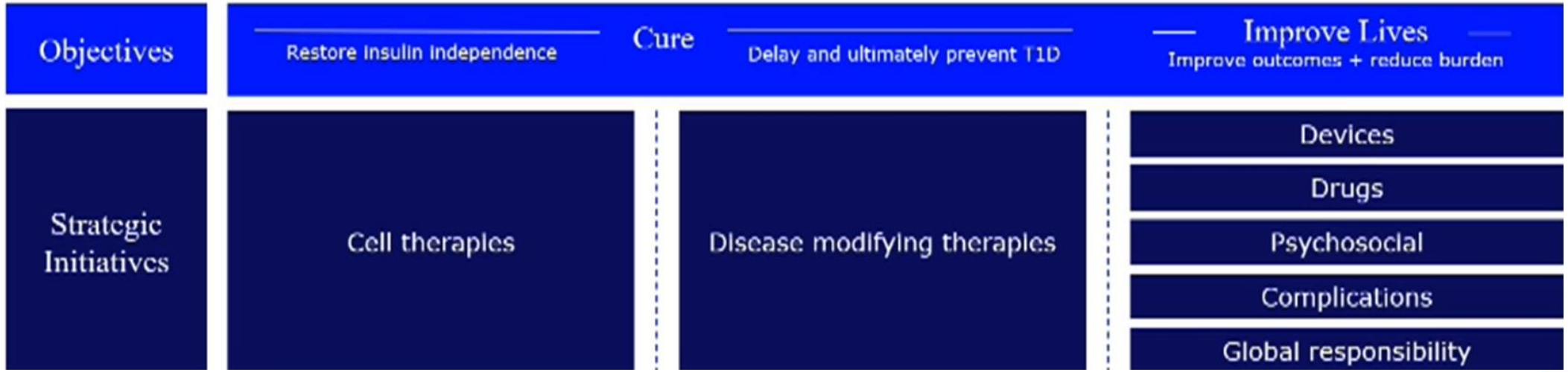
Misión Estratégica 2030: Crear estrategias focalizadas y prioritarias en todas las iniciativas de investigación hacia la cura de la Diabetes.

Breakthrough T1D™
Formerly JDRF





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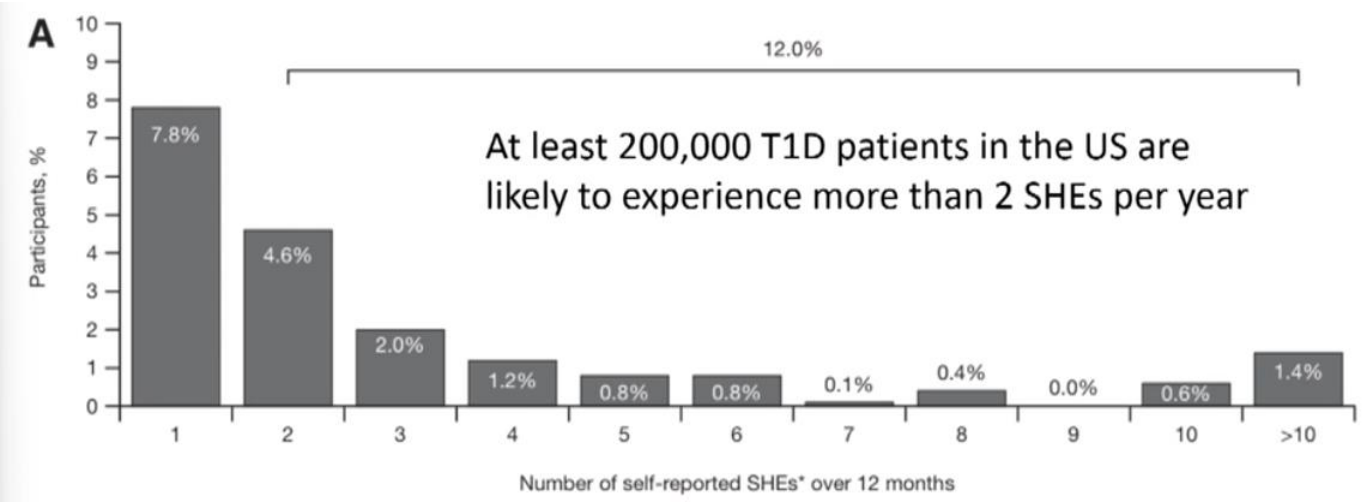
Severe Hypoglycemia and Impaired Awareness of Hypoglycemia Persist in People With Type 1 Diabetes Despite Use of Diabetes Technology: Results From a Cross-sectional Survey

Jennifer L. Sherr, Lori M. Laffel, Jingwen Liu, Wendy Wolf, Jeoffrey Bispham, Katherine S. Chapman, Daniel Finan, Lina Titievsky, Tina Liu, Kaitlin Hagan, Jason Gaglia, Keval Chandarana, Richard Bergenstal, and Jeremy Pettus

Diabetes Care 2024;47(6):941–947 | https://doi.org/10.2337/dc23-1765



At least 200,000 T1D patients in the US are likely to experience more than 2 SHEs per year

Key results

Only **57.7%** of all respondents reported **achieving target HbA1c <7%**

~20% of all respondents reported having **≥1 SHEs in past 12 months** including CGM users (16.6% of AID users, 19% of pump users, and 23% of MDI users)

12% of respondents had **≥2 SHEs** in previous 12 months

Approximately one-third of all respondents **reported IAH in past 12 months**, regardless of CGM or AID usage

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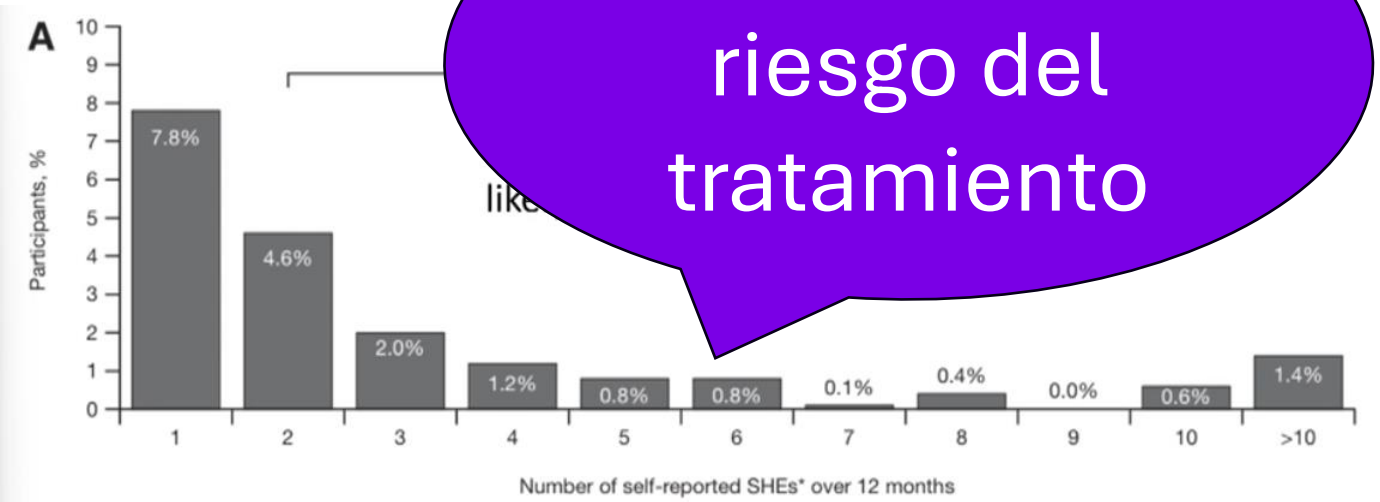
Diabetes Care 2024;47(6):941–947 | https://doi.org/10.2337/dc23-

Gran carga y riesgo del tratamiento



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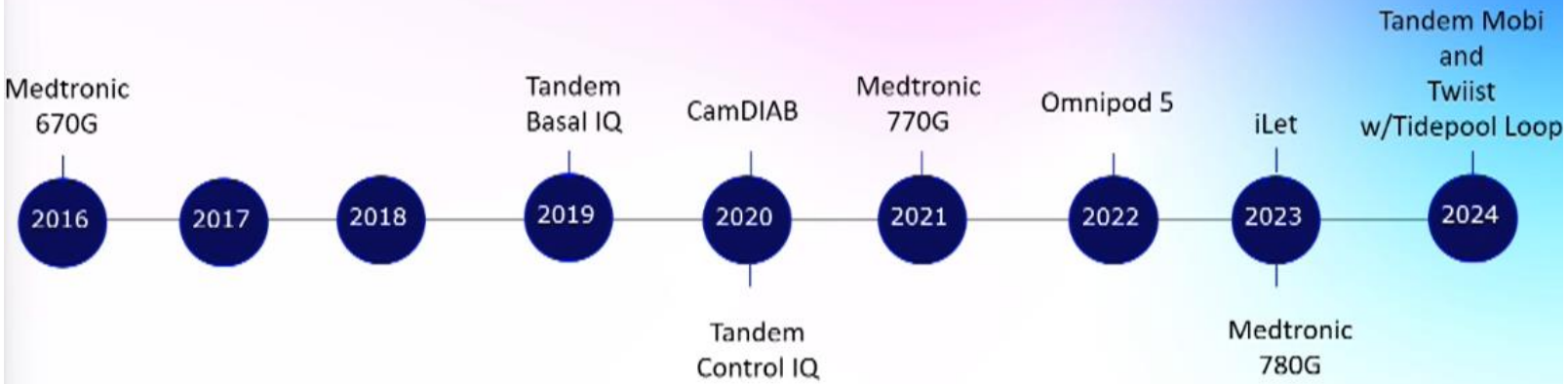
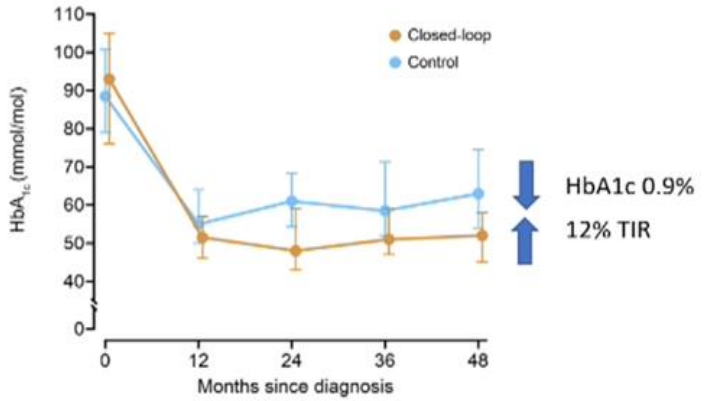
An explosion of AID systems



Are advanced technologies good enough?



59% meet ADA target <7% (53mmol/mol)
34% meet ISPAD target <6.5% (48mmol/mol)

re et al CLOuD Diab Care 2024

¿Son suficientes estos tratamientos desde el inicio en conservación de función celular β?

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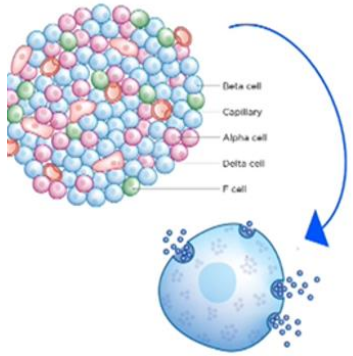
Restaurar la Producción de Insulina:

Terapias celulares

Objetivo: prevenir, detener o revertir la pérdida funcional de célula β

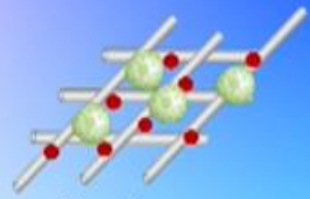


Our strategy: multiple approaches

Encapsulation

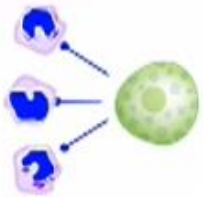
Physical barrier blocks immune attack while ensuring cell survival and function

Scaffolds



Engineered local environment keeps cells alive – multipurpose platform

Immune Modulation



Locally delivered drugs alter immune response, allowing cells to thrive

Gene Editing

Engineered cells to confer immune evasion and enhance survival

Breakthrough T1D™ Formerly JDRF

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Nueva fuente celular para la terapia con células de los islotes en desarrollo clínico para la diabetes tipo 1 complicada por hipoglucemia grave

Michaels
Rickets

VX-880 is an investigational allogeneic stem cell-derived, fully differentiated, insulin-producing **islet cell therapy**

VX-880 is delivered by an **infusion into the hepatic portal vein**

An induction (anti thymocyte globulin) and maintenance (tacrolimus and sirolimus) **immunosuppression regimen** is used to protect the cells from the immune system

The cellular delivery protocol and immunosuppression regimen have been established for deceased donor islet cell therapy (PHPI)

Figure adapted from Pagliuca et al. *Development* 140: 2472, 2013

Penn Medicine

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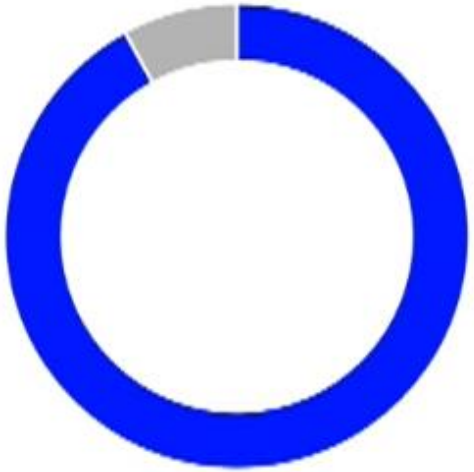
El ensayo clínico de Vertex para evaluar VX-880, una terapia de reemplazo de células Gen 1, está en marcha!

- **12** participants have received the full, target dose of cells
- All 3 individuals who received the therapy at least 12 months ago have eliminated hypoglycemic events and are fully off external insulin—**meeting the primary and secondary endpoints**
- There were **no significant side effects** related to VX-880
- The **trial has expanded** to enroll 20 more participants, to 37



11/12

participants have reduced or eliminated the need for external insulin

https://news.vrtx.com/news-releases/news-release-details/vertex-announces-positive-results-ongoing-phase-12-study-vx-880

Enfoques actuales y futuros para el reemplazo de células de los islotes

Michaels Rickets

KEY: Current Proof-of-Concept Future

β-cell source	Transplant site	Protection from the immune system
Allogeneic islets isolated from a deceased donor	Intrahepatic, via portal vein infusion	Induction and maintenance immunosuppression
Allogeneic islets derived from a human pluripotent stem cell line[3]	Intra-omental, via thrombin bio-scaffold[1] Sub-anterior rectus sheath[4]	Induction immunomodulation with operational tolerance[2]
Autologous islets derived from an inducible pluripotent stem (iPS) cell line[4]	Intramuscular	Immune evasion via genetic engineering[5] or local immunosuppression
Xenogeneic islets isolated from a pathogen-free porcine herd	Subcutaneous, via a device-less space or cell-permeable or -impermeable device	Immune protection via macroencapsulation device

1. Baidal et al. *N Eng J Med* 376: 1887, 2017
2. Wisel et al. *Transplant Int* 36: 1, 2023
3. Reichman et al. *EASD* LBA31(OP6), 2024
4. Wang et al. *Cell* 187, 1, 2024
5. Hu et al. *Cell Stem Cell* 31: 334, 2024

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Reversing the Course of T1D

Disease-modifying therapies (DMTs) are therapies that change the course of a disease aimed at people **at every stage of T1D**

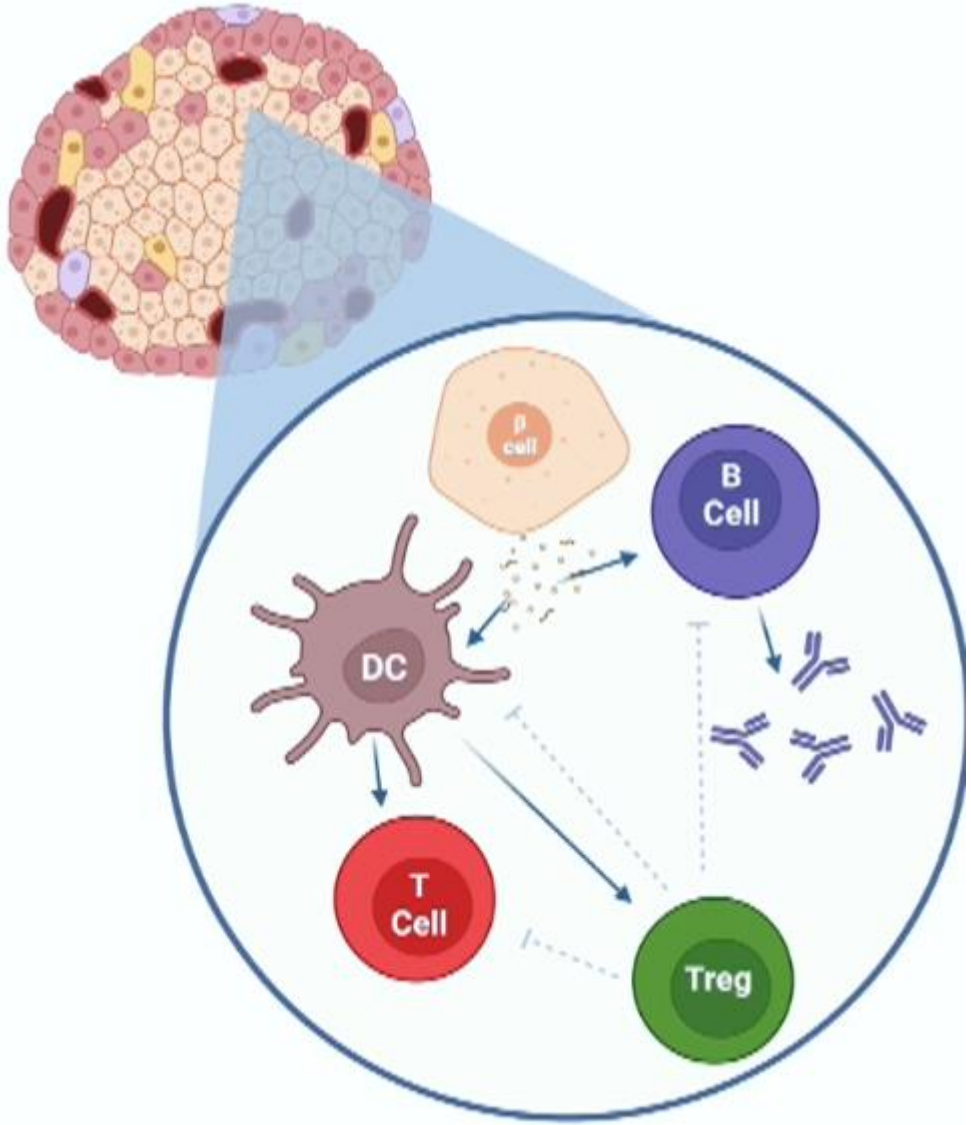
Goal:

Prevent, halt, or reverse the loss of functional beta cells

How?:

- Rebalancing the immune system
- Preserving/regrowing beta cells

Several DMTs are in Breakthrough T1D-supported clinical trials around the world- and one has been approved by the FDA!



Breakthrough T1D™
Formerly JDRF

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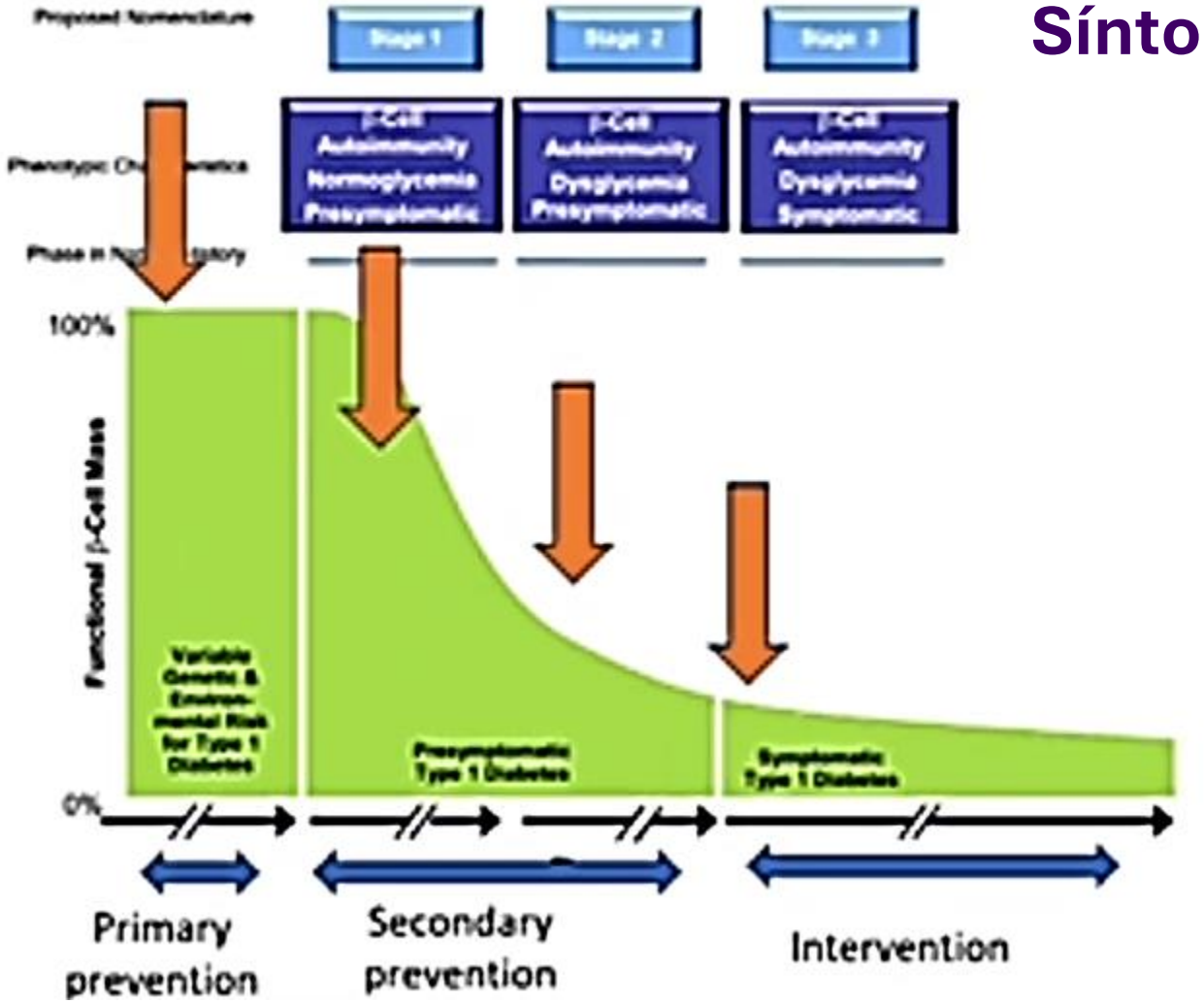
Cambiando el Paradigma en el manejo de la Diabetes tipo 1

Tabitha Randall



Síntoma → Intervención

1. **Novedades en la Intervención**
2. **Desafíos en la implementación**

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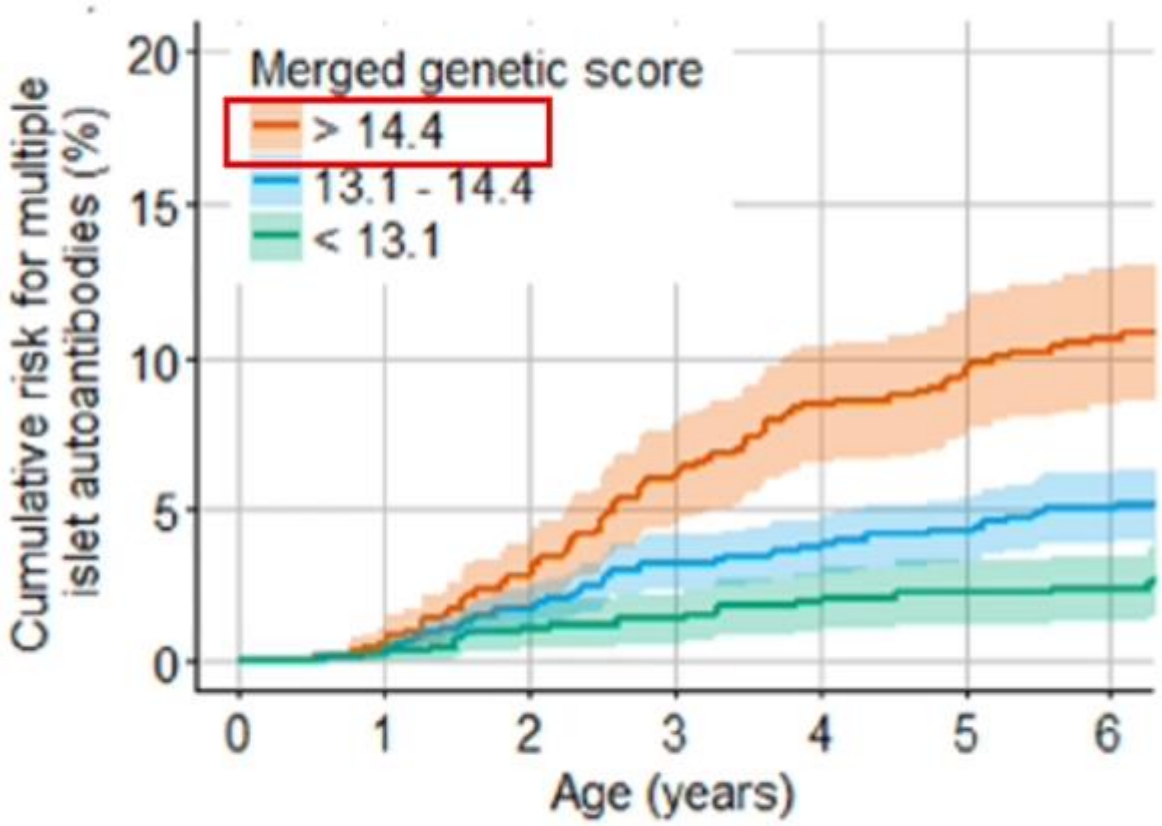
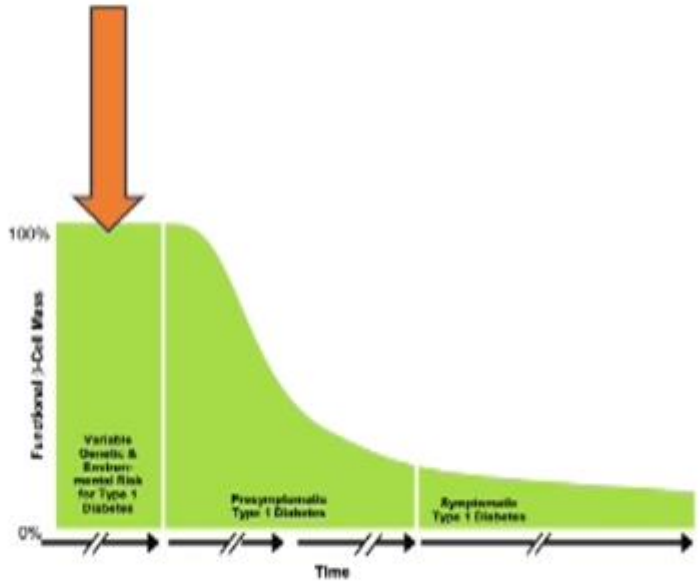
Prevención Primaria: Prevención de anticuerpos



Bonifacio Plos Medicine 2018

GPPAD



Ziegler BMJ Open 2019 and 2021

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GPPAD A WORLD WITHOUT 1

INGR1D

Freder1k: Detección temprana para recién nacidos de hasta 7 días de edad

5 Countries, 9 clinical sites

POInT
PRIMARY ORAL INSULIN TRIAL

Oral insulin v Placebo

Age 4-7 months

SINT1A

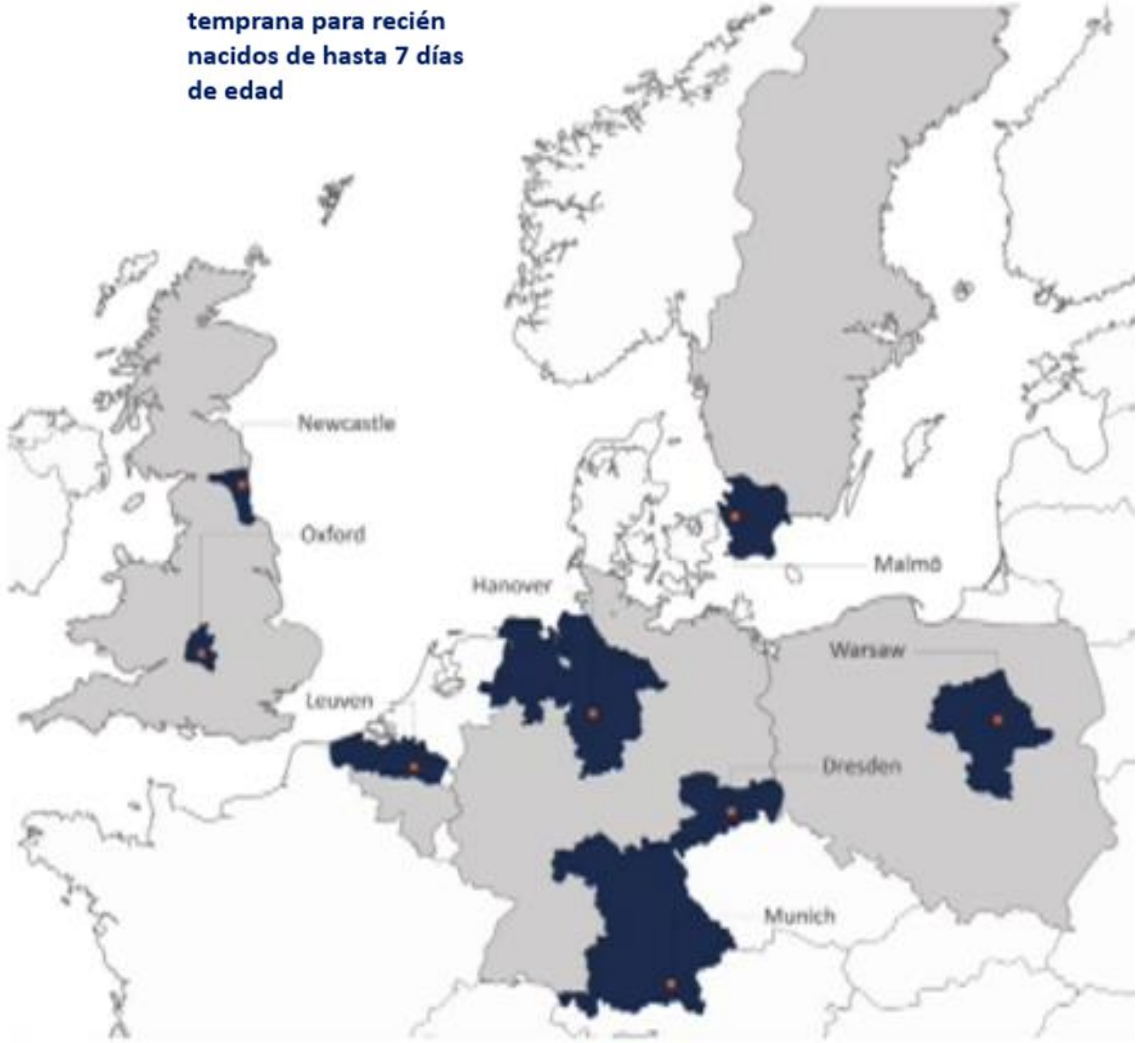
Probiotic v Placebo

Up to 6 weeks

AVANT1A

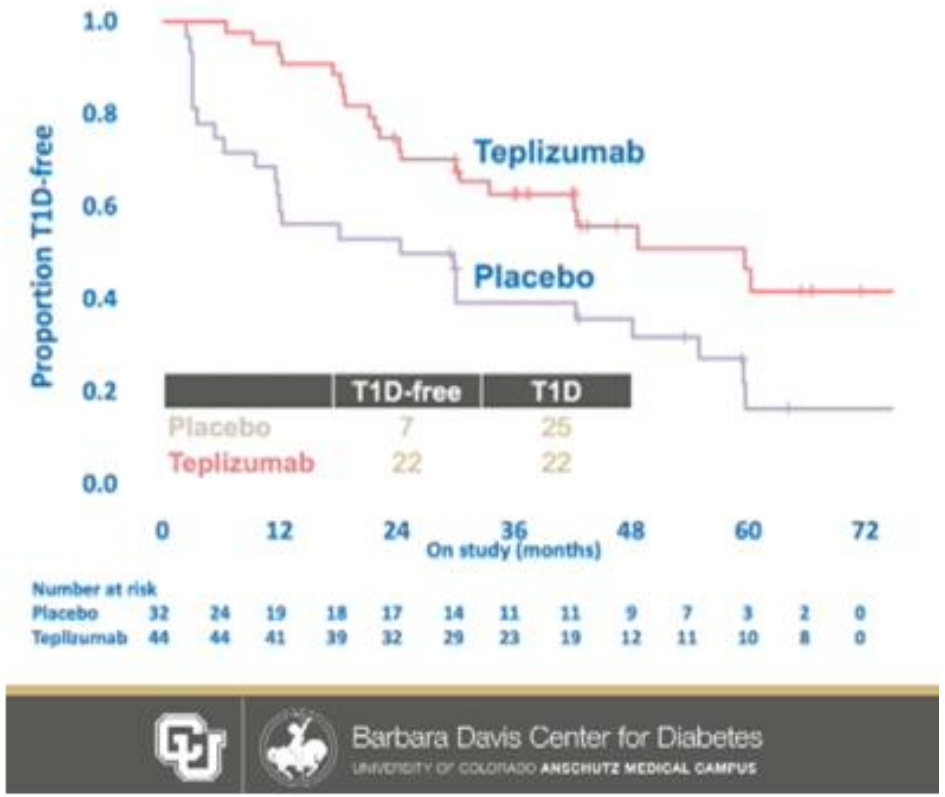
Covid 19 vaccine v Placebo

By age 6m, 6 weeks later, further 8 weeks



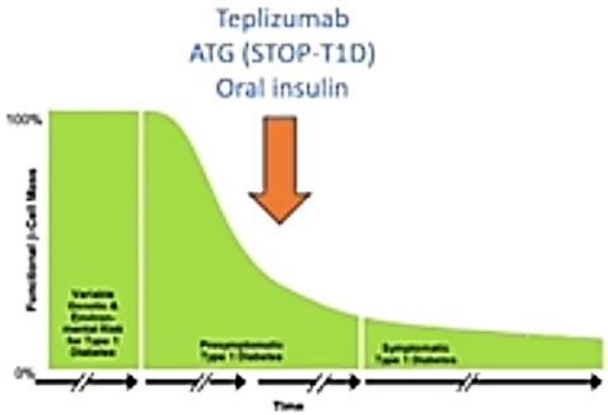
Comienza una nueva era

Estadio 2: Tratamiento temprano



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.,



Teplizumab aprobado por la FDA como el primer y único tratamiento indicado en Estadio 2 de DM para retrasar la aparición de la etapa 3 de la diabetes tipo 1 (DT1)

Noviembre 2022

Teplizumab no se encuentra aprobado en Argentina

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No hay tratamientos disponibles para atacar la fisiopatología autoinmune subyacente y afectar la trayectoria de la enfermedad

Dos tipos de terapias que pueden ser utilizadas en la DT1:

Terapia con Insulina

Reemplazar insulina endógena con inyecciones regulares o bombas

Inmunoterapia

Reprogramar el Sistema immune para que no destruya células beta

La inmunoterapia tiene el potencial de retrasar el debut de la DT1 e incluso prevenirla por completo

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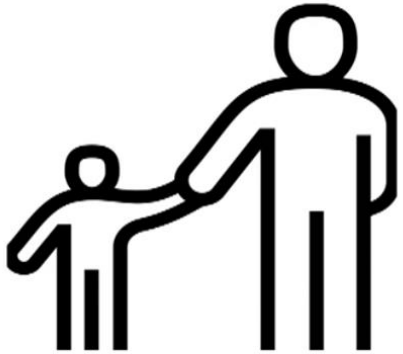
Kimberly Simmons

Real-World Numbers

Real-World Numbers

n=322
since launch
**only reflects patients enrolled in COMPASS program*



Age 8-17 years
n=136 (42%)

Age ≥ 18 years
n=186 (58%)

Barbara Davis Center for Diabetes
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

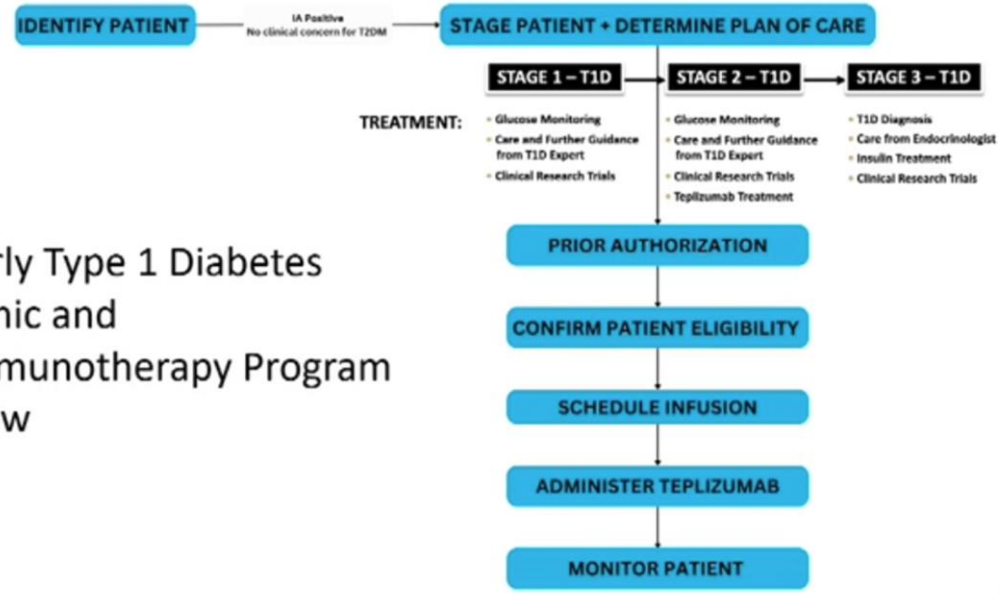
BDC Early T1D Clinical Experience

- Early T1D Clinic opened 12/9/2022
- 104 referrals, 98 new patient clinical visits
- 67 patients completed full metabolic staging
  - 40 youth
  - 27 adults

Barbara Davis Center for Diabetes
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Data as of 10/12/2024

Early Type 1 Diabetes Clinic and Immunotherapy Program Flow



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Kimberly Simmons

Estadios y Metabolismo HC

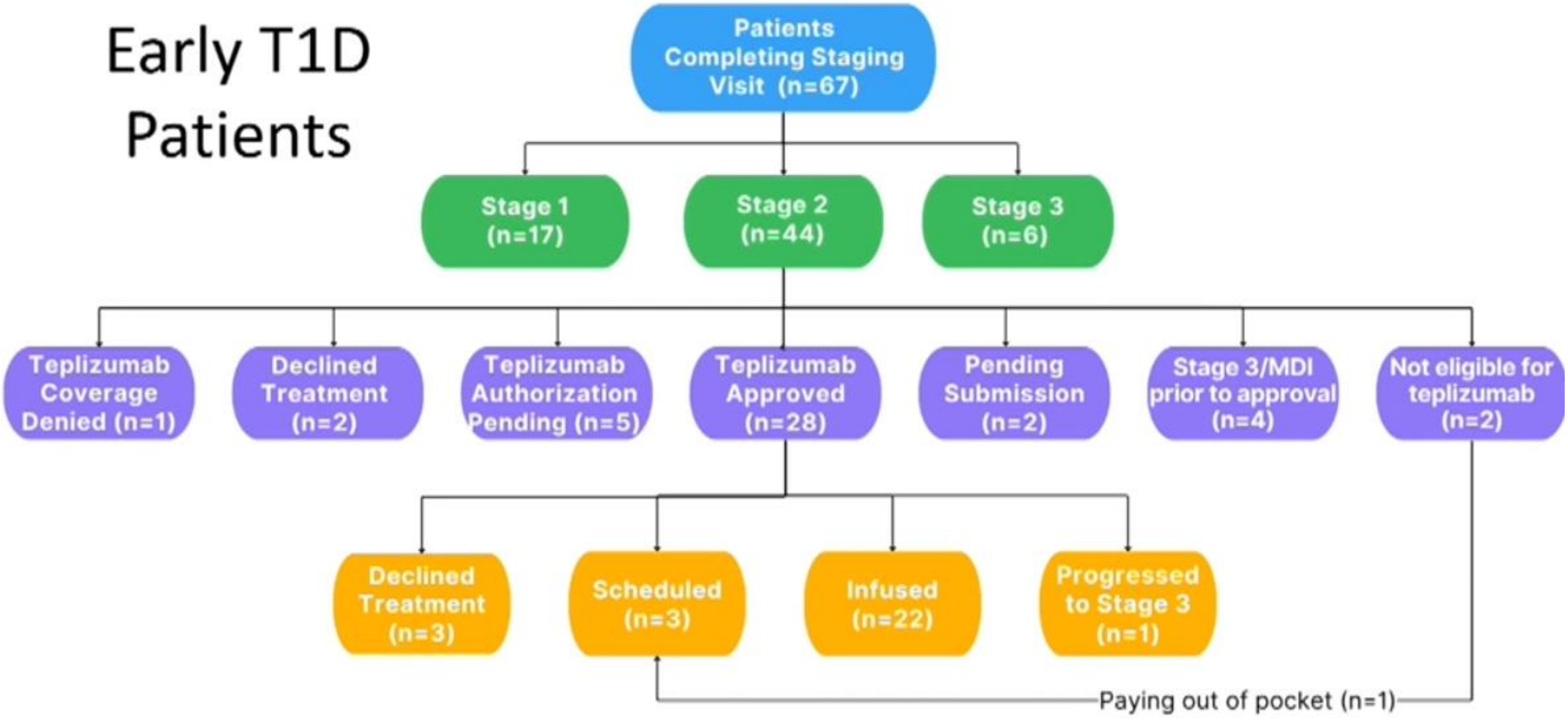
Stage of T1D by Monitoring Tool Used in Early T1D Clinic (n=36)

	Stage 1	Stage 2	Stage 3
HbA1c	16	18	2
Fasting Blood Glucose	24	16	6
2-Hour OGTT Glucose	14	9	13

Stage 1 (n=9), CGM time ≥ 140 mg/dl (7.8 mmol/L) 2 to 21%
Stage 2 (n=25), CGM time ≥ 140 mg/dl (7.8 mmol/L) 2 to 67%
Stage 3 (n=2), CGM time ≥ 140 mg/dl (7.8 mmol/L) 46% to 56%

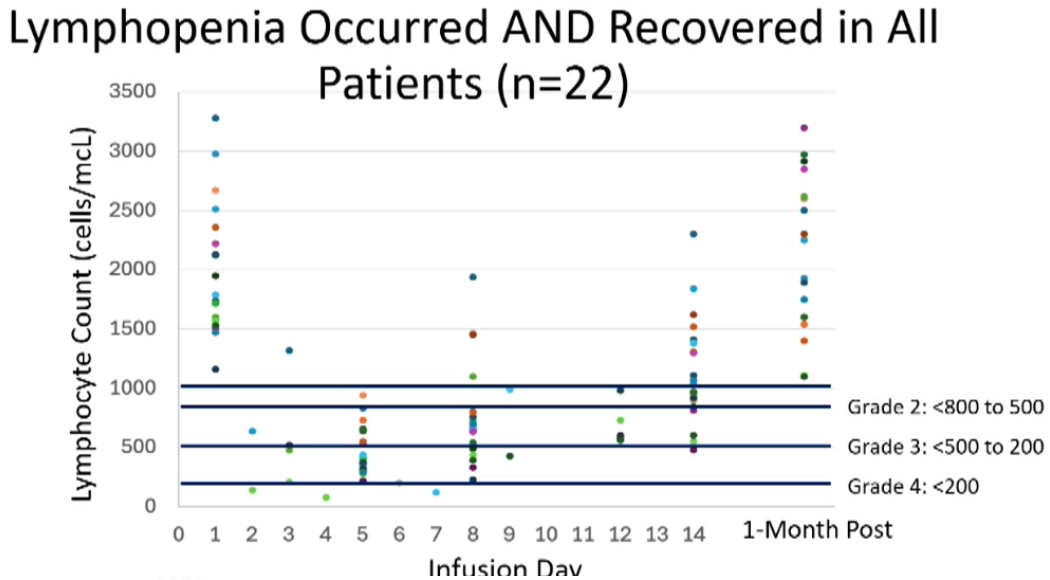
Patient eligibility varies by tool used to evaluate for dysglycemia.
To date, only 4 of 67 patients in stage 2 met stage 2 criteria for all categories.

Early T1D Patients

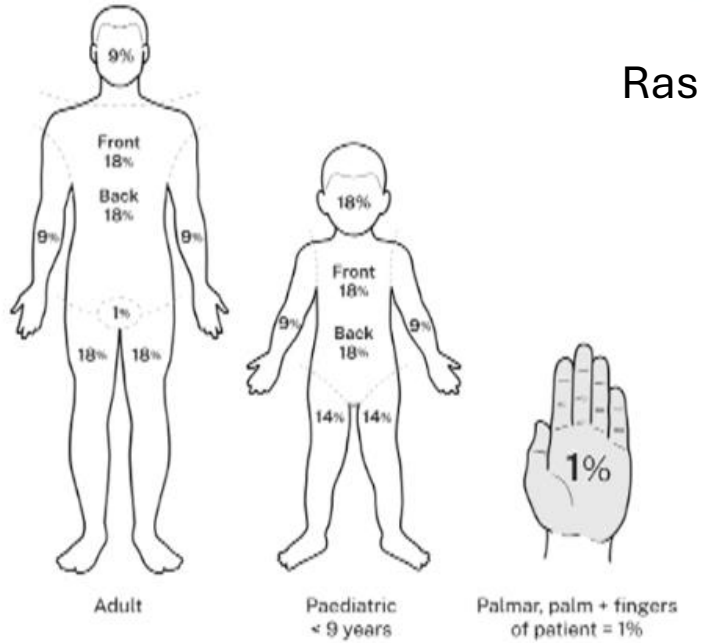


Apertura del centro 10 /04/2023
Completaron el tratamento
22 individuos al 14/10/2024

Age:	Mean 23 years, Range 10-55 years
	50% <20 years, 50%>20 years
Sex:	59% (n=13) female, 41% (n=9) male
Race:	82% (n=18) White, 14% (n=3) Hispanic,
	4% (n=1) Asian
FDR :	32% (3 sibs, 2 parents, 1 aunt, 1 uncle)



Rash



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Teplizumab Side Effects

	Clinical Trials N=791	BDC N=22
Lymphopenia	**80% (632)**	**100% (22)**
Nausea	20% (155)	**91% (20)**
Leukopenia	**63% (501)**	**82% (18)**
Rash	35% (273)	**77% (17)**
Headache	27% (215)	**59% (13)**
AST increased	28% (222)	41% (9)
ALT increased	27% (210)	41% (9)
Neutropenia	40% (313)	36% (8)
Thrombocytopenia	22% (172)	18% (4)
Cytokine Release Syndrome (CTCAE Version 5.0 grade 2, with hypotension responsive to IV fluids)	5.8% (4)	14% (3)
Anemia	29% (228)	5% (1)

Side Effect Mitigated with Pre-Medications and OTC and RX Treatments

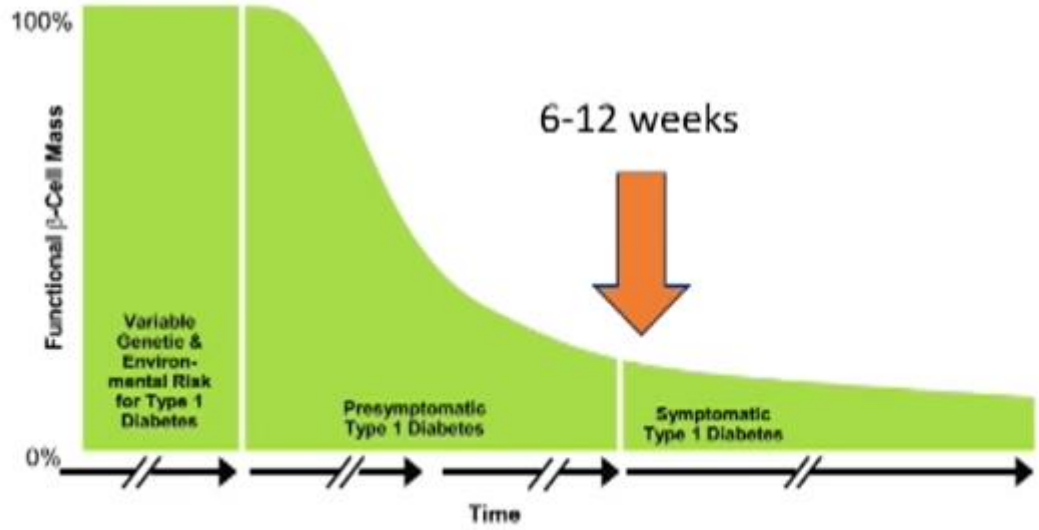
- Pre-medications
  - Diphenydramine
  - Ibuprofen
  - Famotidine
- PRN
  - Tylenol
  - Zofran
  - Topical Benadryl cream, hydrocortisone cream
  - Loratidine
  - Lansoprazole, Miralax

Tabitha Randall

Estadio 3
Objetivo: Preservar la Función pancreática que queda

Shown efficacy

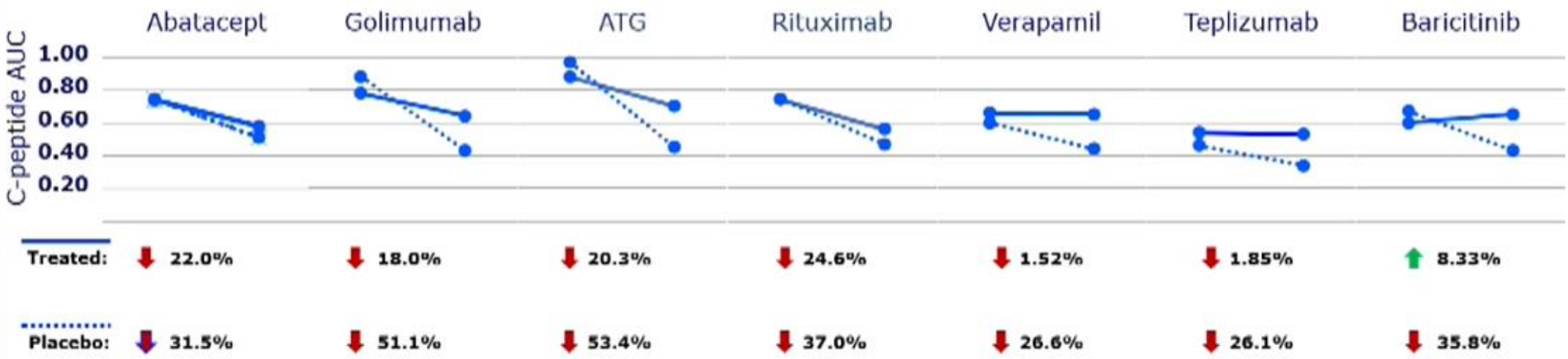
- Teplizumab
- ATG
- Ritiximab
- Abatacept
- Alefacept
- Golimumab
- Ustekinumab
- Imatinib
- Baracitinib
- Verapamil



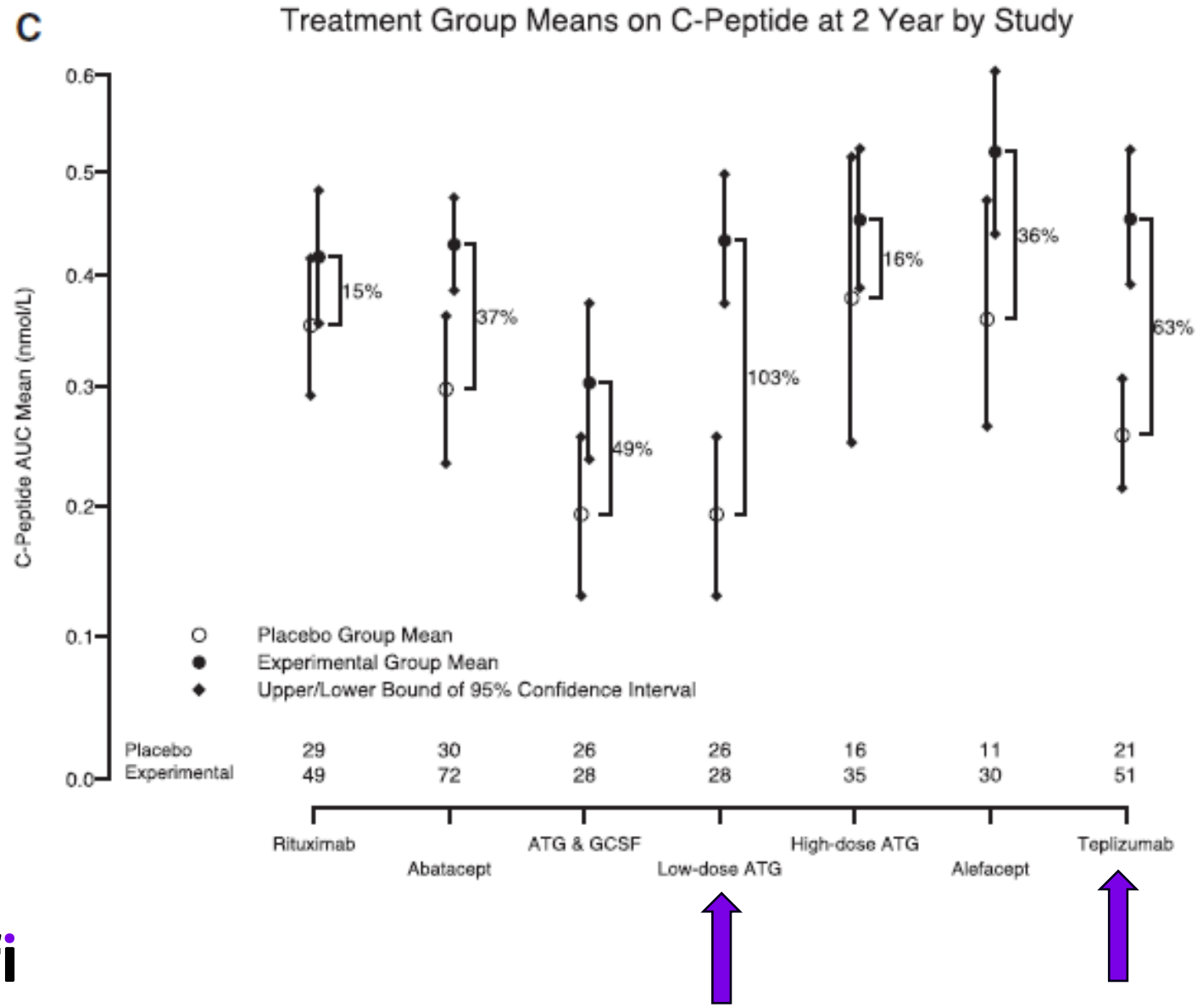
Sanjoy Dutta

7 DMTs Showing Preservation of C-peptide following 1 Year of Treatment in Stage 3

(C-peptide, baseline vs endpoint)



¿Todas las inmunoterapias son iguales?



New studies

Recruitment complete

Vera T1D

MELD (ATG)

IMPACT

CFZ533 (Iscalimab)

ITAD

JACOBSEN ET AL.
DIABETES TECHNOLOGY & THERAPEUTICS
Volume 22, Number 12, 2020

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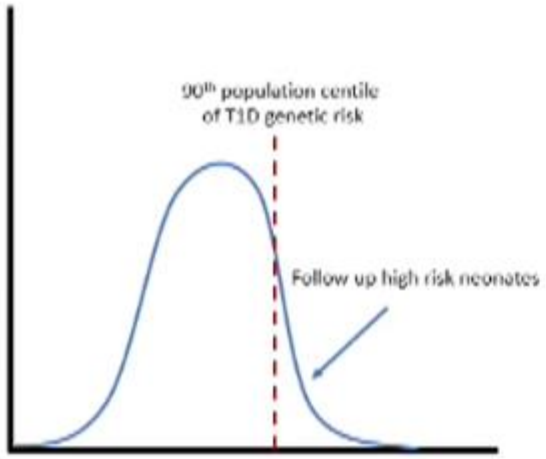
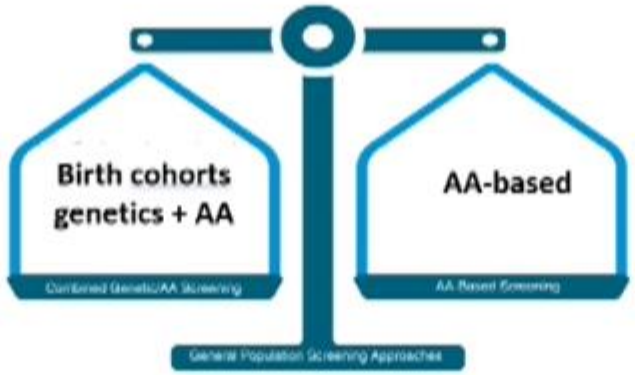
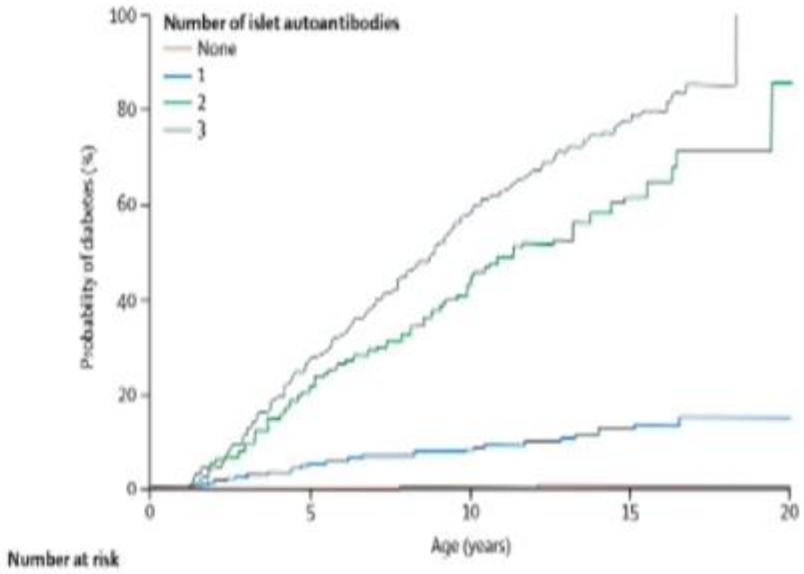
Screening, ¿Cómo?



Dayan Besser Science 2021



Adapted from Sims Diabetes 2022



Ziegler JAMA 2013

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Screening, ¿quiénes?

Familiares de pacientes con Diabetes vs población general

15 veces más riesgo en familiares

5% vs 0,3 % en población general

1. Eurodiab Ace Study Group and The Eurodiab Ace Substudy 2 Study Group. Diabetologia. 1998;41(10):1151-6. 2. Karges B, et al. Diabetes Care. 2021;44(5):1116-24. 3. Hemminki K, et al. Diabetologia. 2009;52(9):1820-8. 4. Parkkola A, et al. Diabetes Care. 2013;36(2):348-54. 5. Turtinen M, et al. Diabetologia. 2019;62(11):2025-39. 6. Sims EK, et. al. Diabetes 2022;71:610-3. 7. Besser REJ, et al. Arch Dis Child. 2022;107:790-5.

Screening, ¿quiénes?

Individuals diagnosed with T1D:

EURODIAB ACE Study[1]	Diabetes Prospective Follow-up Registry[2]	Swedish Multigeneration Register[3]	Finnish Pediatric Diabetes Register[4,5]
2–17%	6.6%	10.3%	10.4–12.2%

Have a first-degree relative with aT1D

Given that **only ~10% of cases** of aT1D are familial,[1–5] **screening for T1D in the general population is important** to identify individuals with presymptomatic disease but no family history of T1D. Benefits of screening include[6,7]:

- Reduction of DKA
- Fewer hospitalizations
- Time to prepare for T1D
- Access to clinical trials

1. Eurodiab Ace Study Group and The Eurodiab Ace Substudy 2 Study Group. Diabetologia. 1998;41(10):1151-6. 2. Karges B, et al. Diabetes Care. 2021;44(5):1116-24. 3. Hemminki K, et al. Diabetologia. 2009;52(9):1820-8. 4. Parkkola A, et al. Diabetes Care. 2013;36(2):348-54. 5. Turtinen M, et al. Diabetologia. 2019;62(11):2025-39. 6. Sims EK, et. al. Diabetes 2022;71:610-3. 7. Besser REJ, et al. Arch Dis Child. 2022;107:790-5.

General population screening for early T1D

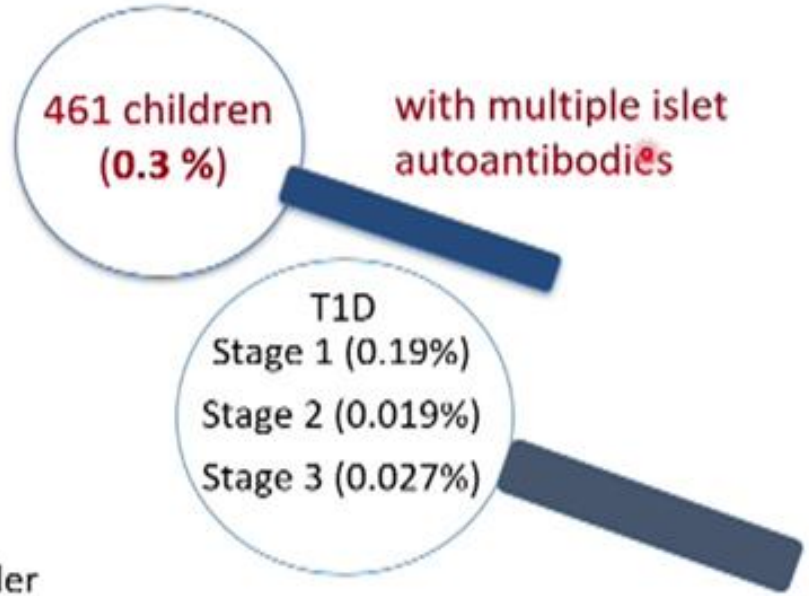
Fr1da

Typ 1 Diabetes: Früh erkennen – Früh gut behandeln

In cooperation with > 600 primary care pediatricians in Bavaria, Germany

Capillary blood

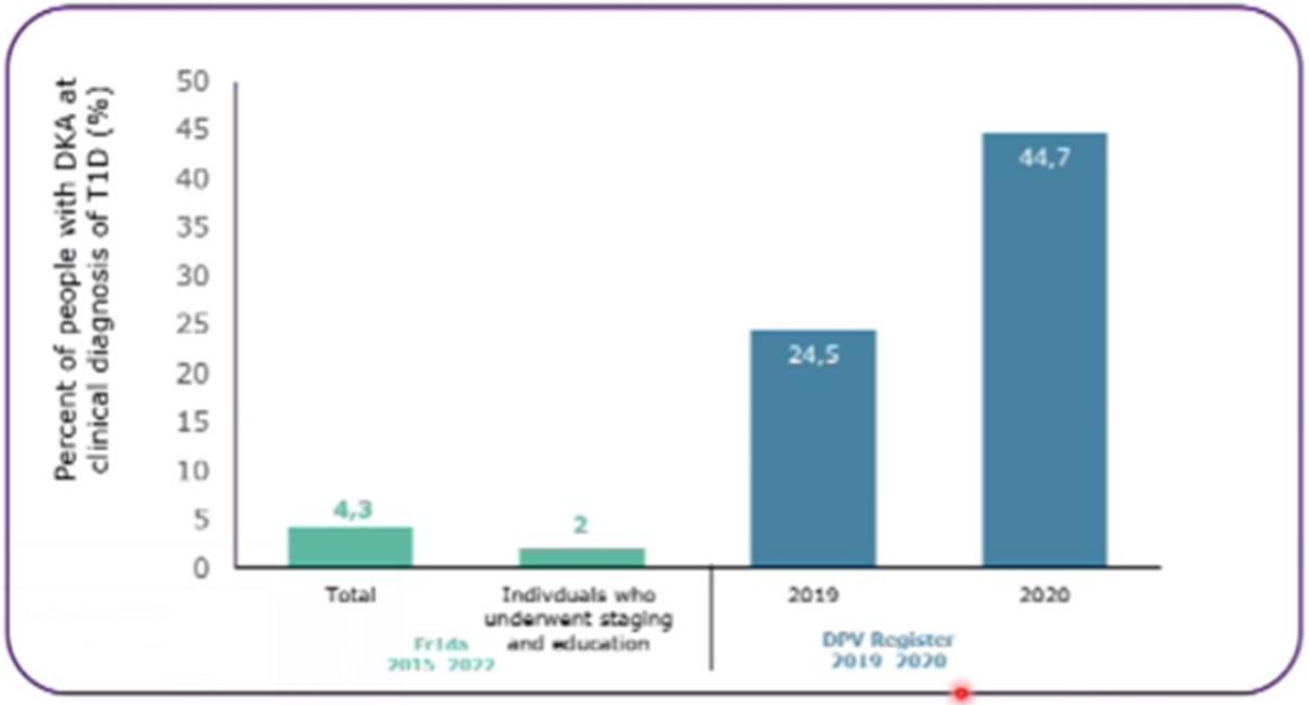
Since 2015:
160,631 participants;
Age 1.75 – 10.99 years



Ziegler, JAMA 2020;
Raab, BMJ open 2016
Ziegler, Diabetes Technol Ther 2016

Courtesy of A. Ziegler

The rate of diabetic ketoacidosis is drastically reduced in individuals previously screened for early stage T1D compared with those from the background population



Fr1da

Typ 1 Diabetes: Früh erkennen – Früh gut behandeln

Kamrath C et al. JAMA. 2020 Aug 25;324(8):801-804
Ziegler AG et al. JAMA. 2020 Jan 28;323(4):339-351

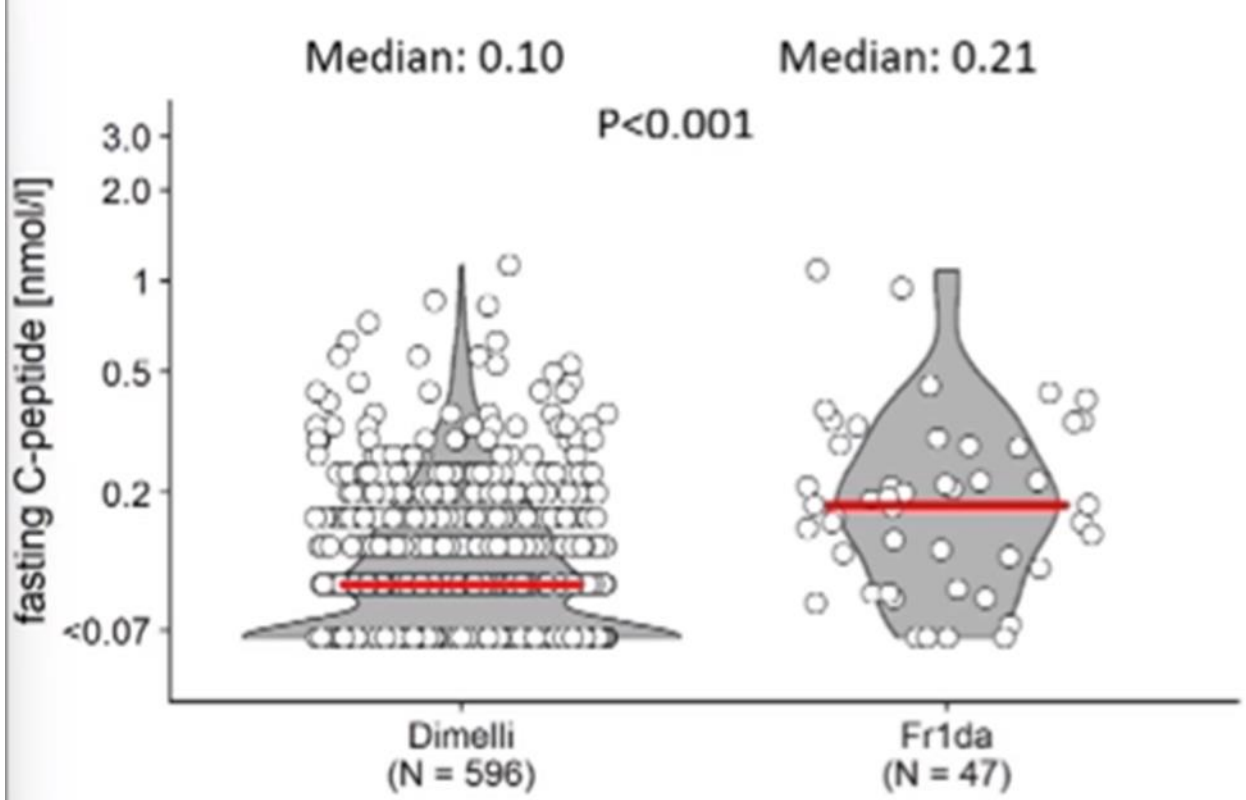
Raab, BMJ open 2016
Ziegler, Diabetes Technol Ther 2016

Courtesy of A. Ziegler

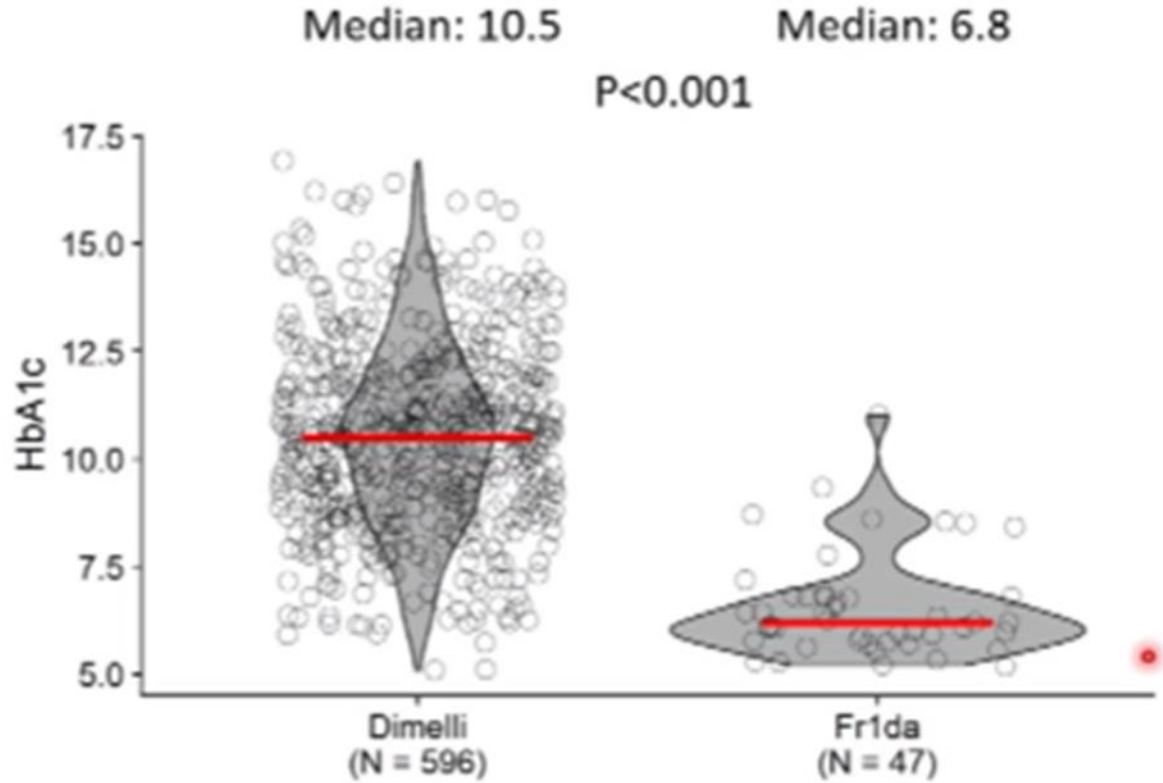
Children diagnosed with presymptomatic T1D through public health screening have milder diabetes at clinical manifestation

Fr1da
Typ 1 Diabetes: Früh erkennen – Früh gut behandeln

Fasting C-Peptide at clinical manifestation



HbA1c at clinical manifestation



DiMelli
Studie zur Untersuchung von neu aufgetretenem Diabetes mellitus im Kindes- und Jugendalter

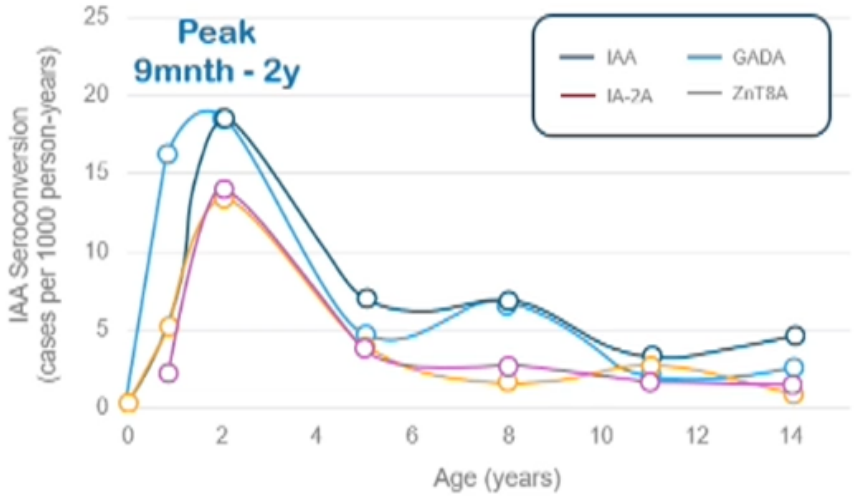
New onset register cohort in children in Bavaria, Germany

Hummel S et al. Diabetologia. 2023 Sep;66(9):1633-1642

Screening, ¿cuándo?

Challenge 3: Screening – when?

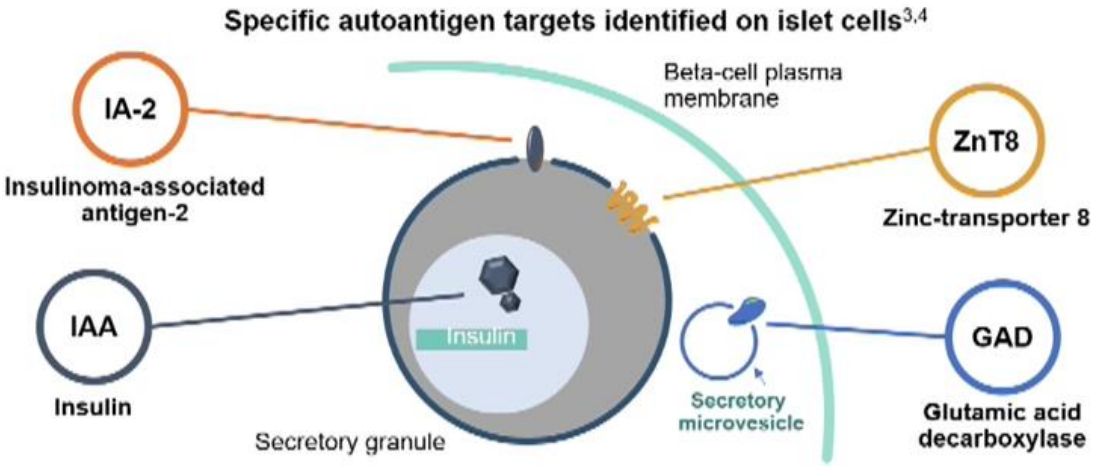
80% children develop antibodies by 6 years



Ziegler et al. Diabetologia 2012, Bonifacio Diab Care 2019, Ghalwash Lancet Diab End 2022

One screen approach: 3-4 y

Multiple time points improves sensitivity e.g. 2,6,10 y



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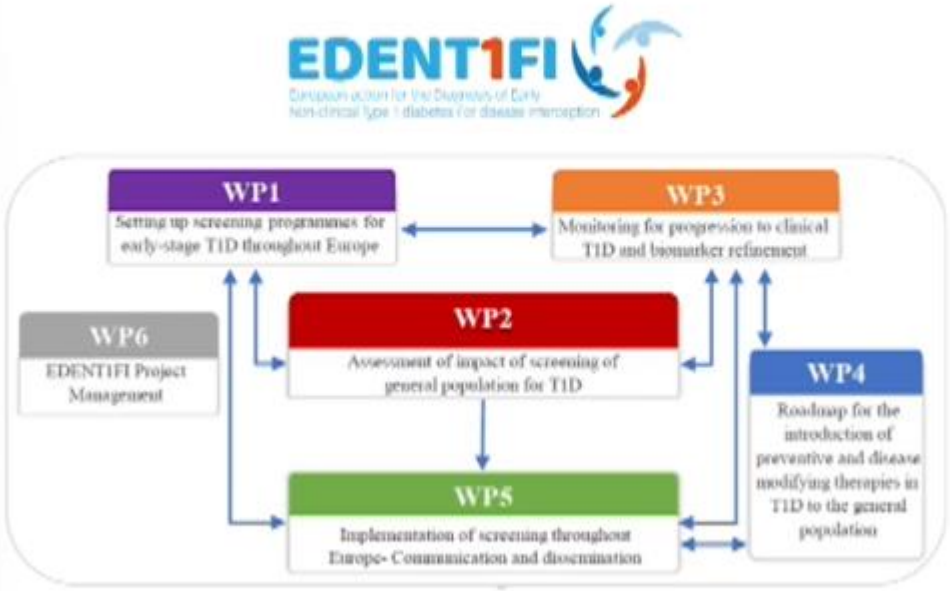
Integrar el screening en los Sistemas de control de salud



Fr1da
Typ 1 Diabetes: Früh erkennen – Früh gut behandeln

Well child check 2-5y – 11y

Hb testing 9-18mnth, 2-5y

TYPE 1 DIABETES
National Screening Program

Newborn, 2 + 6 + 10y
< 1y vaccinations, school

UNISCREEN

Health check 2+ 6 + 10y

T1Early

Vaccination 3-5y

Estandarización de los ensayos utilizados en el screening poblacional

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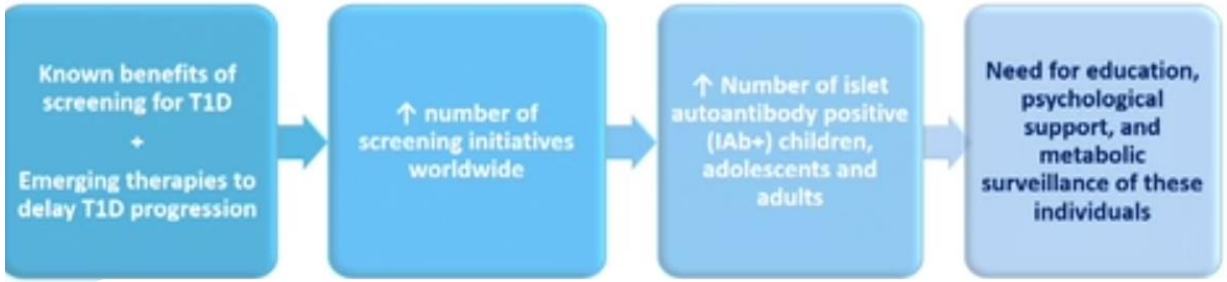
Loredana Marcoveccio

Highlights
Monitoreo post Screening

1. Actualización Guías ISPAD 2024 en screening, estadios y estrategias de preservación de célula β

2. CONSENSO en guías de monitoreo en individuos con Auto anticuerpos positivos

Por qué necesitamos GUÍAS



Loredana Marcoveccio

- Prevención de CAD Menor internación
- Identificar y monitorear intervenciones terapéuticas para retrasar el Debut
- Educar sobre inicio Insulinoterapia
- Evitar diagnóstico erróneo de DM2 y rerasar inicio de insulina
- Referir para estudios de investigación

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Michael Haller

Clinical guidance

Clinical Care Advice for Monitoring of Islet Autoantibody Positive Individuals with Presymptomatic Type 1 Diabetes

Diabetes/Metabolism Research and Reviews

RESEARCH ARTICLE | Open Access

Clinical care advice for monitoring of islet autoantibody positive individuals with presymptomatic type 1 diabetes

A. Emile J. Hendriks, M. Loredana Marcovecchio, Rachel E. J. Besser, Ezio Bonifacio, Kristina Casteels, Helena Elding Larsson, Gita Gemulla, Markus Lundgren, Olga Kordonouri, Roberto Mallone, Flemming Pociot, Agnieszka Szypowska, Jorma Toppari, Thekla von dem Berge, Anette G. Ziegler, Chantal Mathieu, Peter Achenbach, on behalf of the INNODIA consortium, the Fr1da Study Group and the GPPAD Study Group,

First published: 20 February 2024 https://doi.org/10.1002/dmrr.3777

Expert consensus was obtained from members of the Fr1da, GPPAD, and INNODIA consortia, three European diabetes research groups.

Loredana Marcoveccio

Consensus Guidance for Monitoring Individuals With Islet Autoantibody–Positive Pre-Stage 3 Type 1 Diabetes

Moshe Phillip, Peter Achenbach, Ananta Addala, Anastasia Albanese-O'Neill, Tadej Battelino, Kirstine J. Bell, Rachel E.J. Besser, Ezio Bonifacio, Helen M. Colhoun, Jennifer J. Couper, Maria E. Craig, Thomas Danne, Carine de Beaufort, Klemen Dovc, Kimberly A. Driscoll, Sanjoy Dutta, Osagie Ebekozien, Helena Elding Larsson, Daniel J. Felton, Brigitte I. Frohnert, Robert A. Gabbay, Mary P. Gallagher, Carla J. Greenbaum, Kurt J. Griffin, William Hagopian, Michael J. Haller, Christel Hendrieckx, Emlio Hendriks, Richard I.G. Holt, Lucille Hughes, Heba M. Ismail, Laura M. Jacobsen, Suzanne B. Johnson, Leslie E. Kolb, Olga Kordonouri, Karin Lange, Robert W. Lash, Åke Lernmark, Ingrid Libman, Markus Lundgren, David M. Maahs, M. Loredana Marcovecchio, Chantal Mathieu, Kellee M. Miller, Holly K. O'Donnell, Tal Oron, Shivajirao P. Patil, Rodica Pop-Busui, Marian J. Rewers, Stephen S. Rich, Desmond A. Schatz, Rifka Schulman-Rosenbaum, Kimber M. Simmons, Emily K. Sims, Jay S. Skyler, Laura B. Smith, Cate Speake, Andrea K. Steck, Nicholas P.B. Thomas, Ksenia N. Tonyushkina, Riitta Veijola, John M. Wentworth, Diane K. Wherrett, Jamie R. Wood, Anette-Gabriele Ziegler, and Linda A. DiMeglio

Diabetes Care

Diabetes Care 2024;47(8):1–22 | https://doi.org/10.2337/dci24-0042

Diabetologia

Diabetologia (2024) 67:1731–1759
https://doi.org/10.1007/s00125-024-06205-5

Developed by

Breakthrough T1D™
Formerly JDRF

In collaboration with international experts and societies

Monitoring guidance for children, adolescents and adults

This consensus report was endorsed by

- European Society for the Study of Diabetes (EASD)
- American Diabetes Association (ADA)
- American Association of Clinical Endocrinology (AACE)
- American College of Diabetology (ACD)
- Association of Diabetes Care & Education Specialists (ADCES)
- Australian Diabetes Society (ADS)
- **International Society for Pediatric and Adolescent Diabetes (ISPAD)**
- Advanced Technologies & Treatments for Diabetes (ATTD),
- DiaUnion
- Endocrine Society
- Breakthrough T1D

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Michael Haller

Loredana Marcoveccio

ISPAD Clinical Practice Consensus Guidelines 2024

Screening, Staging, and Strategies to Preserve Beta Cell Function in Children and Adolescents with Type 1 Diabetes

Michael J Haller , Kirstine J Bell, Rachel E J Besser, Kristina Casteels, Jenny J Couper, Maria E Craig, Helena Elding Larsson, Laura Jacobsen[1], Karin Lange, Tal Oron, Emily K Sims, Cate Speake, Mustafa Tosur, Francesca Ulivi, Anette-G Ziegler, Diane K Wherrett, M Loredana Marcovecchio

¿Qué hay de nuevo?

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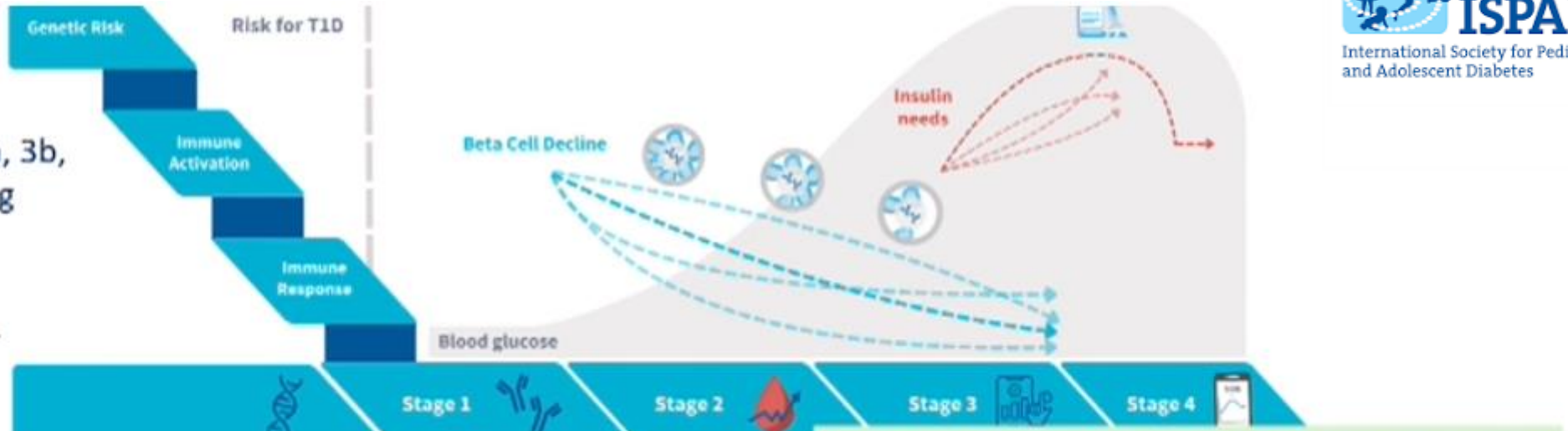
Stages 1, 2a, 2b, 3a, 3b, and 4 T1D are being used in clinical, research, and regulatory settings.



- **Stage 3a:** asymptomatic, may not requiring insulin immediately
- **Stage 3b:** symptomatic, requires insulin

- **Stage 2a:** early, mild dysglycemia
  FPG= 5.6-6.4 mmol/L (100-115 mg/dL)
- **Stage 2b:** late, robust dysglycemia but not reaching threshold for stage 3
  FPG 6.5-6.9 mmol/L (116-125 mg/dL)

Haller MJ et al, ISPAD Clinical Practice Consensus Guidelines 2024 Screening, Staging, and Strategies to Preserve Beta Cell Function in Children and Adolescents with Type 1 Diabetes.

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Indicadores Metabólicos de Monitoreo Glucémico

Method	Pros	Cons	Metrics obtained
Reference OGTT*	• Gold standard in research settings • Used to stage disease and predict progression	• Requires glucose load and 2–5 blood draws over 2 h	• Glycemic staging • Risk scores for progression (DPTRS, DPTRS60, Index60, M60, M120, PLS) (94,165–169)
Standard OGTT†	• Similar to test for GDM: OGTT with 2 × blood draws (compared with 3 × draws in GDM test), performed routinely in clinical care	• Requires 2 blood draws: fasting and at 2 h	• 120-min OGTT-derived glucose • M120
Random glucose	• One-off sample • Low cost	• Requires a blood draw or fingerstick test • Less sensitive than 120-min OGTT	• Similar to 120-min OGTT-derived glucose (96) if obtained 2 h postprandially
Standard HbA_{1c} test	• Highly specific for clinical diagnosis of stage 3 T1D • Can use capillary sample • Longitudinal HbA_{1c} may be as informative as OGTT (66)	• Indicates 3-month mean glucose. Often normal in asymptomatic or recent-onset stage 3 T1D • May be affected by age, nondiabetes disease states (e.g., renal, hematological syndromes) • Not suitable in the home setting	• Risk of progression to "clinical disease": HbA_{1c} >39 mmol/mol (>5.7%) (170) • 10% rise from baseline (at first positive islet autoantibody) over 3–12 months (66,67) suggests dysglycemia and progression to stage 2 T1D • Consider use of CGM if 10% rise in HbA_{1c} is confirmed, or higher frequency of SMBG, to monitor risk for progression
CGM‡	• Can be used at home • Can be blinded for physician review only in some regions • Optimal duration of CGM wear is validated in adults and children >2 years of age with diagnosed T1D, at all glycemic levels (171)	• Risk of anxiety for unblinded user seeing CGM fluctuations and experiencing alarms • Requires appropriate education on use and interpretation • Many primary care HCPs are unfamiliar with interpretation • Cost and access issues • Duration of wear not validated in early-stage T1D	• Sensitive in detecting individuals with asymptomatic stage 3 T1D and dysglycemia in stage 2 T1D (73) • Risk of progression to "dinical disease," i.e., 10% of time with glucose >7.8 mmol/L (>140 mg/dL) has been associated with an 80% risk of progression to T1D within 12 months (72) • ≥5% time with glucose

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C	• Optimal duration of CGM wear is validated in adults and children >2 years of age with diagnosed T1D, at all glycemic levels (171)	• Requires appropriate education on use and interpretation • Many primary care HCPs are unfamiliar with interpretation • Cost and access issues • Duration of wear not validated in early-stage T1D	• T1D and dysglycemia in stage 2 T1D (73) • Risk of progression to "dinical disease," i.e., 10% of time with glucose >7.8 mmol/L (>140 mg/dL) has been associated with an 80% risk of progression to T1D within 12 months (72) • ≥5% time with glucose

Auto Monitoreo glucémico

Simple uso Hogar Baja adherencia

Frecuencia no determinada

Resultado inmediato

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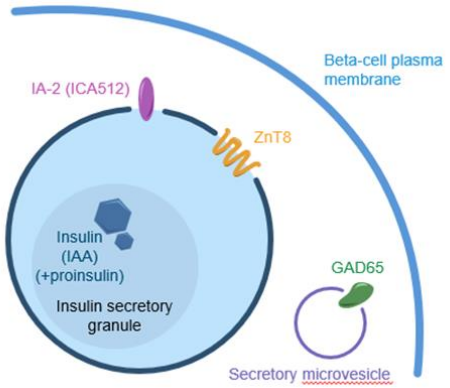
Guías ISPAD 2024

Monitoreo Post screening

Screening

1 AAB

Blood samples to take	Age	Frequency
• Antibodies • HbA1c • Random glycemia	≤ 3y old	• every 6 months for 3 years • every 12 months for another 3 years • if no progression, stop
	>3y old	• every 12 months for 3 years • if no progression, stop



≥ 2 AAB

Staging OGTT[a]

Stage	Blood samples to take	Age	Frequency
Stage 1	• HbA1c • Random glycemia • CGM (if available)	< 3y old	every 3 months
		3-9y old	every 6 months
		≥ 9y old	every 12 months
Stage 2	• HbA1c • Random glycemia • CGM (if available)	< 18y old	every 3 months
		> 18y old	every 6 months

[a]HbA1c, capillary/venous glucose and CGM may be alternatives when OGTT is not feasible

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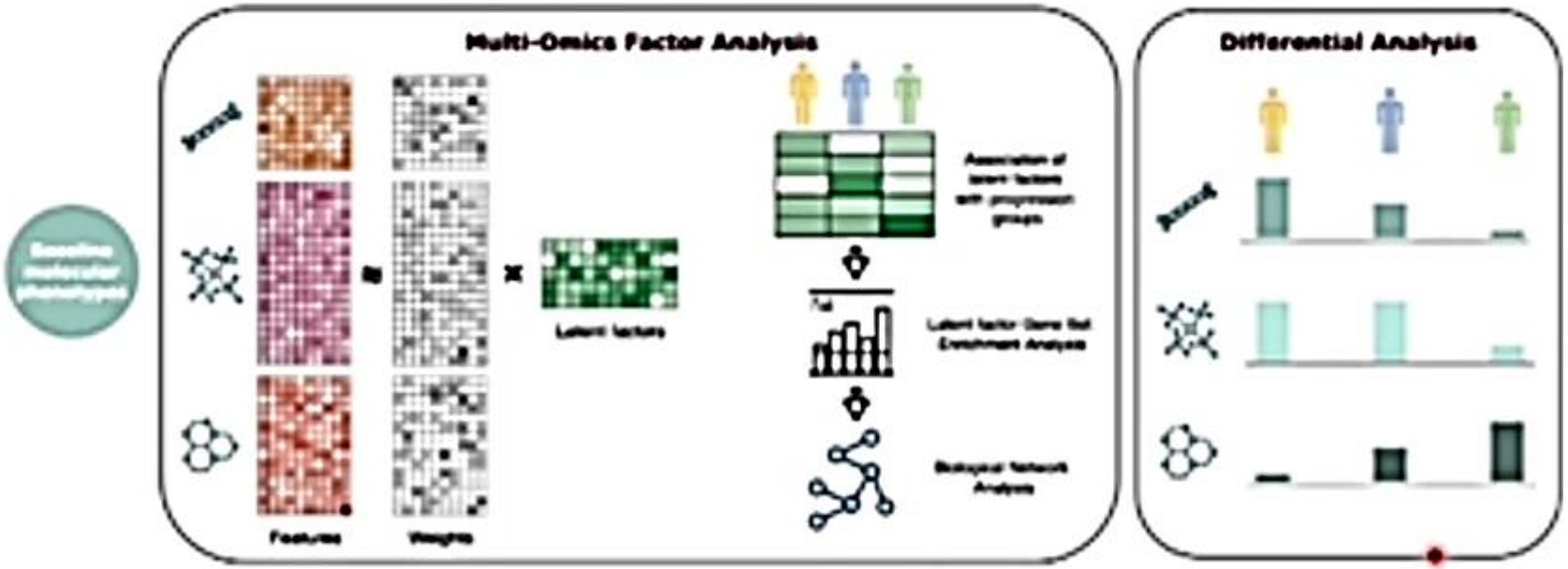
Otros Biomarcadores

Multi-Omics Integration

Multi-Omics data

- Transcriptomics
- miRNA (targeted and untargeted)
- Proteomics
- Lipidomics
- Metabolomics
- Immunomics



Objective

Integration of multi-omics dataset and association with disease progression groups

Methods

Multi-Omics Factor Analysis (MOFA) and differential analysis

S. Brunak, Diab Res Clin pract 2024

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Nuevos Diseños de Investigación

Innovative Designs and Logistical Considerations for Expedited Clinical Development of Combination Disease-Modifying Treatments for Type 1 Diabetes

Randy L. Anderson,[1] Linda A. DiMeglio,[2] Adrian P. Mander,[3] Colin M. Dayan,[4] Peter S. Linsley,[5] Kevan C. Herold,[6] Marjana Marinac,[7] and Sirsi T. Ahmed[7]

Diabetes Care 2022;45:2189–2201 | https://doi.org/10.2337/dc22-0308

Colin Dayan

1. Las plataformas adaptativas incrementan la eficiencia, reducen costos y establecen principios profundos de investigación.

2. Son valiosas en terapias combinadas

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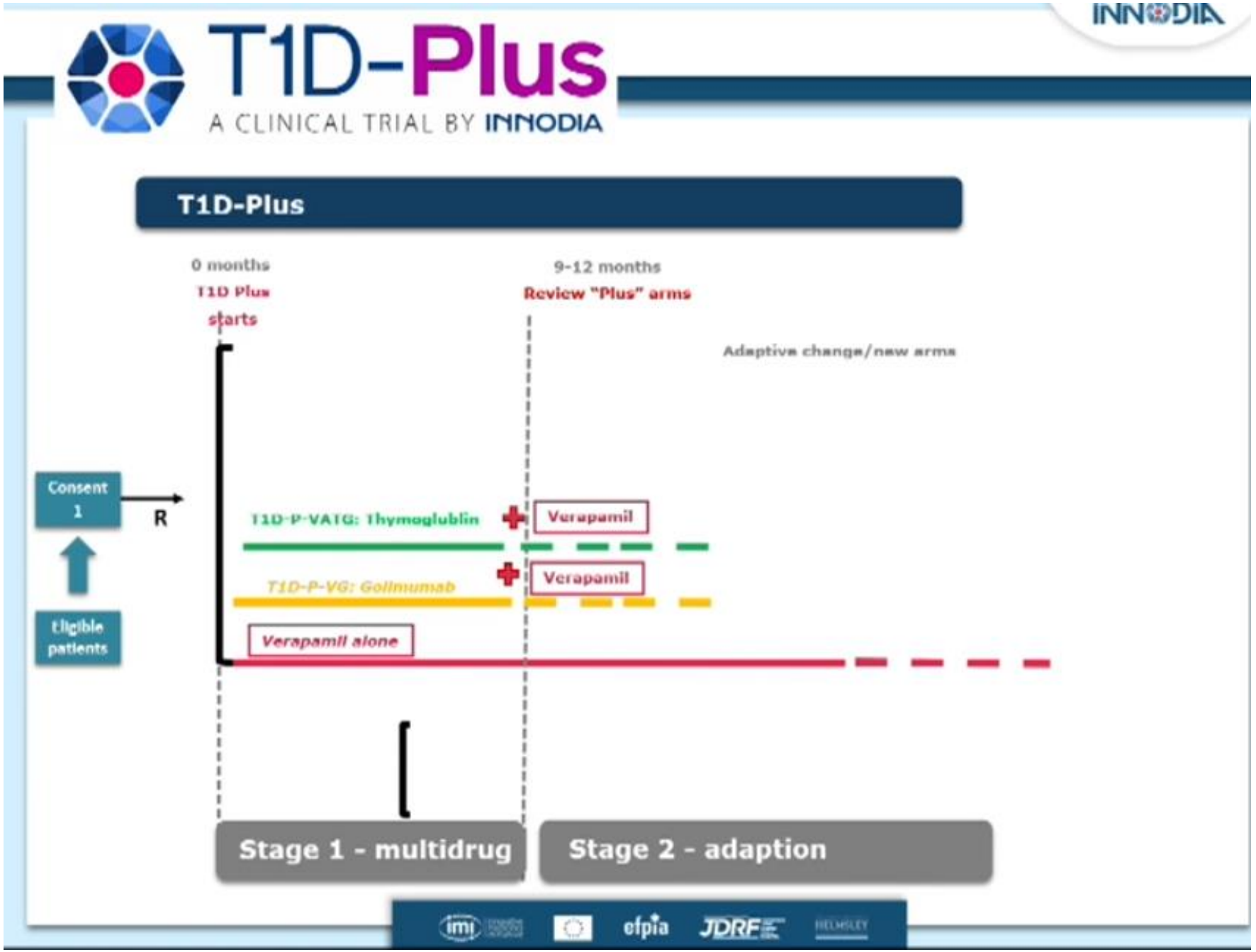

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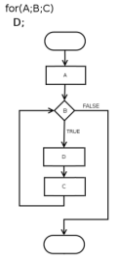
Puntos clave

1. Realización de ensayos abiertos (Open label)
2. Todas las terapias modificadoras de enfermedad tienen al menos un estudio de Fase 2 de monoterapia.
3. Análisis Internos cada 12 meses.
4. Tres financiadores separados.
5. Objetivo ofrecer todos los tratamientos a todos los sitios.
6. Comparación combinada y con Verapamilo sólo.
7. Investigación y ensayos en Reino Unido, Europa y Australia.

¿Qué nos queda aún por responder en el screening temprano de DT1?

1. ***¿Cómo organizar el screening en determinado país según su sistema de salud?***



2. ¿Cómo organizar screening según contexto sociocultural (religión, creencias, verdades)?

3. *¿Qué piensan los pacientes con DT1?*

4. ¿Cómo comunicar a la población la Importancia de la detección temprana de DT1?

5. ¿Cómo definir el beneficio de detección temprana de DT1?

6. ¿Cómo organizar el monitoreo y acordar con reguladores de salud?

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Nuevos horizontes en las terapias y prevención de la diabetes tipo 1

Individuos de riesgo susceptibles, familiares y población general

Terapias de vanguardia que modifiquen la enfermedad

Nuevos biomarcadores de riesgo: Quiénes, cuándo y cómo

Ensayos terapéuticos adaptados Consenso y Guías ISPAD

Muchas Gracias

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Experiencias internacionales en la implementación de la detección temprana de la diabetes

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Carolina Martinez Mateu

- Médica pediatra
- Especialista en Nutrición Infantil
- Equipo Multidisciplinario de Diabetes Hospital J. P. Garrahan
- Docente de la Carrera de Especialistas en Nutrición Pediátrica de Universidad de Buenos Aires

Conflictos de interés:

- Sin conflictos para esta presentación

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Hoja de ruta

- ¿Por qué hacer detección en estadios tempranos?
- ¿En quiénes?
- ¿Qué determinaciones realizar?
- ¿Cuándo?
- Experiencias: Israel e Italia.
- Educacion y manejo nutricional.

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Los principios de la detección de enfermedades

1. La enfermedad debe representar un problema importante de salud pública
2. Debe existir un tratamiento aceptado para los casos detectados
3. Debe ser posible identificar la enfermedad en su fase asintomática
4. El proceso de cribado debe ser seguro, preciso y aceptado por la población
5. Debe existir una política clara para los casos detectados
6. El costo del cribado debe ser razonable en relación con los beneficios obtenidos
7. La historia natural de la enfermedad debe ser bien comprendida
8. El cribado debe ser un proceso continuo

Wilson y Junger, OMS 1968

¿Por qué hacer detección en estadios tempranos?

1. Prevenir la cetoacidosis y evitar la hospitalización.
2. Intervenciones terapéuticas para retrasar el comienzo del estadio 3.
3. Minimizar el daño por hiperglucemia.
4. Evitar confusión con diabetes tipo 2 y el retraso de la insulinización.
5. Posibilidad de enrolarse en ensayos clínicos.

Familiares 1

Población 9

¿A quiénes estudiar?

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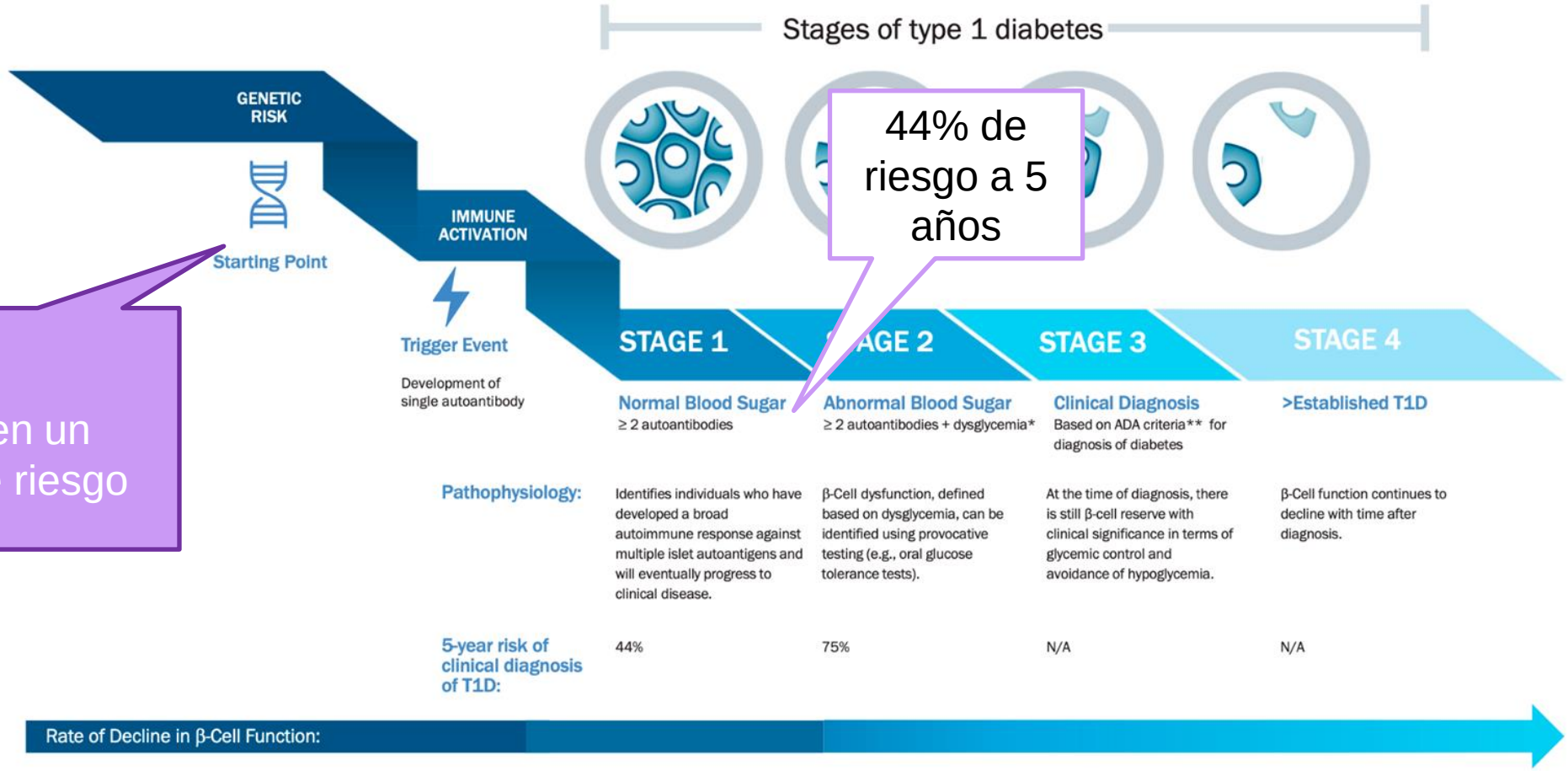
¿Qué determinaciones realizar?



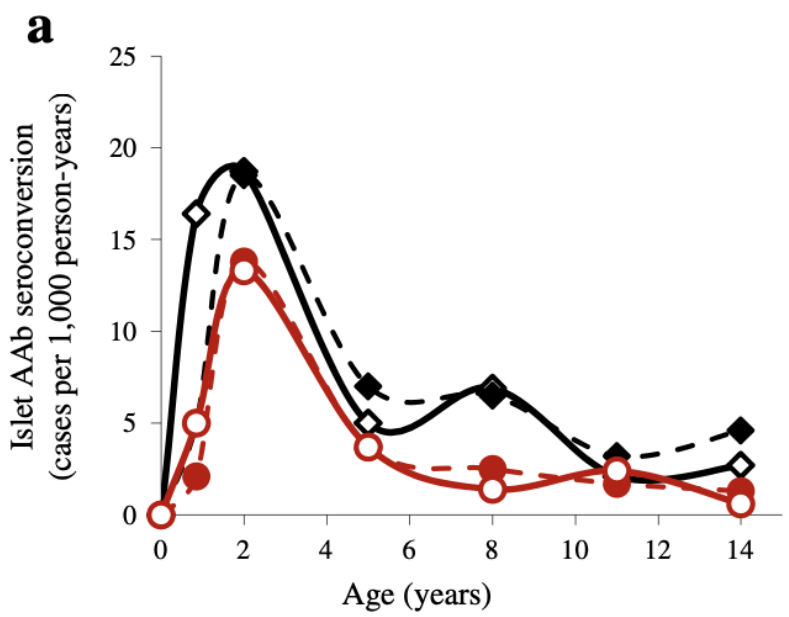
Genes confieren un 10% de riesgo

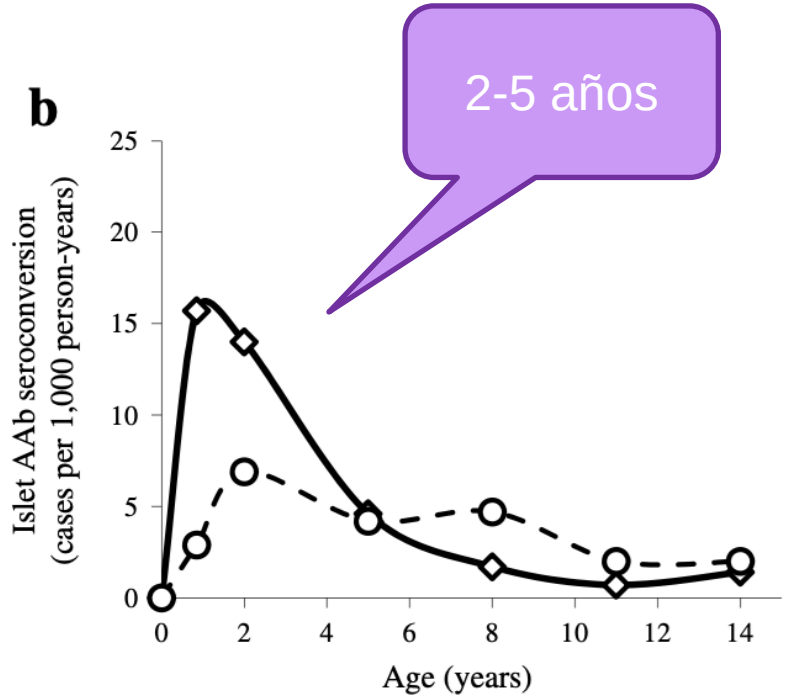
44% de riesgo a 5 años

NIDDK Type 1 Diabetes TrialNet Study Group, Diabetes, 2022

Tasa de conversión de autoanticuerpos

¿Cuándo?





IAA	1,650	1,492	1,323	1,163	936	503
GADA	1,650	1,508	1,338	1,171	943	502
IA-2A	1,650	1,512	1,348	1,198	971	523
ZnT8-A	1,650	1,508	1,345	1,186	972	522

Multiple	1,650	1,489	1,316	1,143	960	483
Single	1,650	1,511	1,364	1,214	987	500

Ziegler, Diabetologia, 2012.

The Antibody Detection Israeli Research

ADIR

ANTIBODY DETECTION ISRAELI RESEARCH

Moshe Phillip

The Institute for Endocrinology and Diabetes
Schneider Children's Medical Center of Israel

Lisbon Oct. 19th

ADIR

Demostrar una disminución en los casos de CAD para que se apruebe un programa nacional de detección.

Enrollment
Community clinics

Central HMO labs

Study lab

Research center

1 PREVENIR CETOACIDOSIS
2 TERAPIAS EFECTIVAS
3 PREVENIR ENFERMEDAD
4 BIOMARCADORES
5 INVESTIGACIÓN

Follow up
Diabetes centers

61 clínicas
6 centros de diabetes

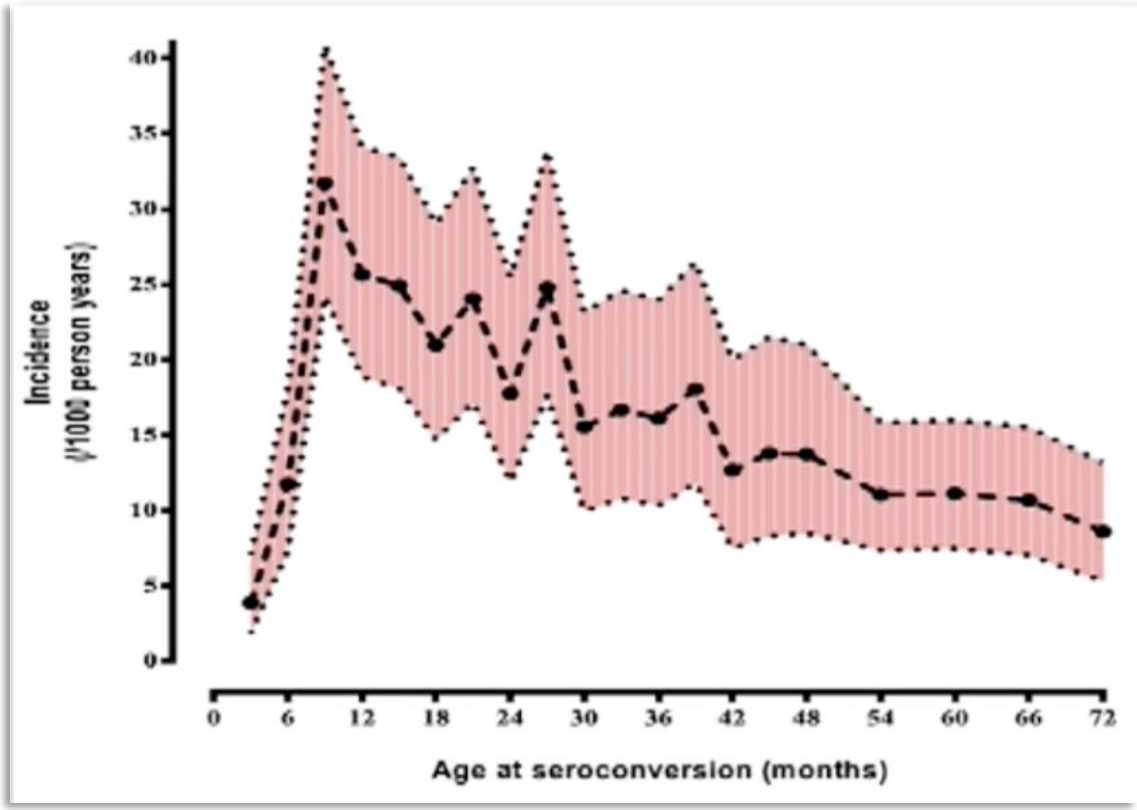
Detección de DT1 Estadío 1

-Sistema Nacional de Salud.

-Historia clínica electrónica.

-Optimizaron recursos: aprovecharon el programa de detección de anemia, que captaba el 97% de los niños en edad 9-18 meses.

-Mejoraron la sensibilidad del test.



Krischer et al. Diabetes Care 2017 (40)
Rogers et al. BMC Medicine 2017 (15)

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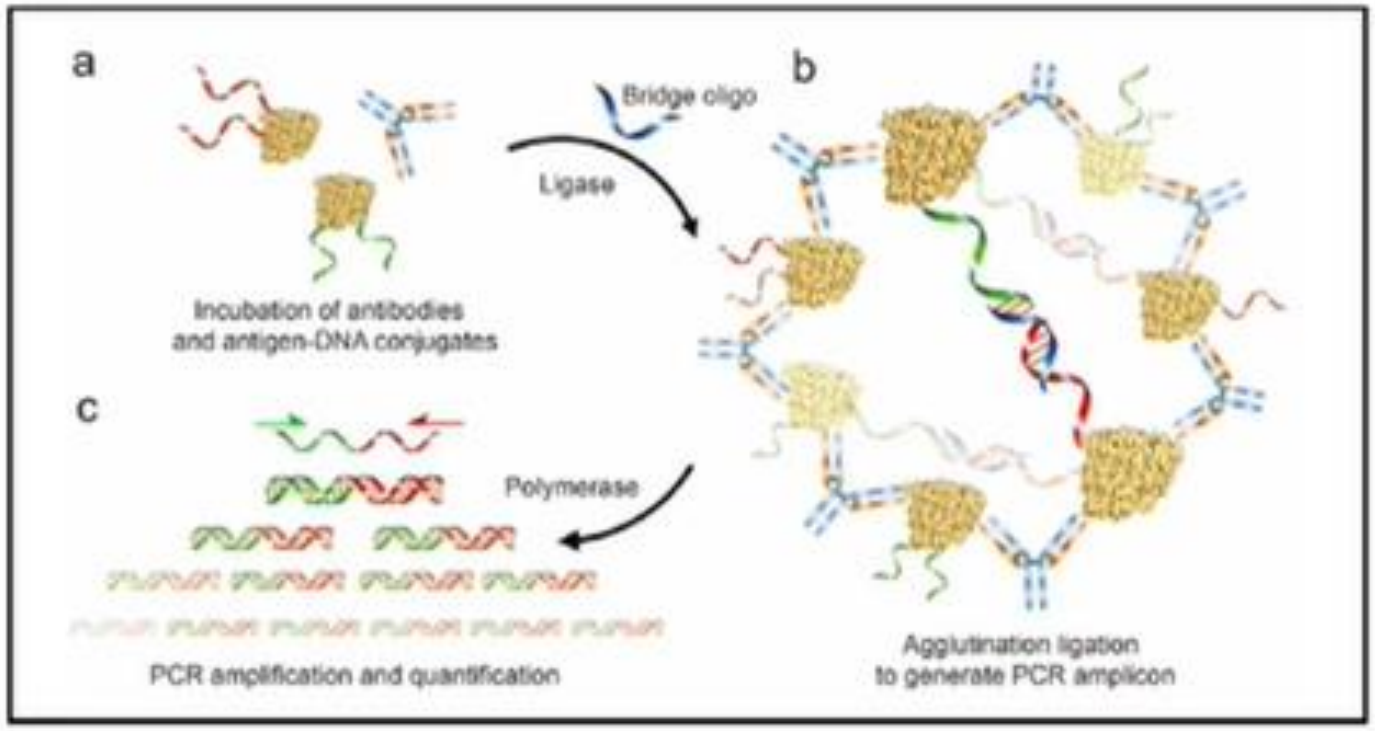
Anticuerpos: ADAP



ADAP
Técnica de aglutinación
PCR-Sensible
IA-2, IAA, GADA
4µL sangre

Oron, Tal, Cortez, Felipe de Jesus, Shtaif, Biana, et al. Detection of Islet Autoantibodies in Whole Blood by Antibody Detection by Agglutination-PCR (ADAP) Technology Is Sensitive and Suitable for General Population Screening Programs, *Pediatric Diabetes*, 2024.

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ADIR Diseño

- **Población:**
  - 35.000 niños a los **9 meses**.
  - 5.000 niños a los **5 años**.
- **Metodología:**
  - Técnica **ADAP** (Antibody Detection by Agglutination-PCR) para detectar autoanticuerpos relacionados con diabetes tipo 1.
  - **Seguimiento de 5 años**:
    - Niños con **≥2 autoanticuerpos positivos**.
    - Posterior inclusión de niños con **1 anticuerpo y antecedentes familiares** tras consenso.

Resultados preliminares

GADA+ IA-2A	GADA+ INS-A	IA2-A+ INS-A	All 3
27	12	7	8

- Población estudiada:
  - Total: 14,608 niños.
    - <18 meses: 10,980.
    - 18 meses - 5 años: 3,628.
- Muestras analizadas: 9,100.
- Resultados positivos:
  - 54 niños (0.59%) con múltiples autoanticuerpos.
  - 5 niños con un autoanticuerpo y antecedentes familiares de diabetes

54/9100: 0,59%

¿¿¿Y después???

Seguimiento 2 anticuerpos: investigadores.

Seguimiento a los que tiene 1 anticuerpo: pediatra, guías y número telefónico.

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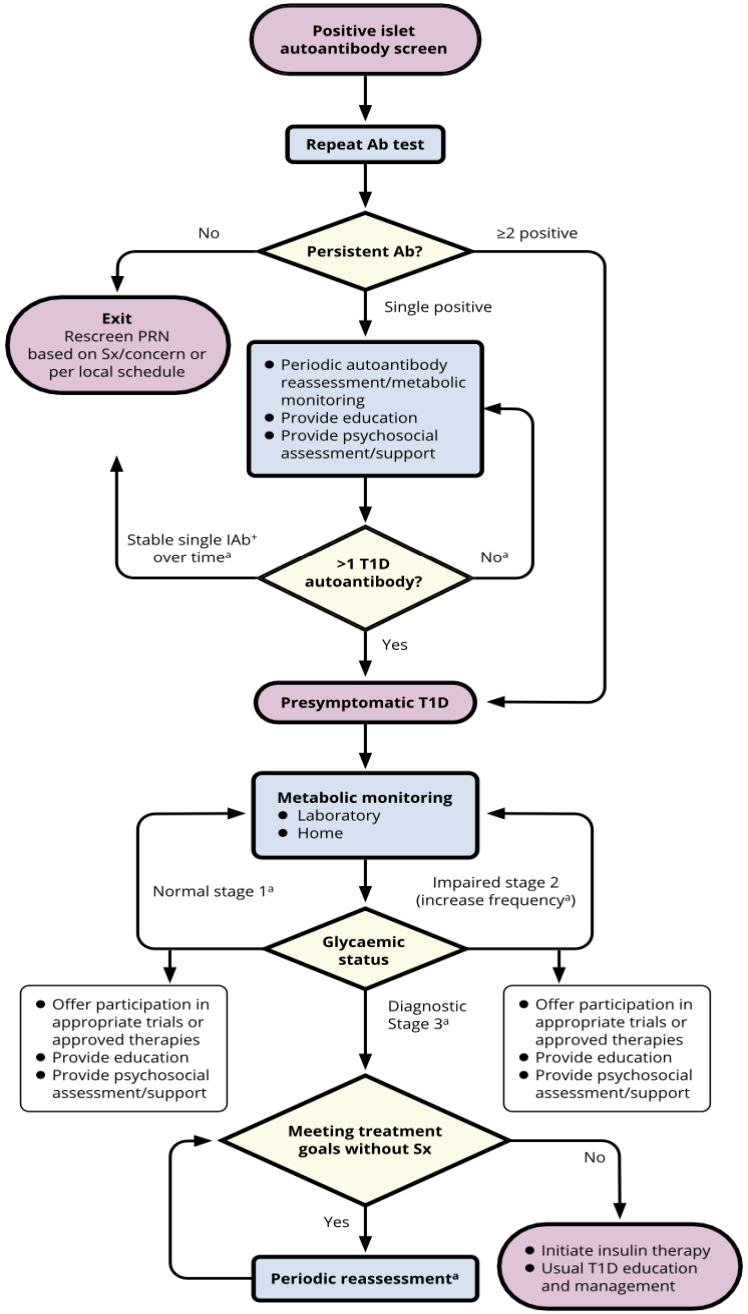

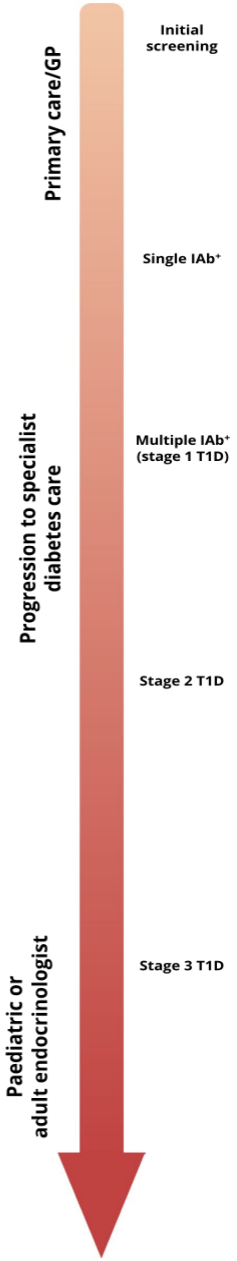

Guía para el monitoreo de personas con autoanticuerpos positivos en estadios tempranos de la DT1

Phillip, M., Achenbach, P., Addala, A. *et al.* Consensus guidance for monitoring individuals with islet autoantibody-positive pre-stage 3 type 1 diabetes. *Diabetologia*, 2024.

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Screening program for type 1 diabetes in Italy

Valentino Cherubini
SOD Diabetologia Pediatrica
Azienda Ospedaliero Universitaria delle Marche

2024.ispad.org

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Programa Nacional por Ley

SERIE GENERALE

GAZZETTA UFFICIALE

DELLA REPUBBLICA ITALIANA

PARTE PRIMA

AVVISO ALLE AMMINISTRAZIONI

SOMMARIO

LEGGE 15 settembre 2023, n. 130.

Disposizioni concernenti la definizione di un programma diagnostico per l'individuazione del diabete di tipo 1 e della celiachia nella popolazione pediatrica. (23G00140) ..... *Pag.* 1

Bosi E, Catassi C. Screening type 1 diabetes and celiac disease by law. Lancet Diabetes Endocrinol. 2024

IL PRESIDENTE DELLA REPUBBLICA

Promulga

la seguente legge:

Art. 1

Programma di screening nazionale per diabete di tipo 1 e celiachia

1. Al fine di prevenire l'insorgenza di chetoacidosi in soggetti affetti da diabete di tipo 1 e di rallentare la progressione della malattia mediante l'impiego delle terapie disponibili, nonche' di effettuare la diagnosi precoce della celiachia, con decreto del Ministro della salute, da emanare entro centoventi giorni dalla data di entrata in vigore della presente legge, previo parere della

Diabetes y Enfermedad celíaca

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D1Ce Screen

Componentes Principales

1. Registro de personas en riesgo.
2. Colaboración con pediatras de atención primaria.
3. Centros especializados en T1D para seguimiento.
4. Educación para pacientes y familias.
5. Pruebas de anticuerpos confiables.
6. Pruebas metabólicas adecuadas.
7. Encuestas de viabilidad y aceptación.
8. Acceso a terapias innovadoras.
9. Monitoreo de resultados (incidencia de DKA).
10. Análisis de costos.

Seguimiento de personas con un solo IA positivo, además de múltiples IA positivos.

Uso de monitoreo continuo de glucosa (CGM) para evaluar la progresión del riesgo.

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Cherubini V et al. *Diabetes Obes Metab*. 2024

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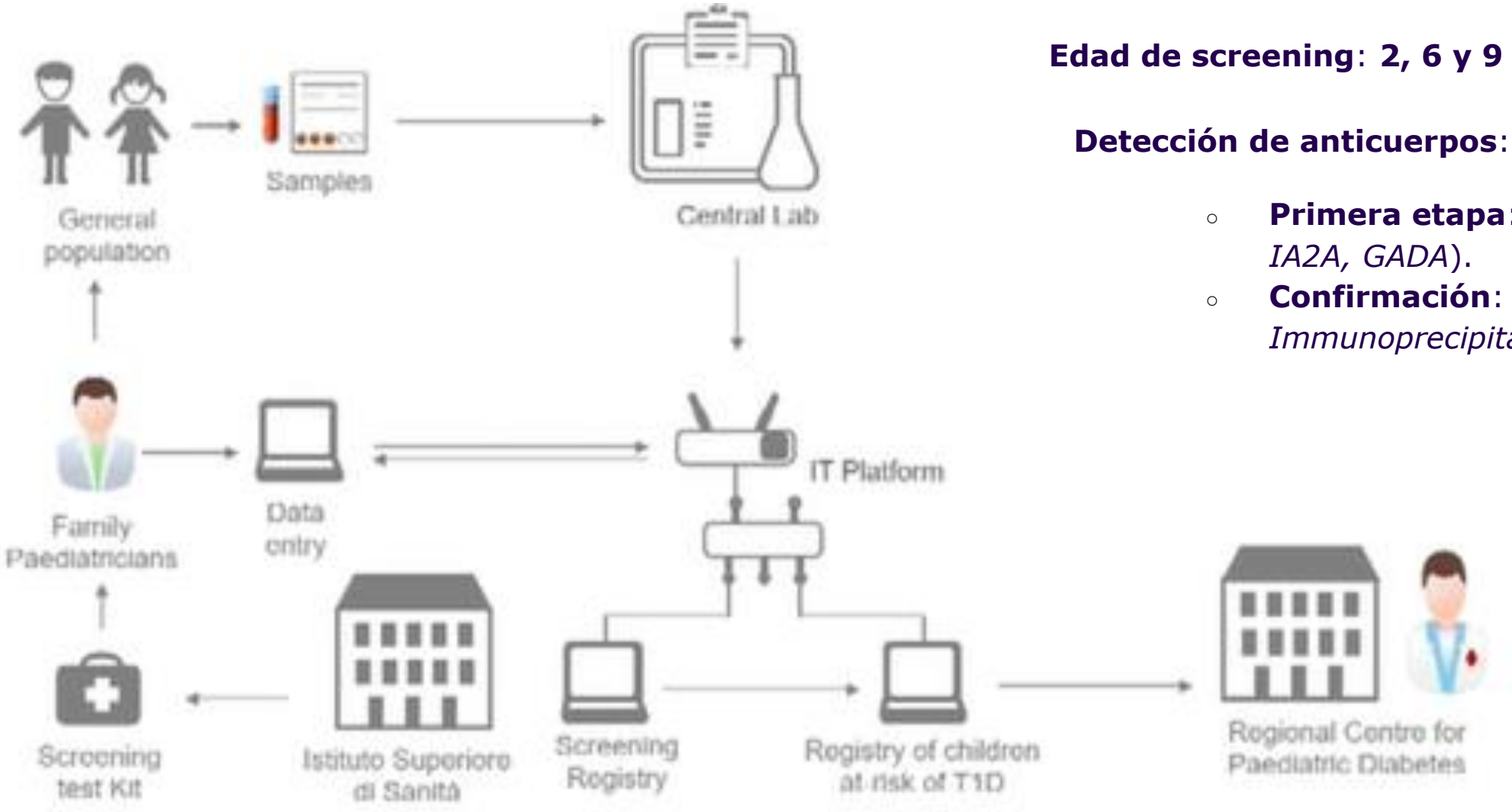


Edad de screening: **2, 6 y 9 años**.

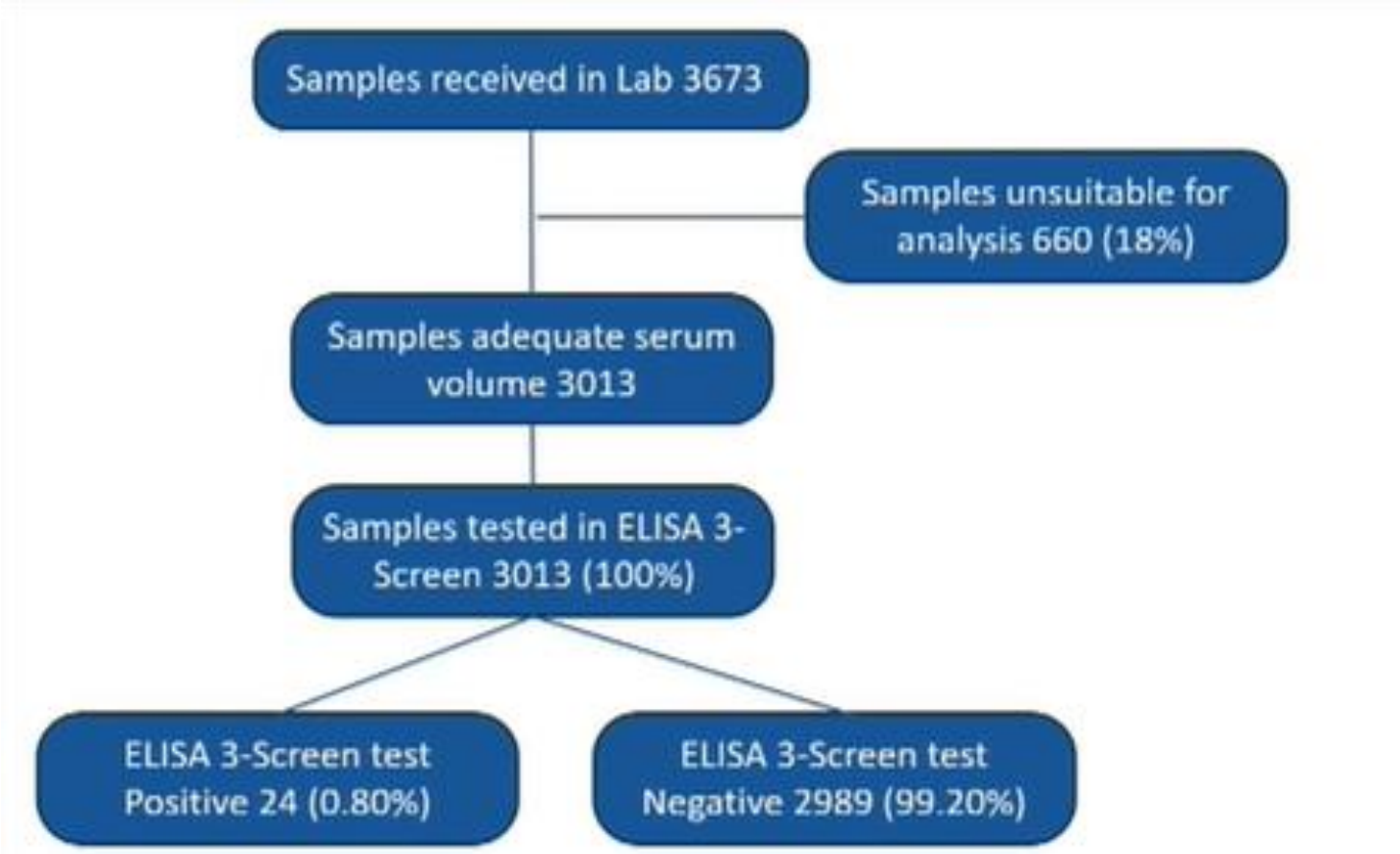
Detección de anticuerpos:

- **Primera etapa**: ELISA (*ZnT8, IA2A, GADA*).
- **Confirmación**: LIPS (*Luciferase Immunoprecipitation System*).

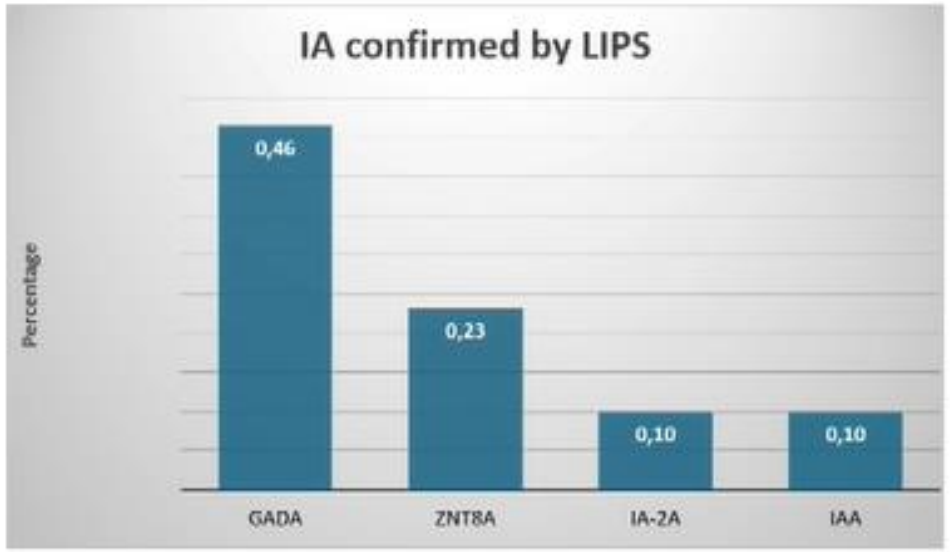
Cherubini V et al. *Diabetes Obes Metab*. 2024

Resultados

15/3013:0,49%



n.	24	9	15



n.	14	7	3	3

Cherubini V et al. Follow-up and monitoring programme in children identified in early-stage type 1 diabetes during screening in the general population of Italy. Diabetes Obes Metab. 2024

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Resultados

- **Alta motivación** de las partes involucradas.
- Los pediatras muestran **buena capacidad para involucrar a las familias**.
- **Dificultades técnicas**:

  Muestras capilares complejas en niños mayores.

  La muestra no es estable para almacenamiento y transporte.

- **Costos**: El 50% del presupuesto se destina a recolección de muestras y transporte.

Desafíos y Recomendaciones

1. **Optimización de recolección de muestras**:
   - Evaluar el uso de muestras en **papel filtro**.
   - **Agrupación de muestras** para reducir costos.
2. **Educación y sensibilización**:
   - Mejorar la información sobre el screening a médicos y familias.
   - Proveer soporte educativo continuo.
3. **Recursos humanos y logísticos**:
   - Incrementar el **personal en centros de referencia.**
   - Incorporar un **psicólogo dedicado** al programa.
4. **Diagnóstico y monitoreo**:
   - Definir los laboratorios para confirmación de positivos.
   - Incluir un código **ICD-10** específico para el screening como parte del cuidado en DT1.

¿Y si lo hiciéramos en Argentina?

Argentina 2022 Población 45.892.285 (INDEC)

0-14 años =1.076.302

76.878 tienen 2 años de edad

453 positivos por año.

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Information brochure for parents and children

Frida

Early diagnosis and care of type 1 diabetes

- ¿Nuestro hijo está en peligro?
- ¿Podemos hacer algo para evitar que la diabetes progrese?
- ¿Qué significa esta enfermedad para nuestra familia y nuestros planes futuros?
- ¿Cuál es la mejor manera de cuidar a nuestro hijo ahora y en el futuro?
- ¿Dónde podemos encontrar apoyo y asesoramiento especializado?

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https://www.typ1diabetes-frueherkennung.de

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Pros y contras del screening de la diabetes

Pros

Sentimientos de satisfacción y seguridad

Contras

Sobreprotección del niño.

El niño es tratado como enfermo.

Impacto negativo en las relaciones padres-hijo.

Preocupación y ansiedad.

ESTRÉS Y ANSIEDAD

Es mayor si hay un familiar con diabetes.

Es mayor en madres que padres.

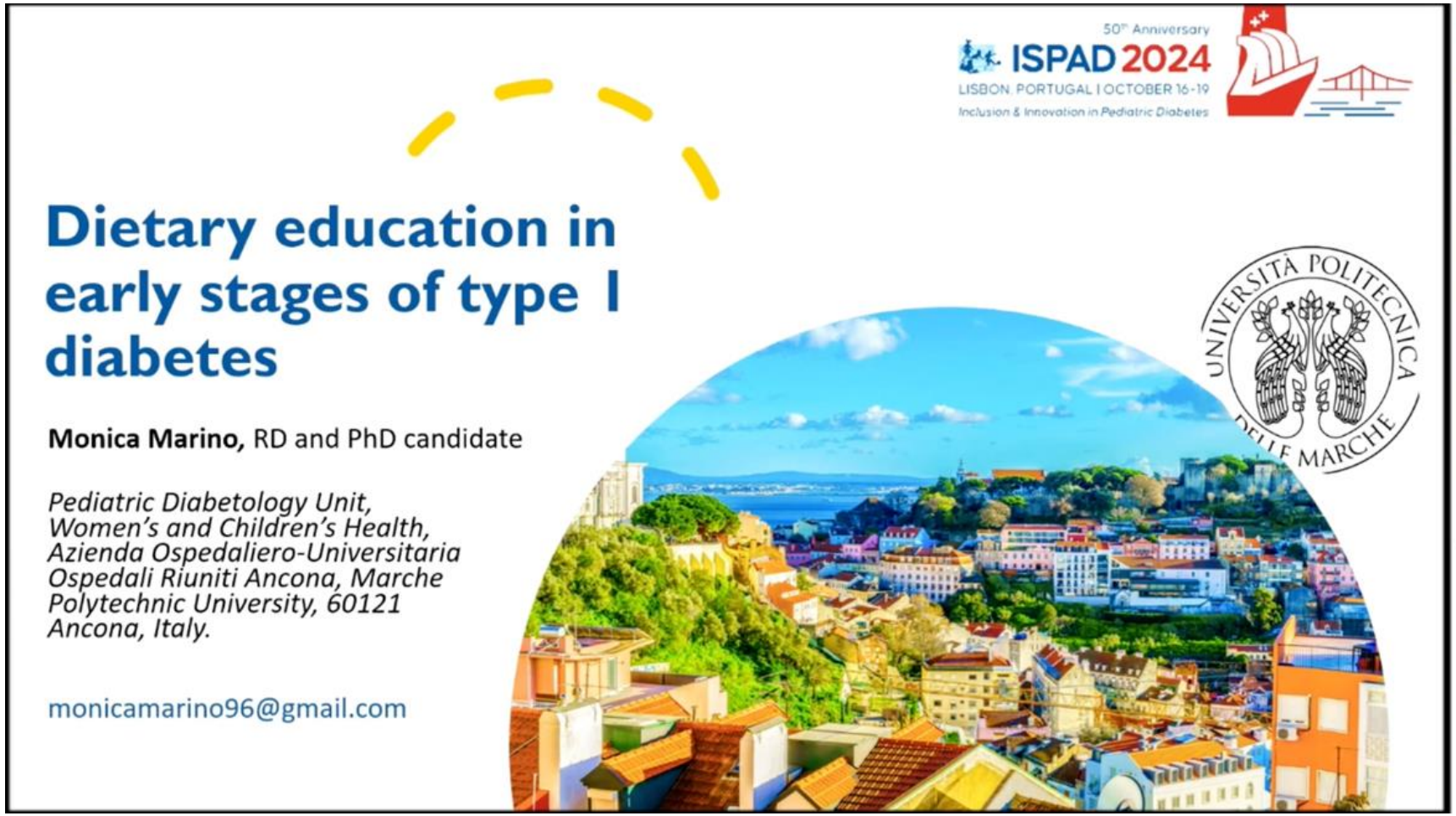
Correlación entre padres e hijo.

Ziegler, JAMA, 2020 O'Donell Diabetes Care 2023

Recomendación del experto

- ✓ TIEMPO!!!
- ✓ Consistencia del equipo. Es mejor tener un referente para cada familia.
- ✓ Comunicar repetidas veces, diversas formas.
- ✓ Evaluación en cada visita

Educación nutricional en los estadios tempranos de la DT1



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Educación nutricional en el programa de detección temprana DT1

¿Quién?

¿Qué?

¿Cómo?

¿Cuándo?

¿Modificar la dieta puede detener o retrasar el desarrollo de la DT1?

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¿Quién?

¿Cuándo?

INMEDIATAMENTE

¿Qué?

Macronutrientes, carga glucémica, efecto de las comidas mixtas en la excursión prandial de la glucemia.

Promover hábitos saludables.

Dieta no detiene la progresión de la DT1.

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Mensajes clave

- ✓ La deteccion temprana está en marcha y es factible.
- ✓ Se requiere estructura y personal dedicado.
- ✓ Mejoras en los métodos de laboratorio.
- ✓ Planificacion del monitoreo.
- ✓ Se presenta ansiedad y requiere abordaje profesional.
- ✓ La educacion debe ser temprana, adecuada y sostenida.
- ✓ Se necesita un código ICD-10 específico para el screening como parte del cuidado en diabetes tipo 1.

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¡Muchas Gracias!

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PUESTA AL DÍA EN TERAPIAS AUTOMATIZADAS

#ISPAD50

Dra. Marcela Raggio
Médica de staff Nutrición Infantil Hospital Universitario Austral y HMIT

50th Annual Conference
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Marcela Raggio

- Médica Pediatra, especialista en nutrición infantil (UBA)
- Magister en Diabetes (USAL)
- Médica de staff Nutrición infantil Hospital Universitario Austral y HMIT (Hospital Materno Infantil Tigre)
- Coordinación Módulo de pediatría Maestría diabetes SAD
- Docente Maestría de diabetes Universidad Austral

Conflictos de interés

✓ Disertante de Simposios de la Industria de Abbott Diabetes, Medtronic Latam, Roche Diabetes, Novo Nordisk.

✓ Asesoría científica Roche Diabetes, Sanofi Diabetes.

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AGENDA
#ISPAD50

Sistemas AID: Evidencia y resultados

Foco en alcanzar la normoglucemia (TITR)

Resultados en poblaciones desafiantes

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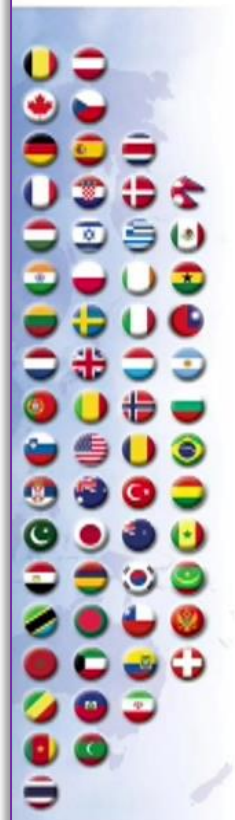
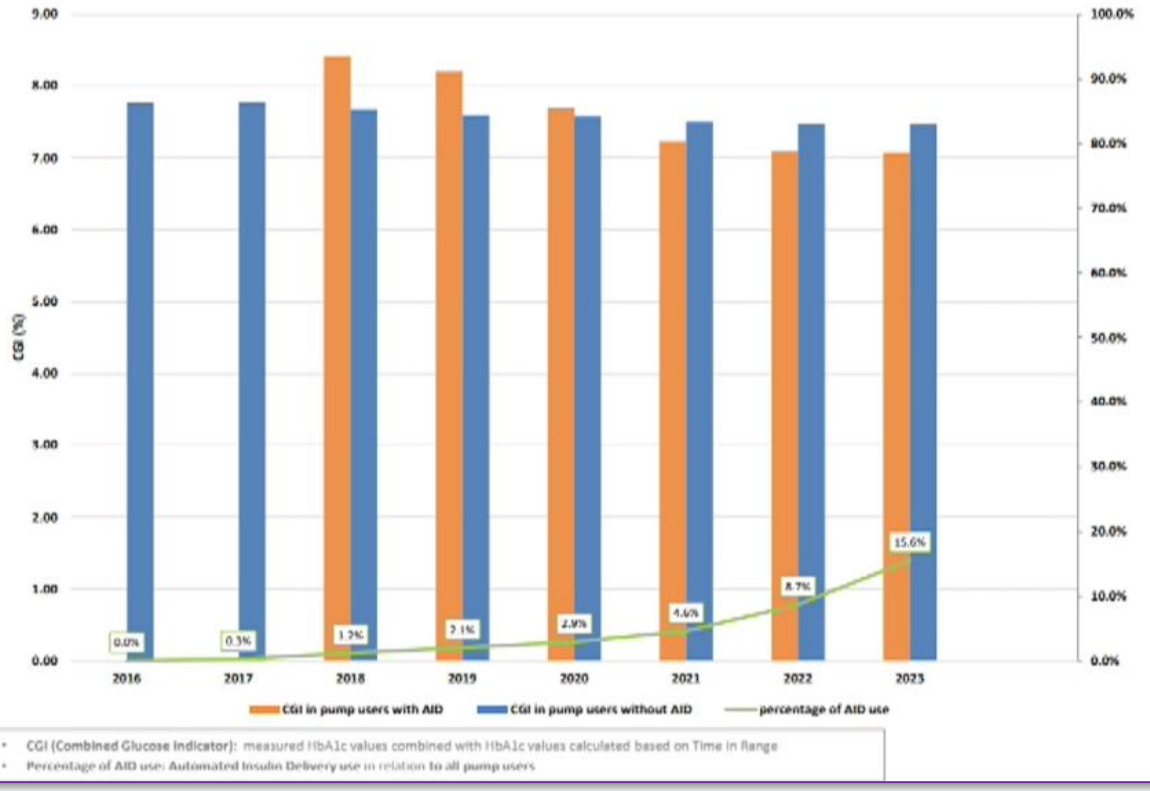
Registro mundial SWEET muestra crecimiento de la AID

Worldwide SWEET Registry shows AID on the rise

Automated Insulin Delivery (AID): usage and metabolic results
all centers with data





Total Percentage
2018 1,2% AID
2023 15,6% AID

HbA1c AID vs Pump
2018 8,3% vs. 7.7%
2023 7.0% vs. 7.5%

Active centers	Patients (overall)	Patients (in 2023)
118	113,502	40,789

Breakthrough T1D™
Formerly JDRF

Los blancos tienen que ser alcanzables. AID es un *game changer*

AID (Automated Insulin Delivery) → Transforming Glucose Variability to Insulin Variability

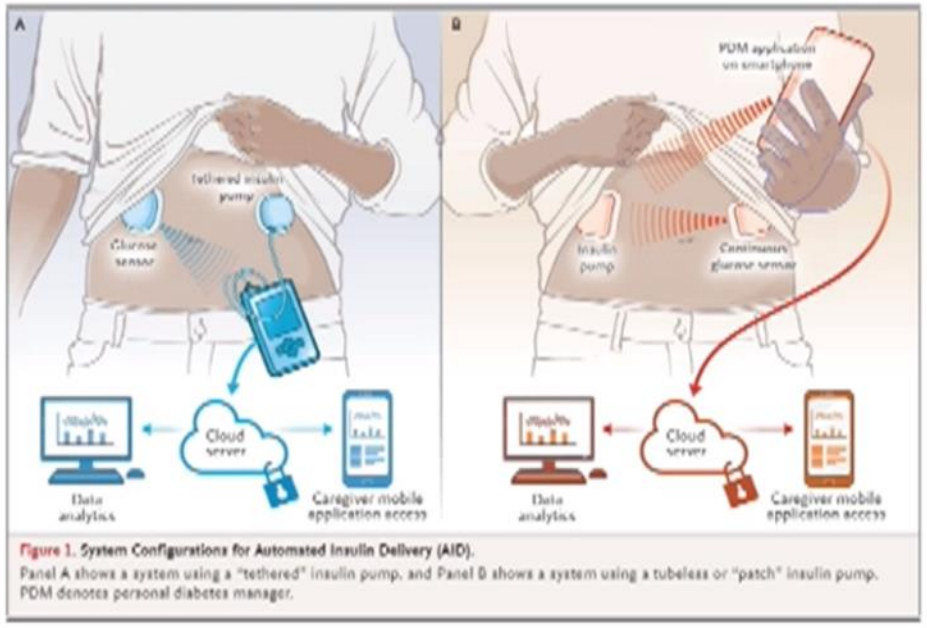
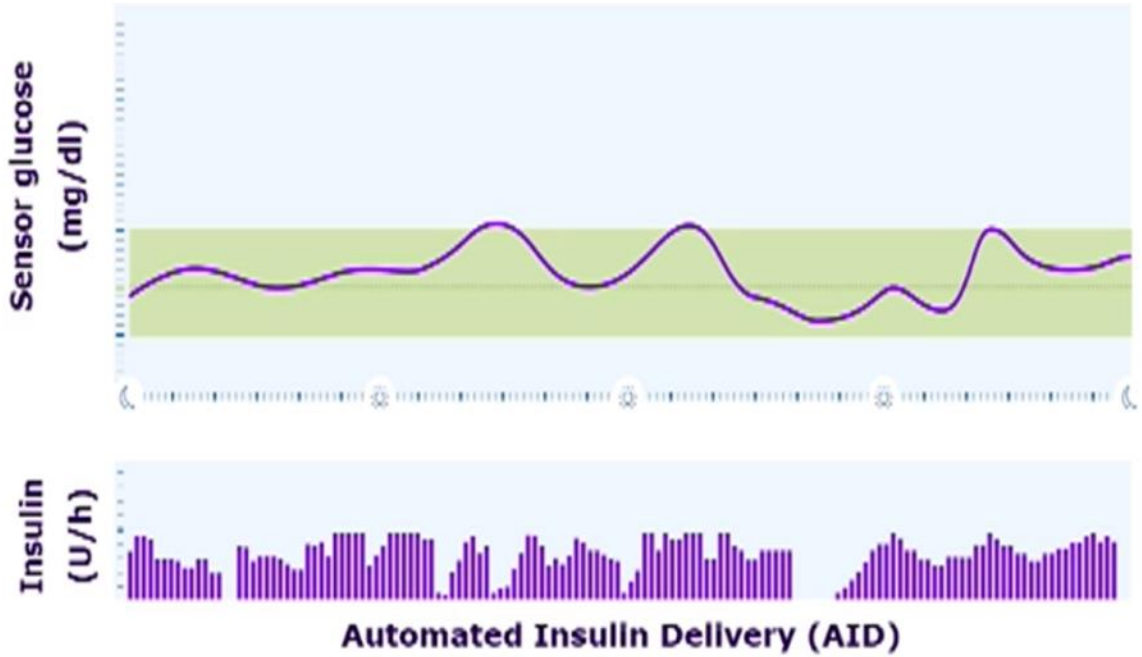


Figure 1. System Configurations for Automated Insulin Delivery (AID).
Panel A shows a system using a "tethered" insulin pump, and Panel B shows a system using a tubeless or "patch" insulin pump.
PDM denotes personal diabetes manager.

Digital Technology for Diabetes

November 30, 2023
N Engl J Med 2023; 389:2076-2086

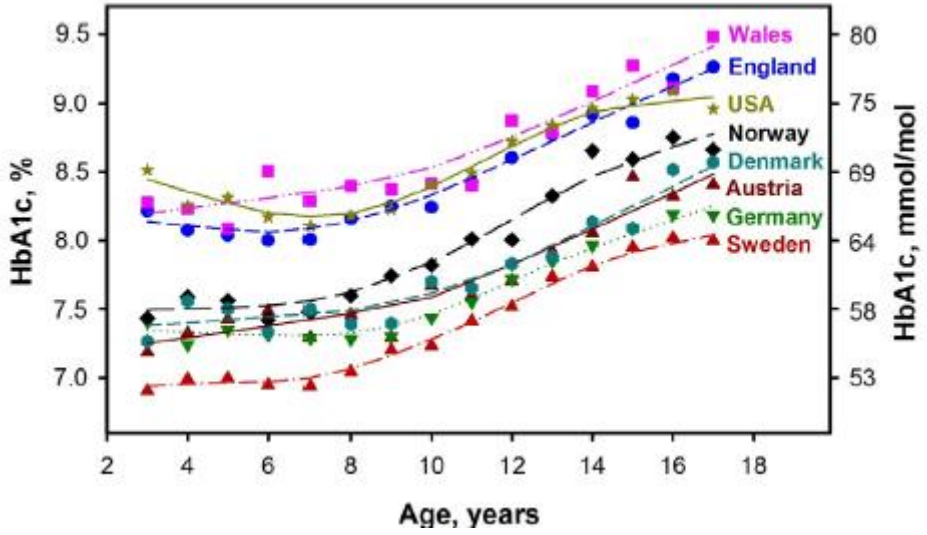
Breakthrough T1D™

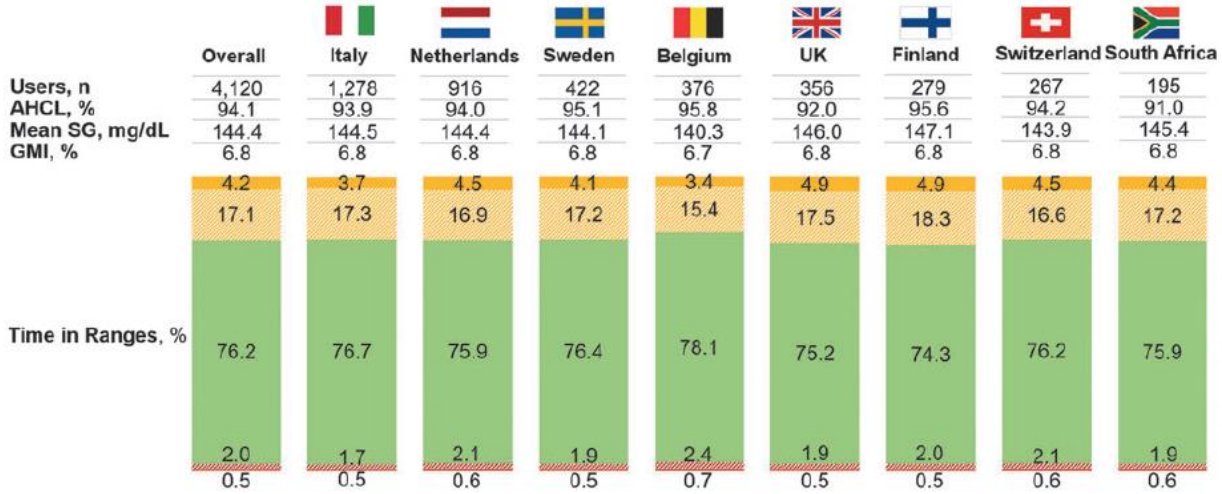


AID: infusión automatizada de insulina; TITR: tiempo en rango estrecho

Diferencias en control entre países y distintos grupos etarios

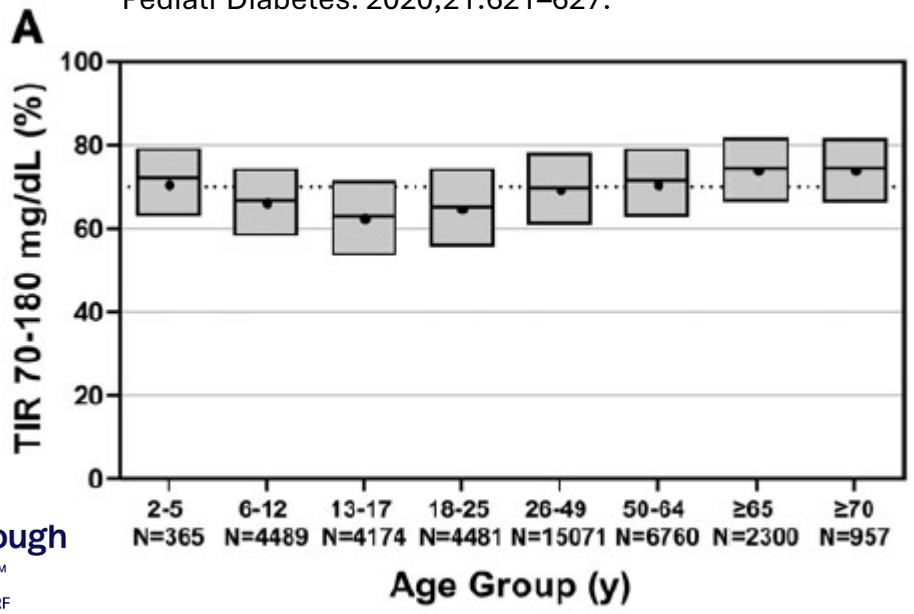
PAÍSES





Pediatr Diabetes. 2020;21:621–627.

EDADES



Real-World Performance of the MiniMed™ 780G System: First Report of Outcomes from 4120 Users

Julien Da Silva, MS,[1] Giuseppe Lepore, MD,[2] Tadej Battelino, MD,[3,i] Arcelia Arrieta, MS,[4] Javier Castañeda, MS,[4] Benyamin Grossman, PhD,[5] John Shin, PhD,[5] and Ohad Cohen, MD[1,ii]

DIABETES TECHNOLOGY & THERAPEUTICS
Volume 24, Number 2, 2022
Mary Ann Liebert, Inc.

Real-World Evidence of Omnipod® 5 Automated Insulin Delivery System Use in 69,902 People with Type 1 Diabetes

Gregory P. Forlenza, MD,[1] Daniel J. DeSalvo, MD,[2] Grazia Aleppo, MD, FACE, FACP,[3] Emma G. Wilmot, MBChB, PhD,[4] Cari Berget, RN, MPH, CDCES,[1] Lauren M. Huyett, PhD,[5] Irene Hadjiyianni, PhD,[5] José J. Méndez, MS,[5] Lindsey R. Conroy, PhD,[5] Trang T. Ly, MBBS, FRACP, PhD,[5] and Jennifer L. Sherr, MD, PhD[6]

DIABETES TECHNOLOGY & THERAPEUTICS
Volume 26, Number 8, 2024
Mary Ann Liebert, Inc.
DOI: 10.1089/dia.2023.0578

Breakthrough T1D™
Formerly JDRF

Diferencias entre control al inicio resultan en TTIR comparables con AID

Time in tight glucosa range in type 1 diabetes: predictive factors and achievable targets in real-Word users of the MiniMed 780G Systen

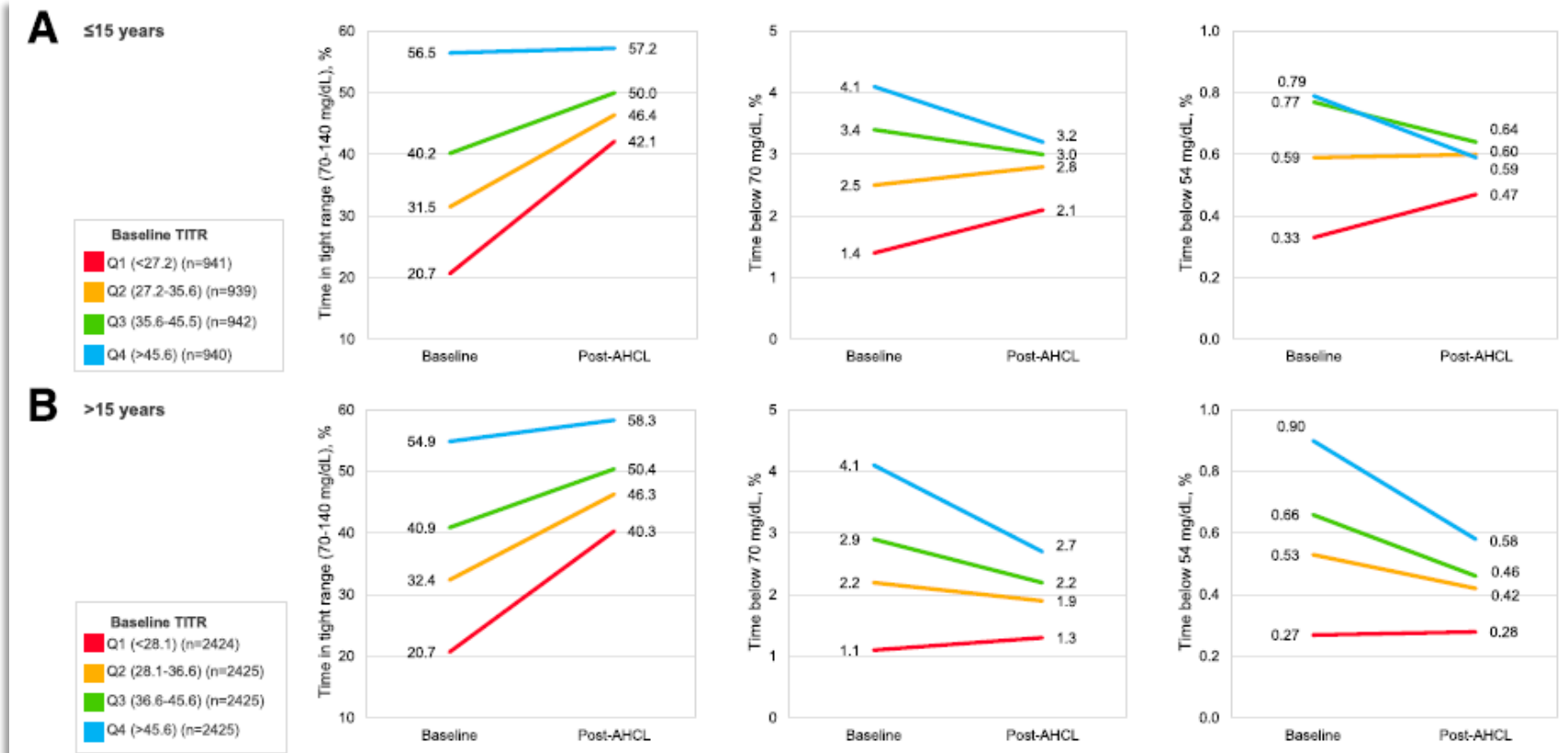


Figure 2—Glycemic control at baseline and post-AHCL initiation grouped by quartile (Q) of baseline TITR for those age ≤15 years (*A*) and the older group (*B*). The figure shows the mean percentage of TITR (70–140 mg/dL), TB70, and TB54 at baseline and post-AHCL initiation, grouped by quartile of the baseline TITR.

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Breakthrough T1D™ Formerly JDRF

Diabetes Care 2024; 47: 790-797

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AGENDA
#ISPAD50

Sistemas AID: Evidencia y resultados

Foco en alcanzar la normoglucemia (TITR)

Resultados en poblaciones desafiantes

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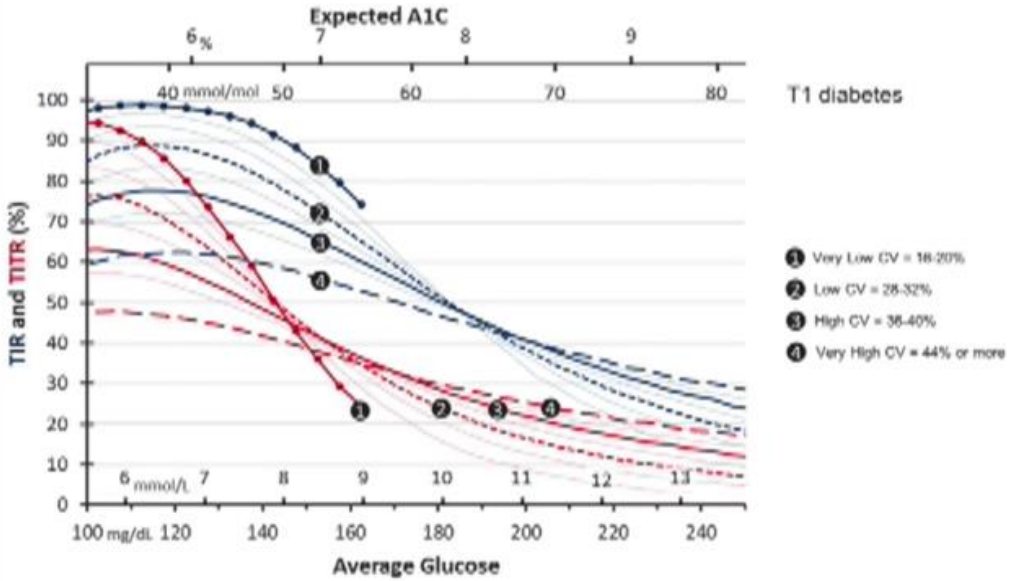
Is It Time to Move Beyond TIR to TITR? Real-World Data from Over 20,000 Users of Continuous Glucose Monitoring in Patients with Type 1 and Type 2 Diabetes

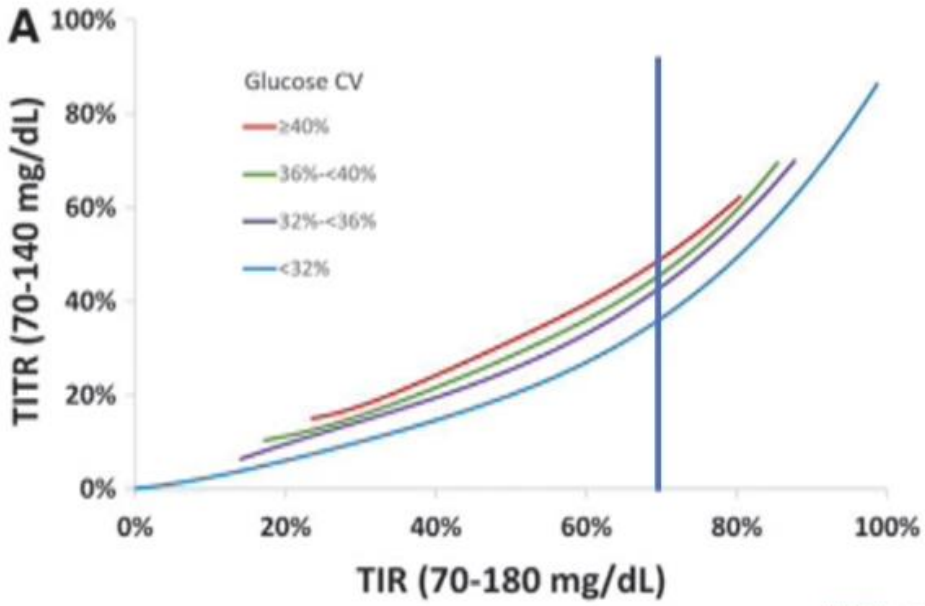
Timothy C. Dunn, PhD,[1] Ramzi A. Ajjan, MD, PhD,[2] Richard M. Bergenstal, MD,[3] and Yongjin Xu, PhD[1]

A Comparison of Continuous Glucose Monitoring-Measured Time-in-Range 70–180 mg/dL Versus Time-in-Tight-Range 70–140 mg/dL

Roy W. Beck, MD, PhD,[1] Dan Raghinaru, MS,[1] Peter Calhoun, PhD,[1] and Richard M. Bergenstal, MD[2]

The relationship between TIR and TITR = nonlinear-> with a higher ratio of TITR:TIR observed as TIR increased->approaching euglycemia





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Dunn TC et al. Diabetes Technol Ther 2024; 26 (3): 203-10. Beck RW et al. Diabetes Technol Ther 2024; 26 (3): 151-5

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Time in range – más cerca de la euglucemia

Fuerte correlación:
TITR – GMI < 7% (-0.93, n=36110)
Correlación débil para:
TIR – GMI ≥ 7% /-0.84 n=20542)

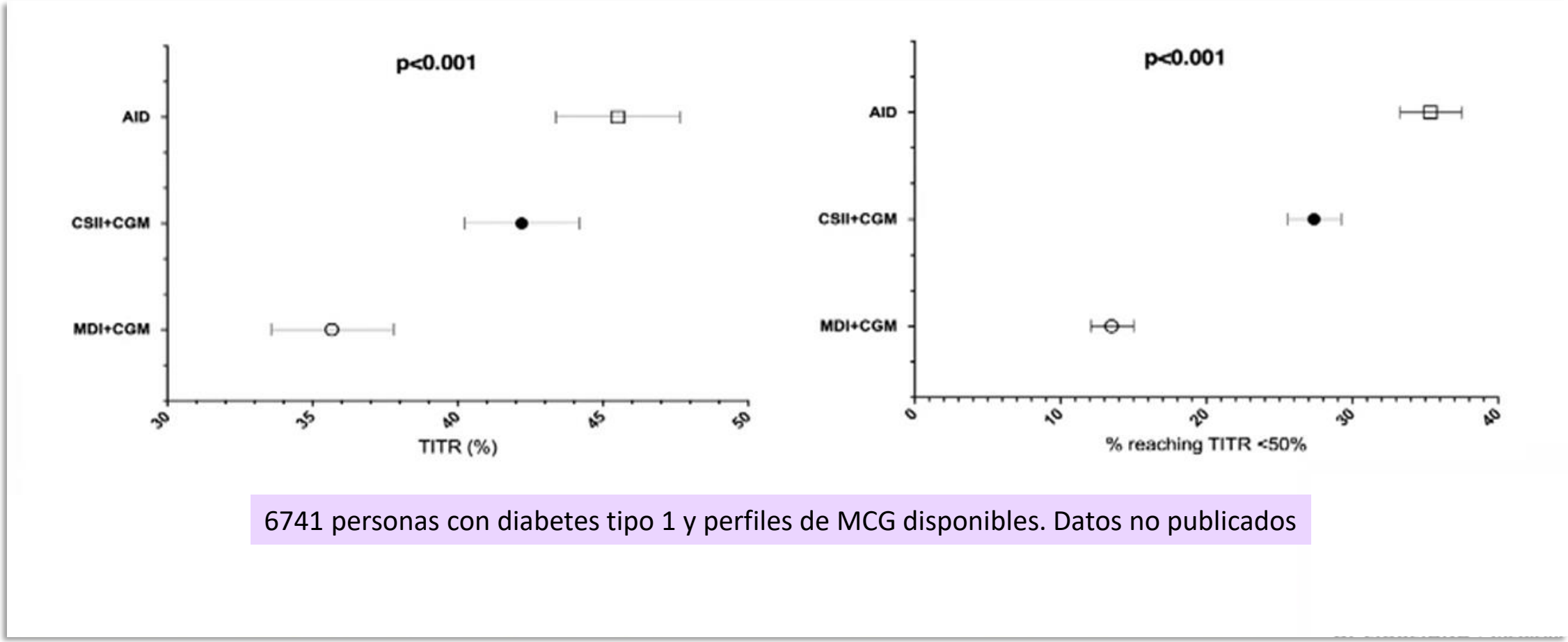
Fuerte correlación:
TIR – GMI ≥ 7% (-0.89)
Correlación débil para:
TIR – GMI < 7% (-0.79)

TITR puede ser un mejor target para pacientes con diabetes tipo 1 con un control de glucosa que está más cercano a la euglucemia lo que se logra mediante tecnología de avanzada.

TITR: tiempo en rango estrecho; GMI: Indicador de Gestión de Glucosa: TIR: tiempo en rango

Van den Heuvel T, er al. Unpublished data

TITR con diferentes modalidades de tratamiento. Registro SWEET



6741 personas con diabetes tipo 1 y perfiles de MCG disponibles. Datos no publicados

TITR: tiempo en rango estrecho; GMI: Indicador de Gestión de Glucosa: TIR: tiempo en rango

Von Dem Berge T et al. Stringent Glycemic Goals. Achievement. Tis vs. Titr in the sweet registry. ATTD 2024, abstrac.
MianowskaB. Cgm-base glycemic variability and its relation to TBR in the sweet registrty. ATTD 2024, abstract.

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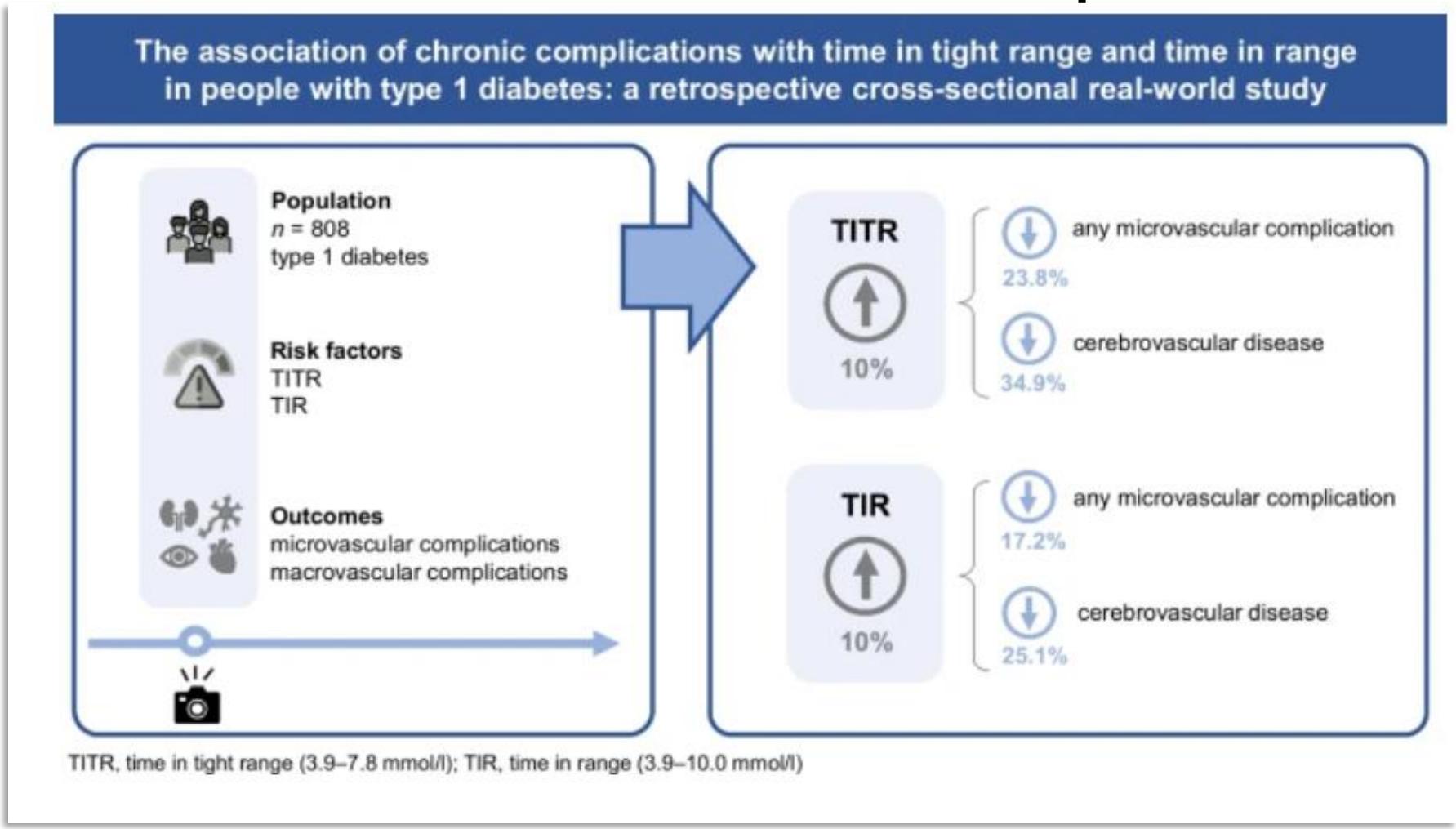
Asociación de complicaciones crónicas y el tiempo en rango en pacientes con DT1: estudio cross retrospectivo de la vida real



Conclusions/interpretation: TITR and TIR are inversely associated with the presence of microvascular complications and CVA in people with type 1 diabetes. Although this study was not designed to establish a causal relationship, this analysis adds validity to the use of TITR and TIR as key measures in glycaemic management.

Beneficios TITR

- ✓ Aportar más información (TIR>70%)
- ✓ Mayor utilidad en AID, remisión parcial y estadio 2 DT1
- ✓ Estudios de intervención (para evaluación)

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Diabetologia 2024 Augt 67 (8): 1527-1535.

AGENDA
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Sistemas AID: Evidencia y resultados

Foco en alcanzar la normoglucemia (TITR)

Resultados en poblaciones desafiantes

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The Lenny trial: The use of closed loop system in young pediatric users (2-6 years old) is safe and effective

Tadej Battelino, on behalf of the LENNY investigators

University Medical Center Ljubljana
University of Ljubljana,
Slovenia

Estudio LENNY

Evaluación del sistema MiniMed 780G en pacientes jóvenes (2-6 años) con diabetes tipo 1 en el ámbito domiciliario

Objective

to evaluate the safety and performance of the MiniMed™ 780G system in Auto Mode in comparison to the MiniMed™ 780G system in Manual Mode with Suspend before low.

Design

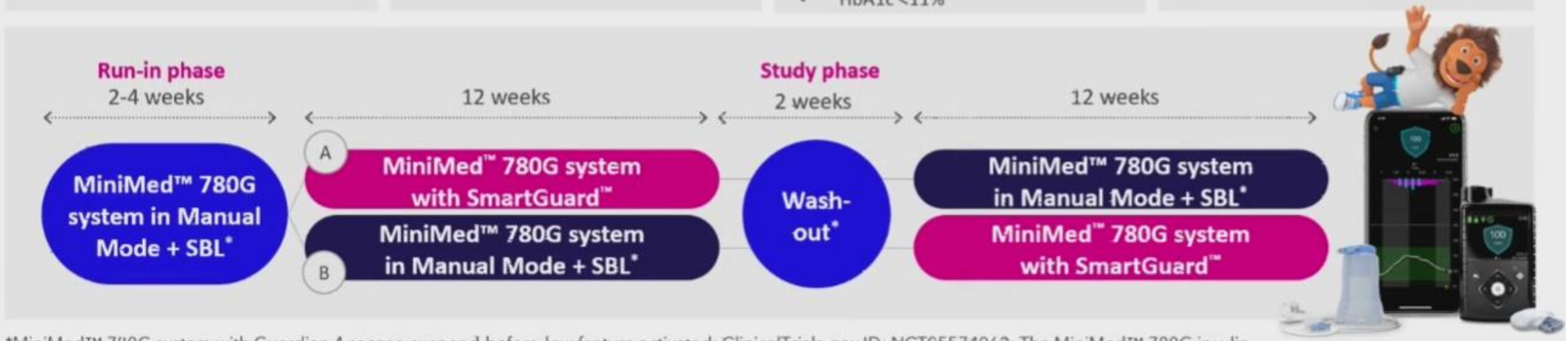
- prospective, open-label, multi-center, randomized crossover study
- 12 centers Finland, Italy, Slovenia and UK

Population

- 98 children aged 2-6 at time of screening
- T1D ≥6 months
- On MDI therapy or CSII with or without CGM
- TDD ≥6 units
- HbA1c <11%

Primary endpoints

- between-treatment difference in time in target range 70-180 mg/dL (3.9-10.0 mmol/L)



*MiniMed™ 780G system with Guardian 4 sensor, suspend-before-low feature activated; ClinicalTrials.gov ID: NCT05574062; The MiniMed™ 780G insulin pump is indicated for use by patients aged 7-80 years with Type 1 diabetes, whose total daily dose of insulin is 8 units per day or more.

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Sistema usado

	Run-in Manual Mode + SBL	Control group Manual Mode + SBL	Intervention group AHCL
Time in AHCL, %	-	-	97.0 ± 3.99
Time in SBL, %	96.5 ± 17.6	98.96 ± 9.5	2.4 ± 2.8
Sensor use, %	96.2 ± 3.6	96.0 ± 4.0	96.3 ± 3.0
SMBG per day, *n*	5.7 ± 3.2	6.2 ± 3.2	1.7 ± 1.5

Data are shown as mean ± SD, unless indicated otherwise; SBL: Suspend Before Low; AHCL: Advanced Hybrid Closed Loop; The MiniMed™ 780G insulin pump is indicated for use by patients aged 7-80 years with Type 1 diabetes, whose total daily dose of insulin is 8 units per day or more.

SBL: suspendido antes de la baja; AHCL: circuito cerrado híbrido avanzado

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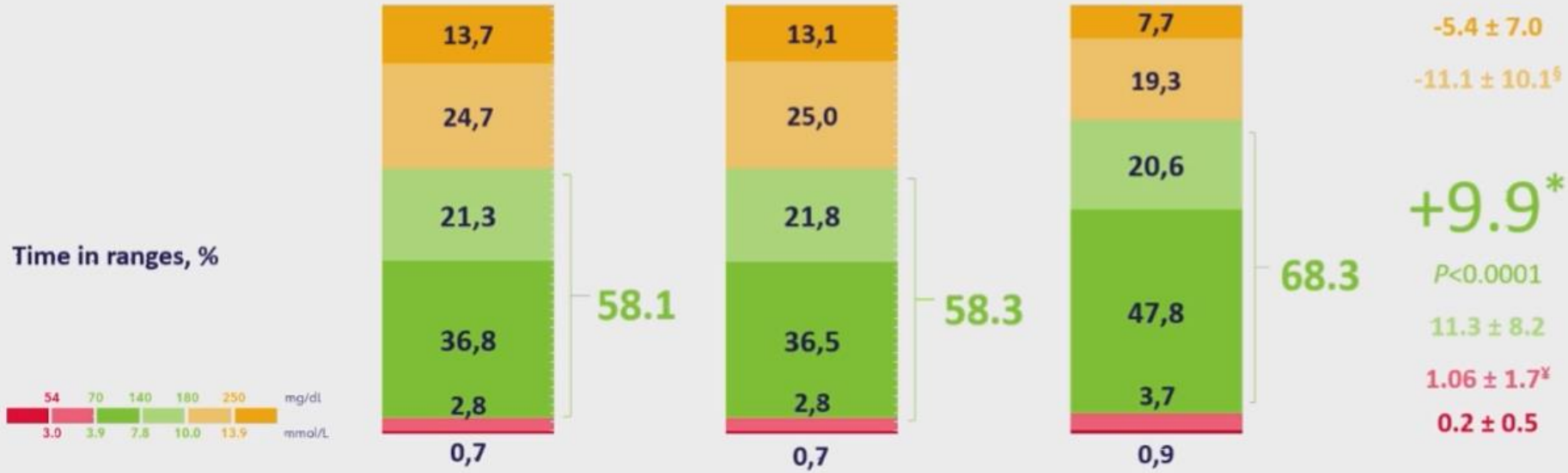
Participantes con AHCL pasaron, en promedio, 2.4 h/día más en rango

Con +10% de reducción de la hiperglucemia

	Run-in Manual Mode + SBL	Control group Manual Mode + SBL	Intervention group AHCL	Between treatment difference
Users, *n*	98	98	98	-
Mean glucose, *mg/dL*	169.6 ± 25.7	169.1 ± 23.1	150.2 ± 10.7	-18.9 ± 18.1
SD of SG, *mg/dL*	65.0 ± 14.7	65.4 ± 13.2	61.8 ± 10.9	-3.6 ± 7.3
GMI, *%*	7.4 ± 0.6	7.4 ± 0.5	6.9 ± 0.3	-0.5 ± 0.4



Data are shown as mean ± SD, unless indicated otherwise; SBL: Suspend Before Low; AHCL: Advanced Hybrid Closed Loop *model adjusted difference: adjusted for sequence effect and TIR during run-in phase; ¥the difference includes time below 54mg/dL; §the difference includes time above 250mg/dL.; The MiniMed™ 780G insulin pump is indicated for use by patients aged 7-80 years with Type 1 diabetes, whose total daily dose of insulin is 8 units per day or more. UNPUBLISHED DATA; DO NOT COPY OR DISTRIBUTE

SBL: suspendido antes de la baja; AHCL: circuito cerrado híbrido avanzado

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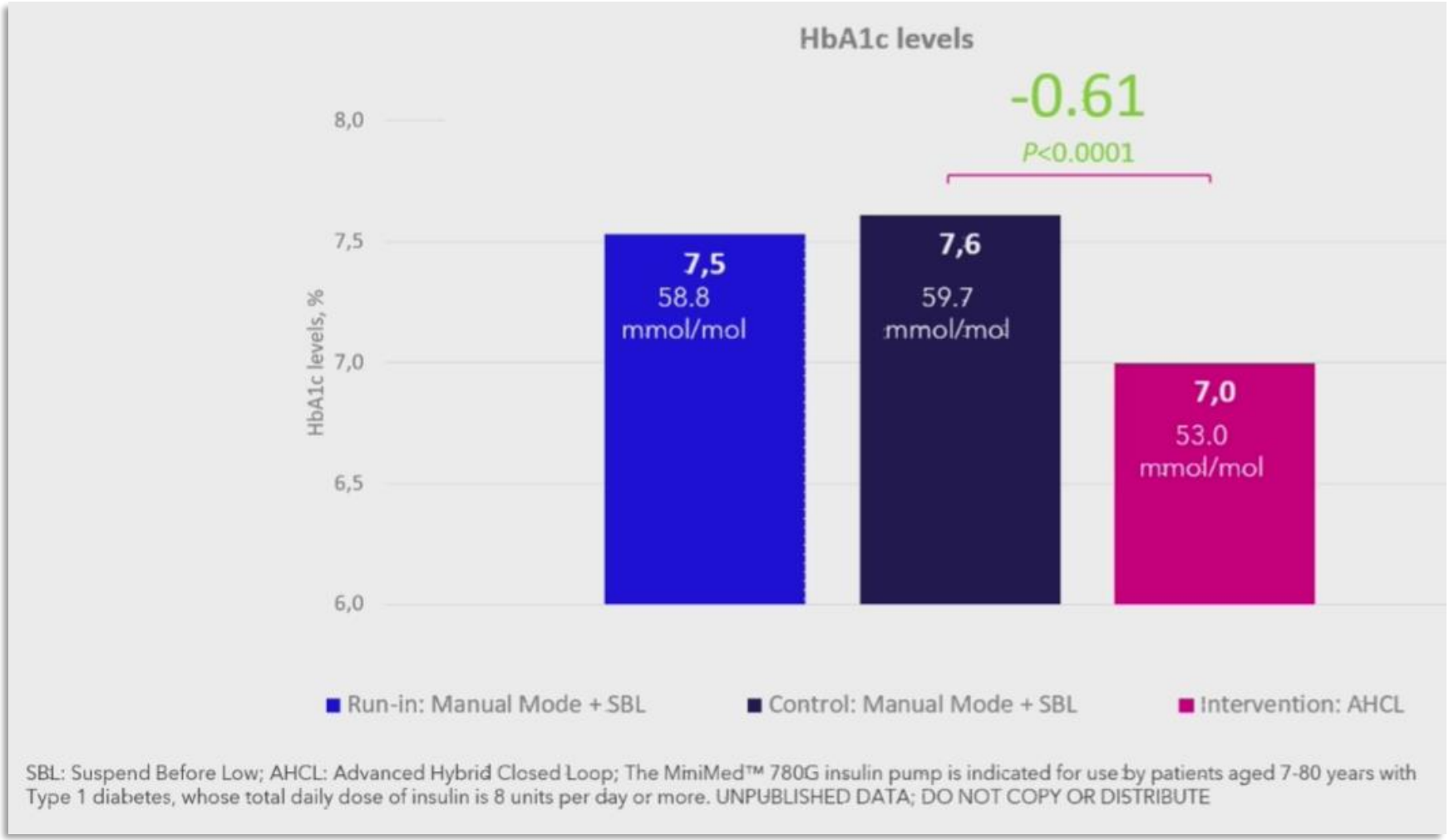
La HbA1c mejoró con -0.6% con la terapia AHCL

Comparada con el grupo control con modo manual SBL

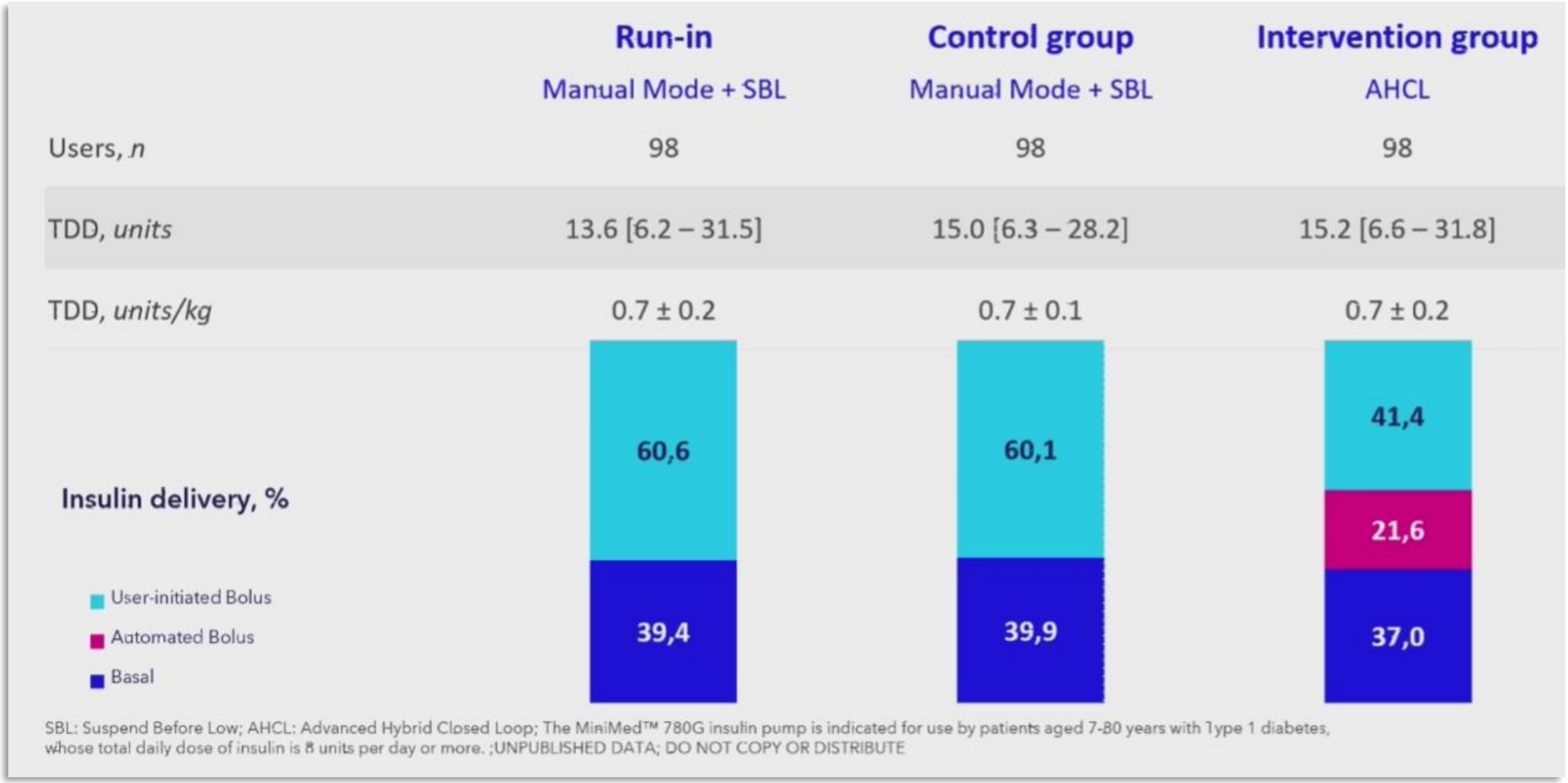


SBL: suspendido antes de la baja; AHCL: circuito cerrado híbrido avanzado

No hubo diferencias en TDD

21.6% de bolos de insulina entregados automáticamente con el sistema AHCL

	Run-in Manual Mode + SBL	Control group Manual Mode + SBL	Intervention group AHCL
Users, *n*	98	98	98
TDD, *units*	13.6 [6.2 – 31.5]	15.0 [6.3 – 28.2]	15.2 [6.6 – 31.8]
TDD, *units/kg*	0.7 ± 0.2	0.7 ± 0.1	0.7 ± 0.2



SBL: Suspend Before Low; AHCL: Advanced Hybrid Closed Loop; The MiniMed™ 780G insulin pump is indicated for use by patients aged 7-80 years with Type 1 diabetes, whose total daily dose of insulin is 8 units per day or more. ;UNPUBLISHED DATA; DO NOT COPY OR DISTRIBUTE

TDD: dosis total diaria; SBL: suspendido antes de la baja; AHCL: circuito cerrado híbrido avanzado

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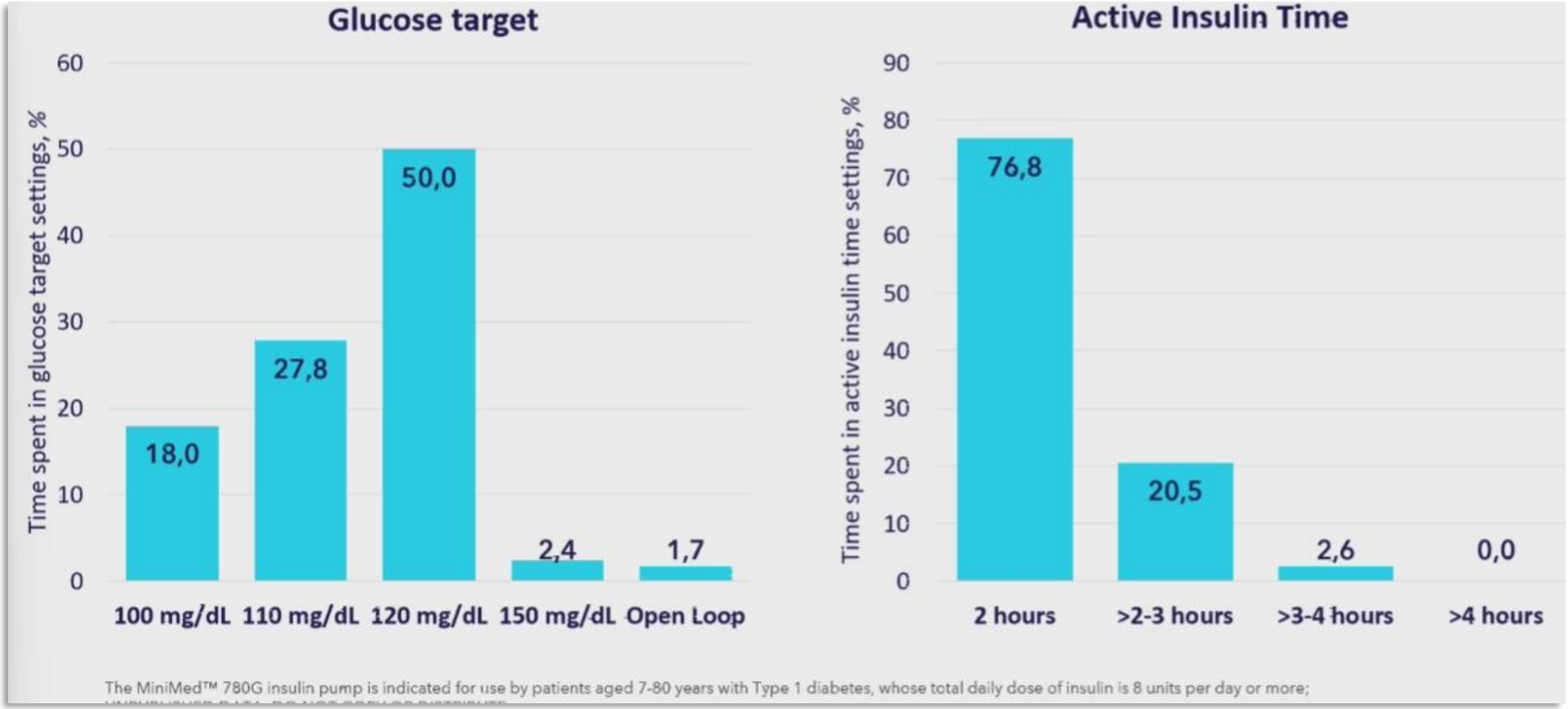
El protocolo de reducción de la glucosa fue basado en el TIR con riesgo de hipoglucemia

Con una glucemia de inicio de 120 mg/dL con la terapia AHCL



DATA NO PUBLICADA

TIR: tiempo en rango; AHCL: circuito cerrado híbrido avanzado

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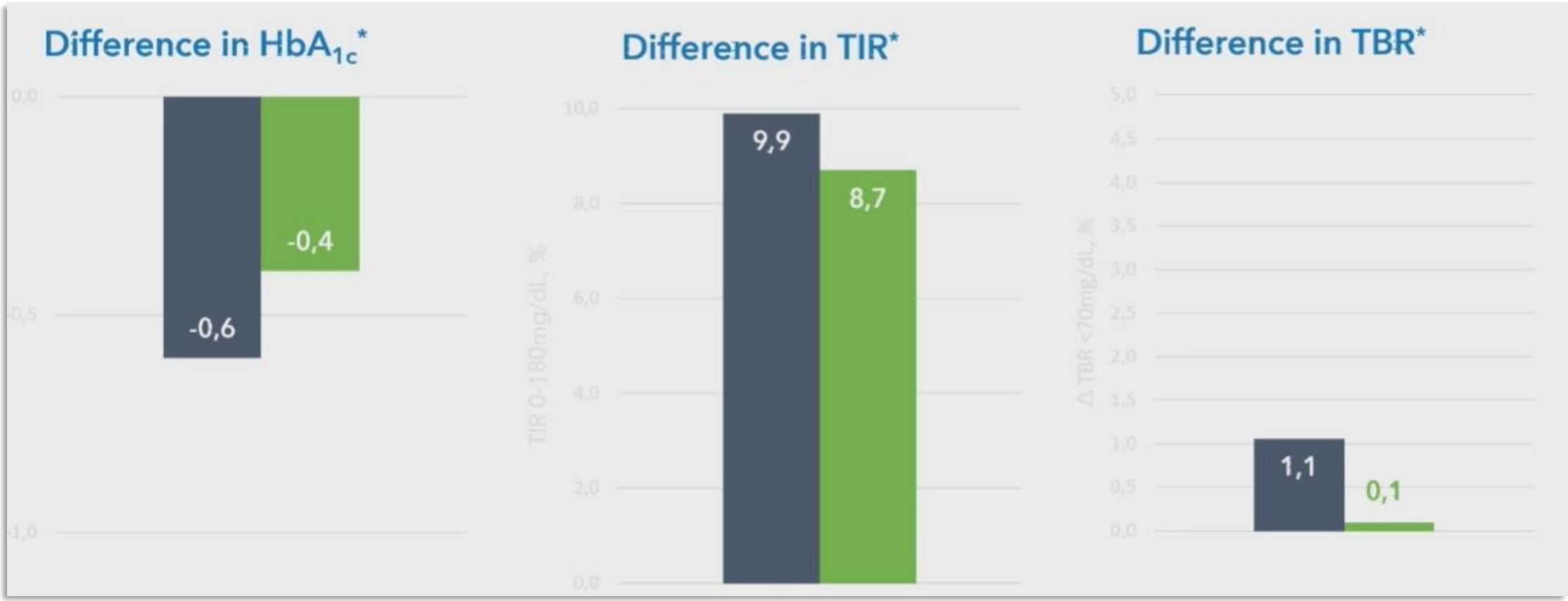
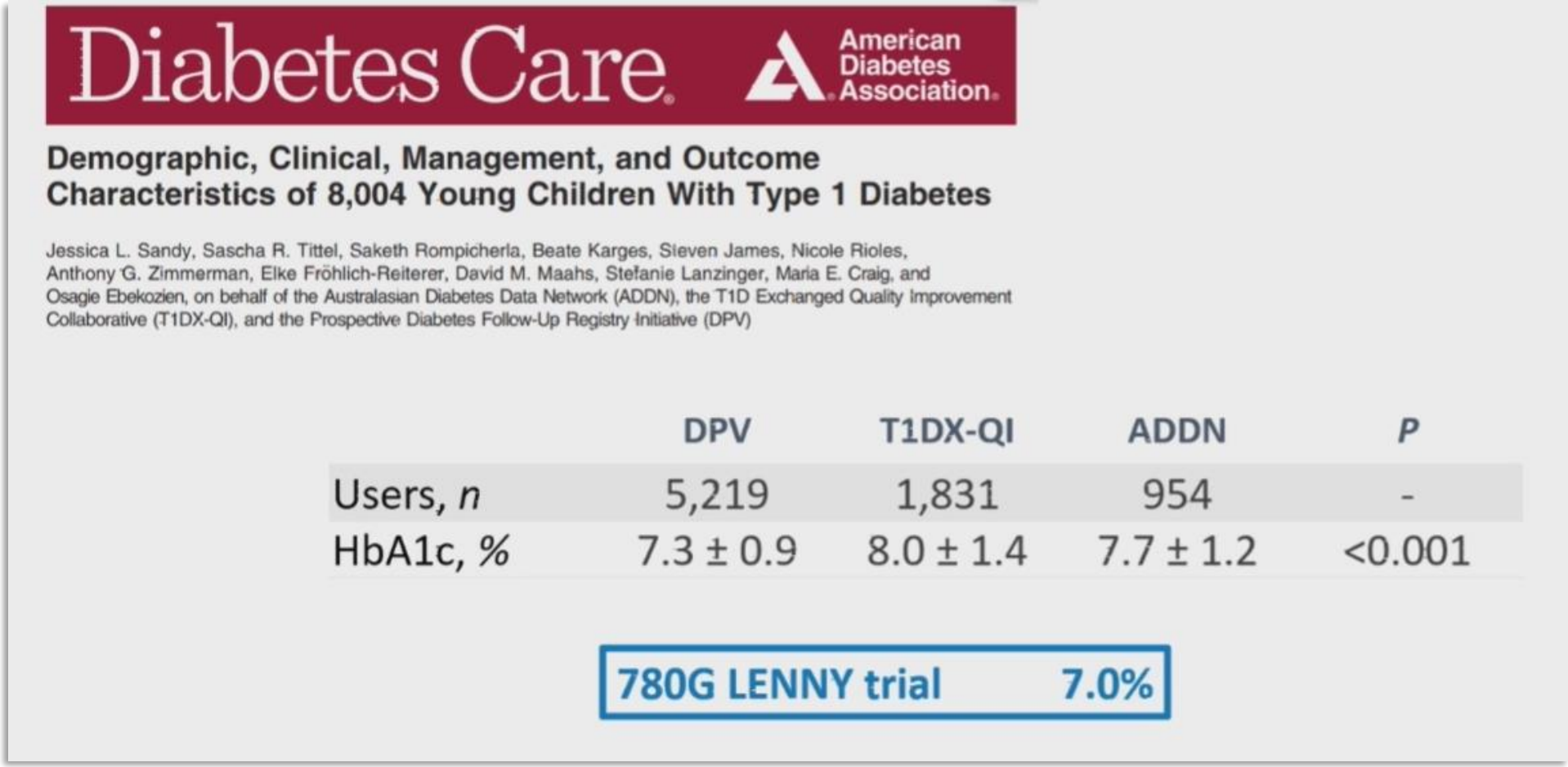
Resultados comparables entre los sistemas AID



AID: infusión automatizada de insulina; TIR: tiempo en rango; TBR: tiempo bajo el rango

Ware J et al. NEJM 2022; 386 (3): 209-219. *Valores medios ajustados.

Superioridad de AID en registros recientes



Diabetes Care

American Diabetes Association.

Demographic, Clinical, Management, and Outcome Characteristics of 8,004 Young Children With Type 1 Diabetes

Jessica L. Sandy, Sascha R. Tittel, Saketh Rompicherla, Beate Karges, Steven James, Nicole Rioles, Anthony G. Zimmerman, Elke Fröhlich-Reiterer, David M. Maahs, Stefanie Lanzinger, Maria E. Craig, and Osagie Ebekozien, on behalf of the Australasian Diabetes Data Network (ADDN), the T1D Exchanged Quality Improvement Collaborative (T1DX-QI), and the Prospective Diabetes Follow-Up Registry Initiative (DPV)

	DPV	T1DX-QI	ADDN	*P*
Users, *n*	5,219	1,831	954	-
HbA1c, %	7.3 ± 0.9	8.0 ± 1.4	7.7 ± 1.2	<0.001

780G LENNY trial 7.0%

Sandly JL et al. Diabetes Care 2024 (4): 660-667

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Conclusiones

- ✓ *El estudio LENNY demostró que el uso del sistema MiniMed 780G en jóvenes de 2-6 años con TDD≥6 U es seguro y efectivo.*
- ✓ *MiniMed 780G mejoró los outcomes con +9.9% (+2.4h) en el TIR y –0.6% en la HbA1c.*
- ✓ *Familiares y cuidadores reportaron un mejor sueño y menos temor a la hipoglucemia.*

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MENSAJES CLAVE

Resultados consistentes que se replican en distintos países y en diferentes poblaciones

Siendo factibles resultados uniformes surge la posibilidad de pensar en nuevas métricas cercanas a la normoglucemia

AID cambia paradigmas en relación a selección de “candidatos” , permitiendo mayor inclusión y beneficios para todos los usuarios

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GRACIAS POR SU ATENCIÓN

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¿Qué hay de nuevo en Diabetes 2?

Adriana Roussos
Hospital de Niños Ricardo Gutiérrez, Buenos Aires

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Adriana Roussos

- Médica pediatra, especialista en Nutrición.
- Jefa Sección Nutrición y Diabetes, Hospital de Niños R. Gutiérrez, CABA.
- Docente adscripta UBA, Pediatría.
- Docente de posgrado UBA, USAL, Barceló.

Conflictos de interés:

- No presento con respecto a esta disertación.

Diabetes 2 en jóvenes: Hoja de ruta

HACIA UN MEJOR CONTROL	ACTUALIZACIÓN EN TRATAMIENTO
MCG EN DT2 ○ Fundamento ○ Evidencia ○ Métricas	**NUEVAS GUÍAS ISPAD** ○ Objetivos ○ Tratamiento farmacológico

MCG: monitoreo continuo de glucosa

Objetivos glucémicos y métricas de MCG en DT2: hacia un Consenso

Tadej Battelino. Ljubljana (Eslovenia)

Jefe de Departamento de Endocrinología, Centro Médico Universitario de Ljubljana. Farmacólogo clínico. Profesor titular de Pediatría de la Facultad de Medicina de la Universidad de Ljubljana.

¿Por qué?

- Relación dosis-respuesta entre los niveles de glucemia y la ECVA, ERC, IC.

  Honigberg MC y col. J Am Coll Cardiol. 2021; 78(5): 453-464.

- Relación dosis-respuesta entre los niveles de glucemia y capacidad cognitiva.
  - Estructura cerebral y capacidades cognitivas.

  Ranglani. Diabetes Obes metab 2023; 25:3136-3143.

  - Demencia vascular y no vascular.

  Celis-Morales. Diabetes Care 2022; 45:634-641.

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ECVA: enfermedad cardiovascular aterosclerótica; ERC: enfermedad renal crónica; IC: insuficiencia cardíaca

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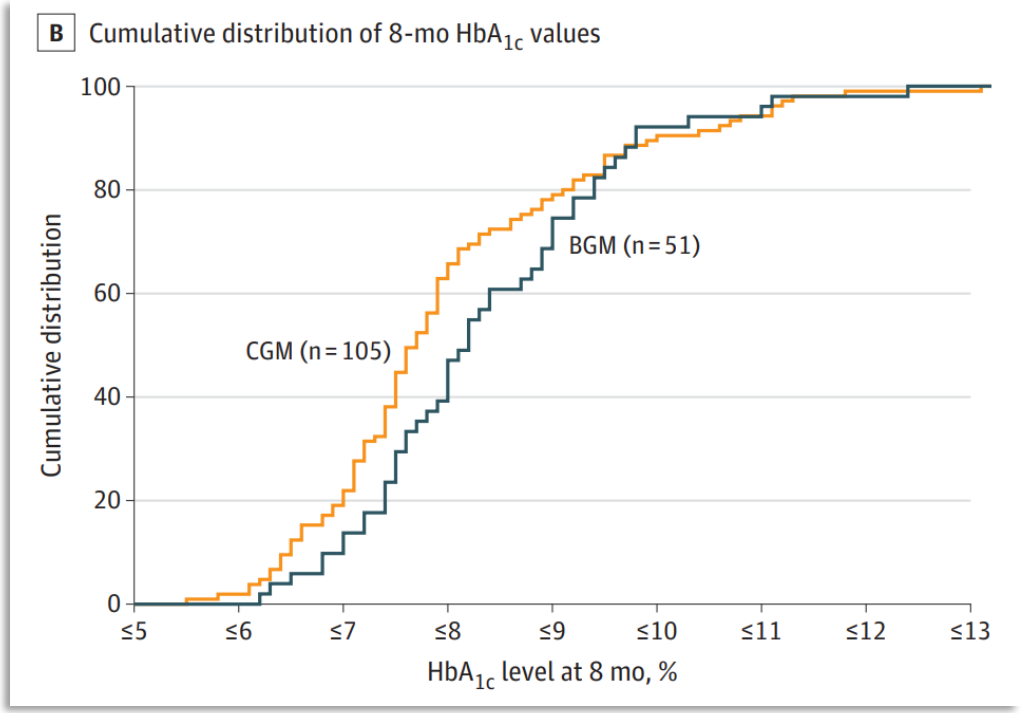
La glucemia elevada es dañina, aún en el rango “normal”

Evidencia de MCG en DT2

Efectos del monitoreo continuo de glucosa sobre el control glucémico en pacientes con diabetes tipo 2 tratados con insulina basal. Estudio clínico aleatorizado



CON INSULINA

EAC, multicéntrico, EE.UU.

117 adultos con DT2

Insulina basal solamente, con o sin ADO

MCG: HbA1c significativamente menor

TIR significativamente mayor

	Baseline CGM	Baseline SBGM	8 mo CGM	8 mo SBGM	Diff.	p
N	114	59	93	53		
TIR (%)	40(26)	40(25)	59(25)	43(26)	15 (8-23)	<0.001
TAR > 250 (%)	26(22)	25(21)	11(11)	27(24)	-16 (21-11)	<0.001
Mean glucose (mg/dL)	209(48)	206(45)	179 (43)	206 (53)	-26 (41-12)	<0.001

JAMA 2021: 8; 325(22):2262-2272

Comparación de monitoreo continuo de glucosa con control de glucemia en adultos con diabetes tipo 2 insulinizados y con inadecuado control (Steno2Tech Study).

Estudio aleatorizado, controlado, de un centro a 12 meses

CONTINUOUS GLUCOSE MONITORING FOR ADULTS WITH INSULIN-TREATED TYPE 2 DIABETES

AIM

To evaluate the long-term effect of CGM versus BGM in adults with inadequately controlled, insulin-treated type 2 diabetes

METHODS

12-month single-center, open-label, parallel, RCT

76 participants randomized to 12 months of CGM or BGM (40 CGM, 36 BGM)

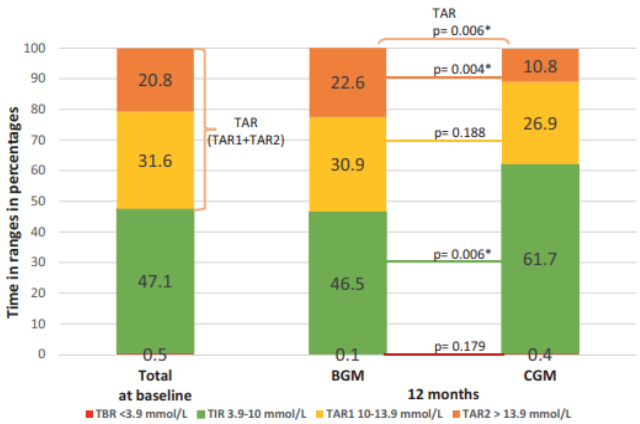


Figure 1: CGM-derived metrics at baseline and 12-month follow-up.

MAIN RESULTS

(BETWEEN-GROUP DIFFERENCE IN CHANGE)

↑ 15.2% TIR (3 h 39 min)
↓ 15.5% TAR
↓ 0.9% (9.4 mmol/mol) in HbA_{1c}
↓ 10.6 units of insulin/day
↓ 3.3 kg in body weight

↑ Self-rated treatment and glucose monitoring satisfaction
↑ Self-rated general and diabetes-related health
↑ Self-rated health behavior

CONCLUSION

CGM significantly improved glycemic, metabolic, and participant self-rated outcomes compared to BGM in adults with insulin-treated type 2 diabetes

CGM – Continuous glucose monitoring, BGM – Blood glucose monitoring, TIR – Time in range (3.9-10 mmol/L), TAR – Time above range (>10 mmol/L)

CON INSULINA

83% solo con basal
17% MDI
66% AR GLP-1
Péptido C presente

TIR: ↑ 15%
TBR: sin diferencia
DDT: ↓ 10,6U
Peso -3,3 kg

MDI: múltiples dosis de insulina; TIR: tiempo en rango; TBR: tiempo bajo el rango; DDT: dosis total diaria

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Diabetes Care 2024; 47: 881-889

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Cambios en el control glucémico a 24 semanas con el uso de monitoreo flash de glucosa en la vida real en pacientes de Europa con diabetes tipo 1 y 2 con diferentes niveles de control glucémico

SIN INSULINA

TIR < 70	Basal-bolus			Basal			SIN INSULINA		
	Sensor 1	Sensor 12	Difference; p-value (95% CI)	Sensor 1	Sensor 12	Difference; p-value (95% CI)	Sensor 1	Sensor 12	Difference; p-value (95% CI)
Number of subjects	588	588		70	70		21	21	
Mean glucose (mmol/L)	10.1	9.4	**−0.7; p < 0.0001 (−0.83 to −0.57)**	10.4	9.5	**−0.9; p = 0.0007 (−1.38 to −0.39)**	9.9	8.7	**−1.2; p = 0.02 (−2.21 to −0.24)**
eHbA1c (%)	7.9	7.5	**−0.4; p < 0.0001 (−0.52 to −0.36)**	8.2	7.6	**−0.55; p = 0.0007 (−0.87 to −0.24)**	7.9	7.1	**−0.77; p = 0.02 (−1.39 to −0.15)**
eHbA1c (mmol/mol)	63.4	58.6	**−4.8; p < 0.0001 (−5.66 to −3.9)**	65.7	59.7	**−6.1; p = 0.0007 (−9.46 to −2.66)**	62.4	54.0	**−8.41; p = 0.02 (−15.19 to −1.64)**
TIR 3.9–10.0 mmol/L (%)	51.7	61.0	**9.3; p < 0.0001 (7.84 to 10.77)**	48.6	60.7	**12.1; p < 0.0001 (6.63 to 17.5)**	52.7	72.2	**19.5; p = 0.003 (7.62 to 31.47)**
CV (%)	31.0	30.0	**−1; p < 0.0001 (−1.39 to −0.54)**	30.3	29.2	−1.09; p = 0.11 (−2.44 to 0.25)	29.0	25.5	**−3.5; p = 0.03 (−6.71 to −0.31)**
Glucose SD (mmol/L)	55.6	50.5	**−5.1; p < 0.0001 (−6 to −4.16)**	55.7	50.1	**−5.6; p = 0.001 (−9.02 to −2.27)**	50.6	39.9	**−10.7; p = 0.003 (−17.21 to −4.2)**
Time < 3.0 mmol/L (%)	0.2	0.0	**−0.27; p = 0.0006 (−0.43 to −0.12)**	0.2	0.0	−0.3; p = 0.07 (−0.56 to 0.02)	0.1	0.0	−0.6; p = 0.13 (−1.33 to 0.19)
Time < 3.9 mmol/L (%)	0.9	0.7	**−0.4; p = 0.006 (−0.76 to −0.13)**	0.8	0.4	−0.5; p = 0.10 (−1.04 to 0.09)	0.7	0.0	−1.7; p = 0.13 (−3.99 to 0.55)
Time > 10.0 mmol/L (%)	46.3	37.2	**−9.2; p < 0.0001 (−10.7 to −7.6)**	49.7	37.6	**−12.1; p < 0.0001 (−17.6 to −6.6)**	45.3	27.0	**−18.3; p = 0.006 (−30.7 to −5.9)**

TIR

TAR

Diabetes Research and Clinical Practice 201 (2023) 110735

Impacto en el monitoreo flash de glucosa en personas con diabetes tipo 2 inadecuadamente controladas con terapia no insulínica antihiperglucémica (IMMEDIATE)

Estudio aleatorizado controlado

	isCGM + DSME	DSME
n	58	58
Age (y)	59.2 ± 9.6	57.6 ± 10.6
Duration of T2D (y)	9.2 ± 6.3	10.9 ± 5.9
Females, n (%)	21 (36.2)	21 (36.2)
HbA1c (%)	8.5 ± 1.0	8.7 ± 1.2
HbA1c (mmol/mol)	69 ± 11	72 ± 14
% TIR (70-180 mg/dl)	56.3 ± 26.4	57.5 ± 25.7
% TAR (> 180 mg/dl)	42.5 ± 27.4	40.2 ± 27.3
% TBR (< 70 mg/dl)	1.0 ± 2.7	1.4 ± 3.3
Mean glucose (mg/dl)	10.0 ± 2.8	9.7 ± 2.7
Weight (kg)	85.6 ± 1.0	85.5 ± 22.4
Body mass index (kg/m^2)	30.0 ± 6.1	29.8 ± 6.4
Waist circumference (cm)	102.6 ± 14.0[a]	101.4 ± 16.7[a]
Systolic blood pressure (mmHg)	127 ± 13	126 ± 17[b]
Diastolic blood pressure (mmHg)	81 ± 10	81 ± 12
eGFR (ml/min/1.73m^2)	88.9 ± 19.5	89.8 ± 17.2
Number of non-insulin antihyperglycaemic therapies	2.6 ± 0.8	2.7 ± 1.0
Metformin, n (%)	58 (100.0)	56 (96.6)
Sulphonylurea, n (%)	32 (55.2)	25 (43.1)
SGLT2i, n (%)	20 (34.5)	25 (43.1)
DPP-4i, n (%)	25 (43.1)	27 (46.6)
GLP-1 RA, n (%)	16 (27.6)	20 (34.5)

	isCGM + DSME	DSME	Adjusted mean difference (95% CI)	Adjusted *P* value
n	51	48		
% TIR (3.9-10.0 mmol/L)	76.3 ± 17.4	65.6 ± 22.6	−9.9 (−17.3 to −2.5)	**.009**
% time in the tight glycaemic range (3.9-7.8 mmol/L)	50.3 ± 21.9	40.4 ± 23.1	−8.5 (−16.6 to −0.3)	**.042**
% TAR (> 10.0 mmol/L)	21.2 ± 18.1	30.7 ± 24.5	8.1 (0.5 to 15.7)	**.037**
% TBR (< 3.9 mmol/L)	1.9 ± 3.5	3.0 ± 6.5	1.3 (−0.8 to 3.3)	.218
% TBR level 2 (< 3.0 mmol/L)	0.6 ± 2.3	0.9 ± 3.1	0.3 (−0.8 to 1.4)	.553
Mean glucose (mmol/L)	8.1 ± 1.5	8.8 ± 2.4	0.6 (−0.2 to 1.3)	.123
SD (mmol/L)	2.2 ± 0.6	2.4 ± 0.6	0.2 (−0.1 to 0.4)	.113
CV (%)	27.3 ± 6.9	28.1 ± 7.1	0.7 (−2.2 to 3.5)	.650
Number of hypoglycaemic events	1 (0.0, 5.0)	0.5 (0.0, 5.3)		
Number of nocturnal hypoglycaemic events	0 (0.0, 2.5)	0 (0.0, 4.0)		
Number of level 2 hypoglycaemic events	0 (0.0, 1.0)	0 (0.0, 1.0)		

TIR: ↑ 10%

TITR: ↑8,5%

TBR: sin diferencia

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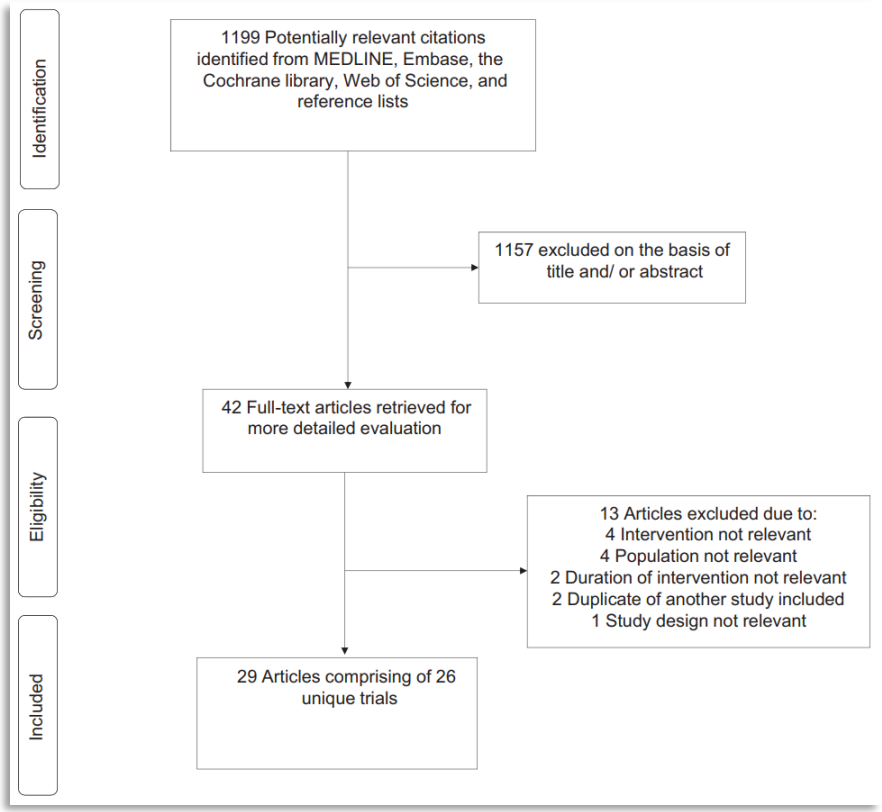
Diabetes Obs Met 2023; 25: 1024-1031

METANÁLISIS 1

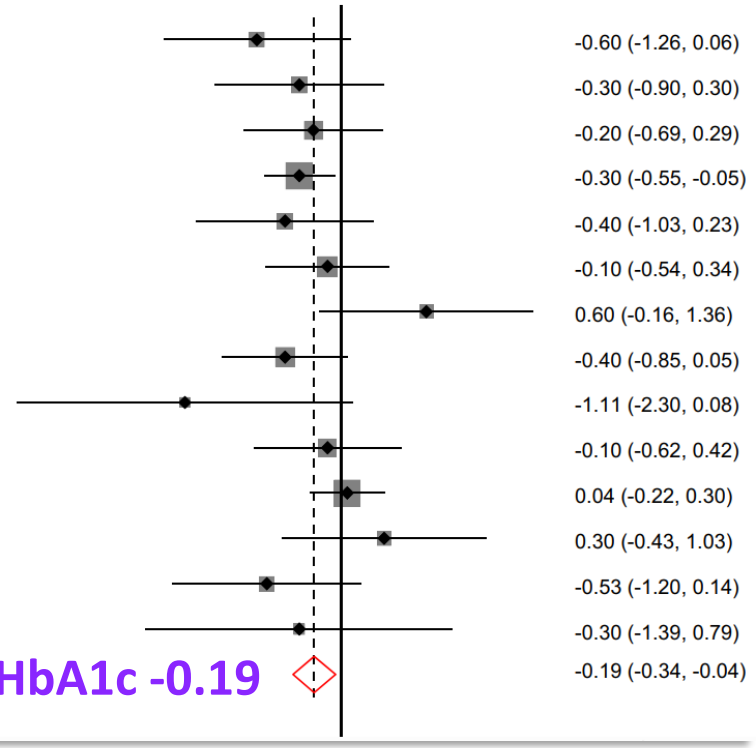
Eficacia y seguridad en el monitoreo continuo de glucosa en pacientes con diabetes tipo 2. Revisión - metaanálisis de evidencia internacional



Reducción significativa en HbA1c
CGM vs usual/SMBG

Author, year of publication	CGM N	CGM Mean (SD)	Usual care/SMBG N	Usual care/SMBG Mean (SD)	Mean difference (95% CI)
Moon, 2023	15	-0.60 (0.70)	15	0.00 (1.10)	-0.60 (-1.26, 0.06)
Yoo, 2008	29	8.00 (1.20)	28	8.30 (1.10)	-0.30 (-0.90, 0.30)
Vigersky, 2012	50	7.70 (1.10)	50	7.90 (1.40)	-0.20 (-0.69, 0.29)
Beck, 2017	79	7.70 (0.68)	79	8.00 (0.91)	-0.30 (-0.55, -0.05)
Allen, 2008	21	7.70 (1.23)	25	8.10 (0.87)	-0.40 (-1.03, 0.23)
Ilany, 2017	49	8.40 (1.00)	49	8.50 (1.20)	-0.10 (-0.54, 0.34)
Tang, 2014	15	7.90 (1.32)	17	7.30 (0.75)	0.60 (-0.16, 1.36)
Martens, 2021	105	8.00 (1.40)	51	8.40 (1.30)	-0.40 (-0.85, 0.05)
Cox, 2020	20	-1.30 (0.89)	10	-0.19 (1.81)	-1.11 (-2.30, 0.08)
Price, 2021	44	8.00 (1.10)	23	8.10 (1.00)	-0.10 (-0.62, 0.42)
Bergenstal, 2022	59	7.07 (0.90)	55	7.03 (0.50)	0.04 (-0.22, 0.30)
Sato, 2016	17	8.20 (1.30)	17	7.90 (0.80)	0.30 (-0.43, 1.03)
Taylor, 2019	10	5.90 (0.57)	10	6.43 (0.92)	-0.53 (-1.20, 0.14)
Yeoh, 2018	14	8.80 (1.80)	16	9.10 (1.10)	-0.30 (-1.39, 0.79)
Overall N	527		445		-0.19 (-0.34, -0.04)

(I^2 = 19.1%, p = 0.245)



CGM monitoreo continuo de glucosa; SMBG: automonitoreo de glucosa en sangre

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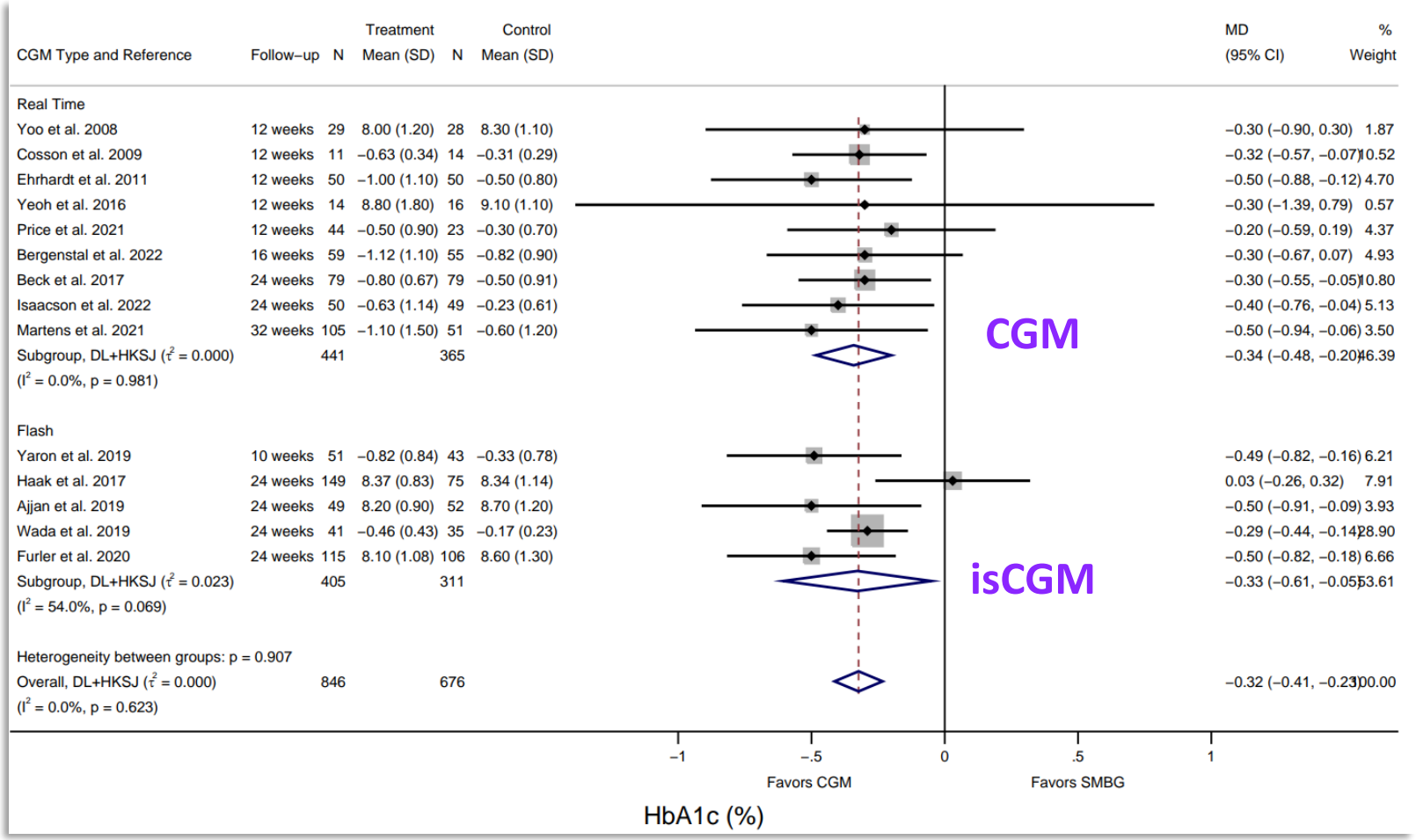
Diabetes Care 2024; 1 (47): 169-179

50th Anniversary ISPAD 2024 LISBON, PORTUGAL | OCTOBER 16-19 Inclusion & Innovation in Pediatric Diabetes

METANÁLISIS 2

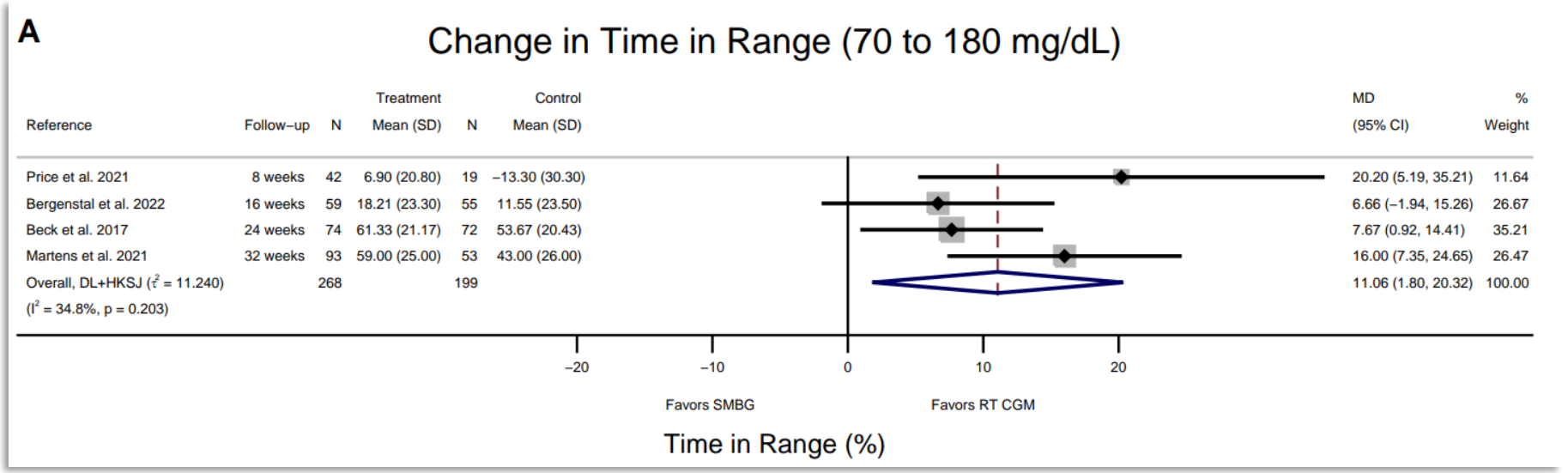
Efectividad del monitoreo continuo de glucosa sobre las métricas de control glucémico en pacientes con diabetes tipo 2. Revisión sistemática metaanálisis de estudios aleatorizados



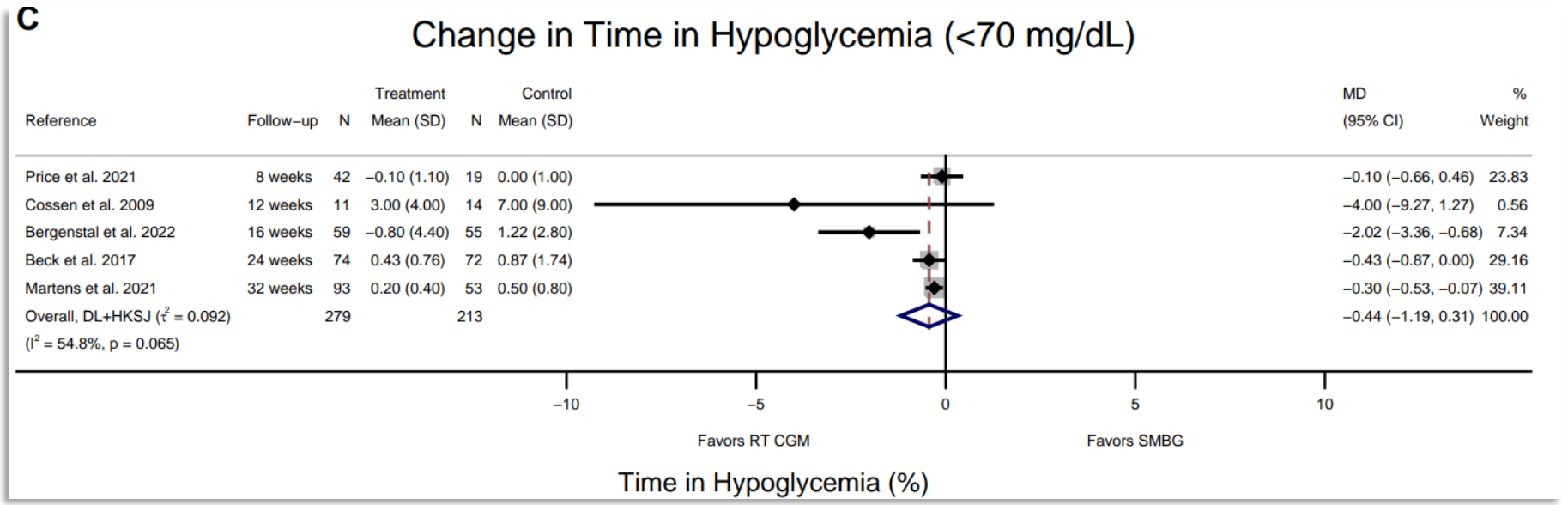
HbA1c -0.3

J Clin Endocrinol Metab 2024; 109 (4): 1119-1131

METANÁLISIS 2



▲ TIR



▼ TBR

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J Clin Endocrinol Metab 2024; 109 (4): 1119-1131

50th Anniversary ISPAD 2024 LISBON, PORTUGAL | OCTOBER 16-19 Inclusion & Innovation in Pediatric Diabetes

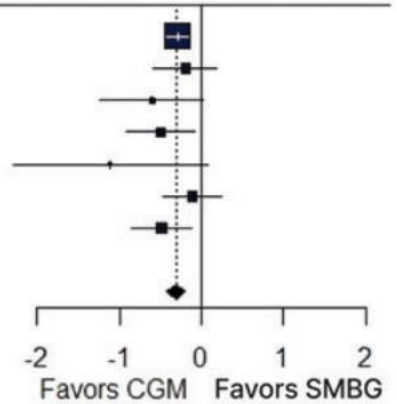
METANÁLISIS 3

Sistemas de monitoreo continuo de glucosa en pacientes con diabetes tipo 2 no insulinizados: revisión sistemática – metaanálisis de estudios aleatorizados

A - HbA1c level (%)

Study	CGM Mean	CGM SD	CGM Total	SMBG Mean	SMBG SD	SMBG Total	Weight	Mean Difference IV, Random, 95% CI
Wada 2020	-0.46	0.4700	49	-0.17	0.1000	51	64.2%	-0.29 [-0.42, -0.16]
Price 2021	-0.50	0.9000	44	-0.30	0.7000	23	7.6%	-0.20 [-0.59, 0.19]
Moon 2022	-0.60	0.8600	33	0.00	1.1000	15	2.9%	-0.60 [-1.23, 0.03]
IMMEDIATE	7.60	0.9000	51	8.10	1.2000	48	6.6%	-0.50 [-0.92, -0.08]
Cox 2020	-1.30	0.8900	20	-0.19	1.8100	10	0.8%	-1.11 [-2.30, 0.08]
Bergenstal 2022.SU	7.00	0.5900	17	7.11	0.4600	17	9.2%	-0.11 [-0.47, 0.25]
Bergenstal 2022.incretin	6.47	0.4700	14	6.96	0.5300	15	8.7%	-0.49 [-0.85, -0.13]
Total (95% CI)			**228**			**179**	**100.0%**	**-0.31 [-0.42, -0.21]**

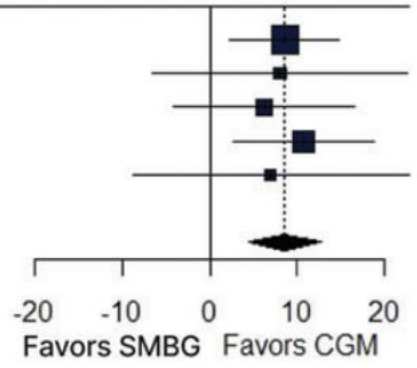
Heterogeneity: $Tau^2 = 0$; $Chi^2 = 5.88$, df = 6 (P = .44); $I^2 = 0\%$
Test for overall effect: Z = -5.71 (P < .01)



B - Time in range (%)

Study	CGM Mean	CGM SD	CGM Total	SMBG Mean	SMBG SD	SMBG Total	Weight	Mean Difference IV, Random, 95% CI
Wada 2020	77.95	13.1200	49	69.37	18.1200	51	43.6%	8.58 [2.40, 14.76]
Price 2021	63.10	25.5000	44	55.10	30.3000	23	7.9%	8.00 [-6.50, 22.50]
Moon 2022	5.28	20.8000	33	-1.00	14.9000	15	15.6%	6.28 [-4.07, 16.63]
IMMEDIATE	76.30	17.4000	51	65.60	22.6000	48	26.2%	10.70 [2.72, 18.68]
Cox 2020	50.00	19.2000	20	43.00	21.5000	10	6.7%	7.00 [-8.76, 22.76]
Total (95% CI)			**197**			**147**	**100.0%**	**8.63 [4.54, 12.71]**

Heterogeneity: $Tau^2 = 0$; $Chi^2 = 0.50$, df = 4 (P = .97); $I^2 = 0\%$
Test for overall effect: Z = 4.14 (P < .01)



Hb A1c -0.31

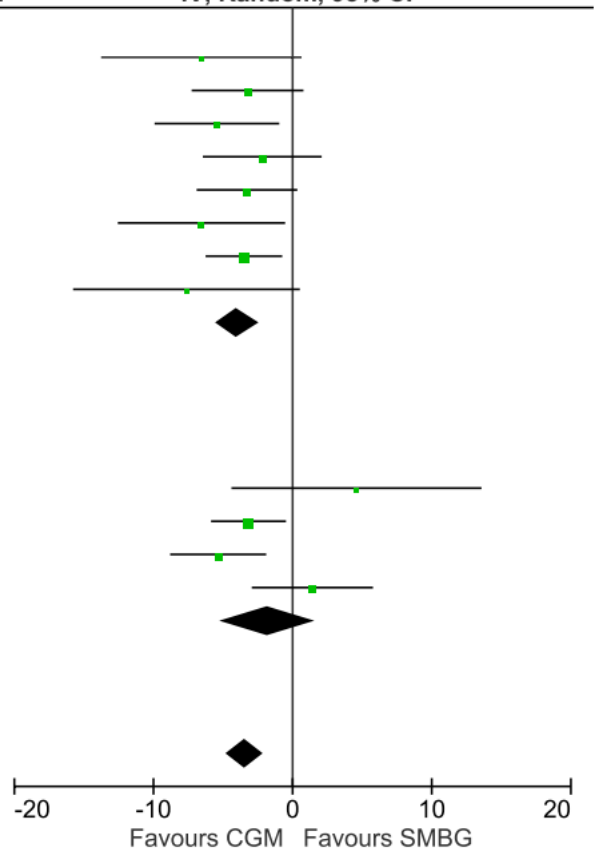
TIR + 8.6

Diabetes Technol Ther 2024; 26 (4): 252-262

METANÁLISIS 4

Monitoreo continuo de glucosa en pacientes adultos con diabetes tipo 2. Revisión sistemática – metaanálisis

Study or Subgroup	CGM Mean	CGM SD	CGM Total	SMBG Mean	SMBG SD	SMBG Total	Weight	Mean Difference IV, Random, 95% CI
1.1.1 rtCGM vs SMBG								
Moon (2023) [32]	-6.56	7.65	15	0	12	15	3.2%	-6.56 [-13.76, 0.64]
Bergenstal (2022) [26]	-12.2	12	59	-8.96	9.84	55	9.0%	-3.24 [-7.26, 0.78]
Martens (2021) [28]	-12	16.4	116	-6.56	13.1	59	7.5%	-5.44 [-9.92, -0.96]
Price (2021) [29]	-5.46	9.84	44	-3.28	7.65	23	8.1%	-2.18 [-6.45, 2.09]
Beck (2017) [22]	-8.74	10.1	77	-5.46	12.5	75	10.7%	-3.28 [-6.90, 0.34]
Vigersky (2012) [30]	-8.74	16.4	50	-2.19	14.2	50	4.4%	-6.55 [-12.56, -0.54]
Cosson (2009) [27]	-6.89	3.72	11	-3.39	3.17	14	16.3%	-3.50 [-6.25, -0.75]
Yoo (2008) [31]	-12	17.1	29	-4.37	14.2	28	2.5%	-7.63 [-15.78, 0.52]
Subtotal (95% CI)			**401**			**319**	**61.7%**	**-3.95 [-5.46, -2.44]**
Heterogeneity: Tau² = 0.00; Chi² = 3.45, df = 7 (P = 0.84); I² = 0%								
Test for overall effect: Z = 5.12 (P < 0.00001)								
1.1.2 isCGM vs SMBG								
Ajjan (2023) [21]	-5.36	21.3	55	-9.95	26.5	55	2.1%	4.59 [-4.40, 13.58]
Wada (2020) [24]	-5.03	5.14	48	-1.86	7.76	45	16.8%	-3.17 [-5.86, -0.48]
Yaron (2019) [25]	-8.96	9.18	53	-3.61	8.52	48	11.6%	-5.35 [-8.80, -1.90]
Haak (2017) [23]	-3.06	14.2	149	-4.48	16.4	75	7.9%	1.42 [-2.94, 5.78]
Subtotal (95% CI)			**305**			**223**	**38.3%**	**-1.79 [-5.28, 1.69]**
Heterogeneity: Tau² = 7.48; Chi² = 8.34, df = 3 (P = 0.04); I² = 64%								
Test for overall effect: Z = 1.01 (P = 0.31)								
Total (95% CI)			**706**			**542**	**100.0%**	**-3.43 [-4.75, -2.11]**
Heterogeneity: Tau² = 0.80; Chi² = 12.95, df = 11 (P = 0.30); I² = 15%								
Test for overall effect: Z = 5.11 (P < 0.00001)								
Test for subgroup differences: Chi² = 1.24, df = 1 (P = 0.27), I² = 19.3%								



Hb A1c -0,31%
IC -4,75- -2,11
p<0,00001

Subgrupo sin insulina: -0,29%
P=0,004

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Diabetología 2024; 67: 798-810

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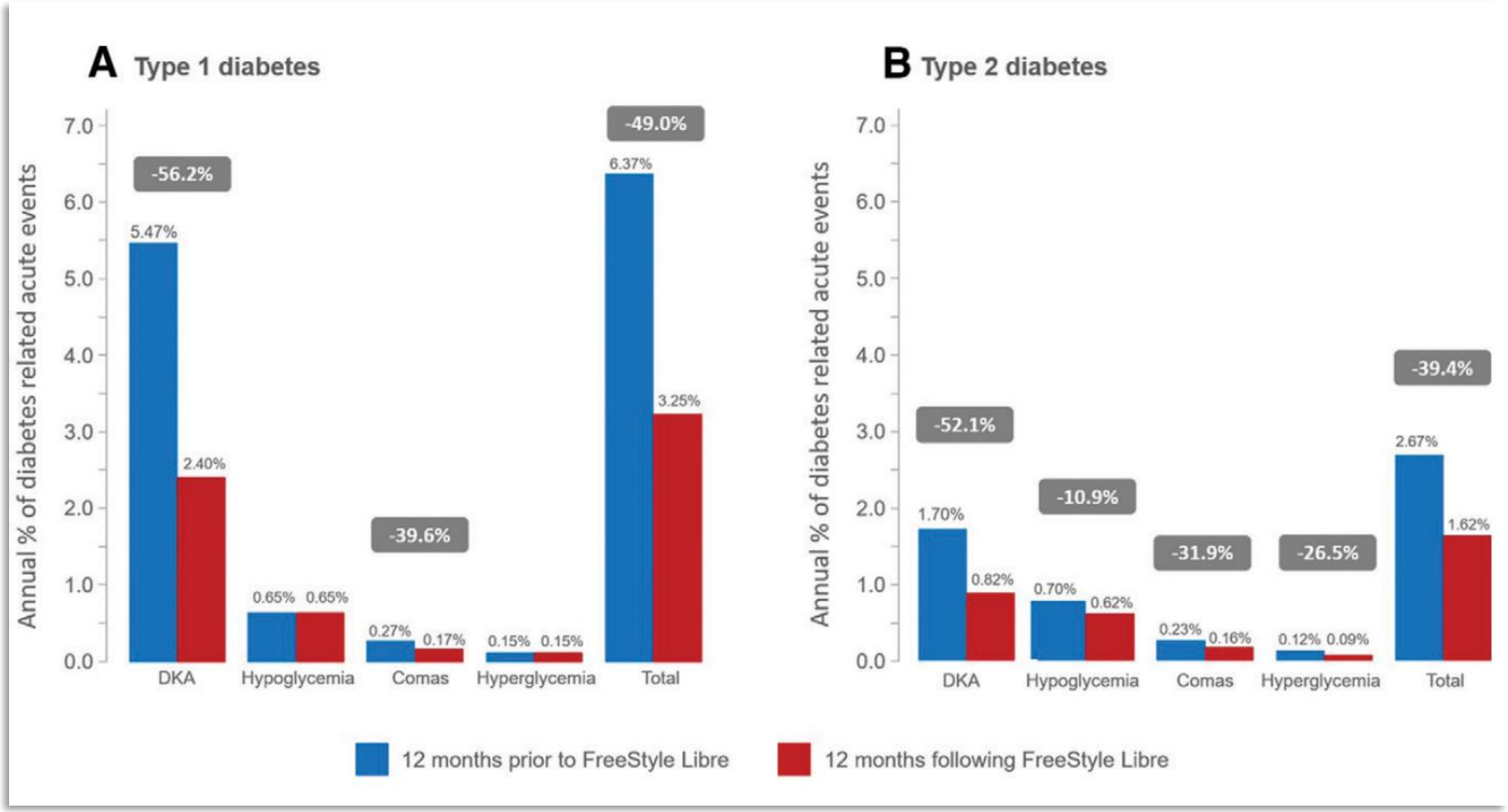
COSTO-EFECTIVIDAD

Caída marcada de las complicaciones agudas de la diabetes en pacientes con diabetes tipo 1 o tipo 2 luego del inicio del monitoreo flash de glucosa. Estudio RELIEF

74.011 individuos con DT1 o DT2.

Usuarios de isCGM Libre identificados de la base de datos de reclamos de Francia.
Persistencia en el sistema a los 12 meses: 98,1%

-39,4% internaciones por complicaciones agudas en DT2



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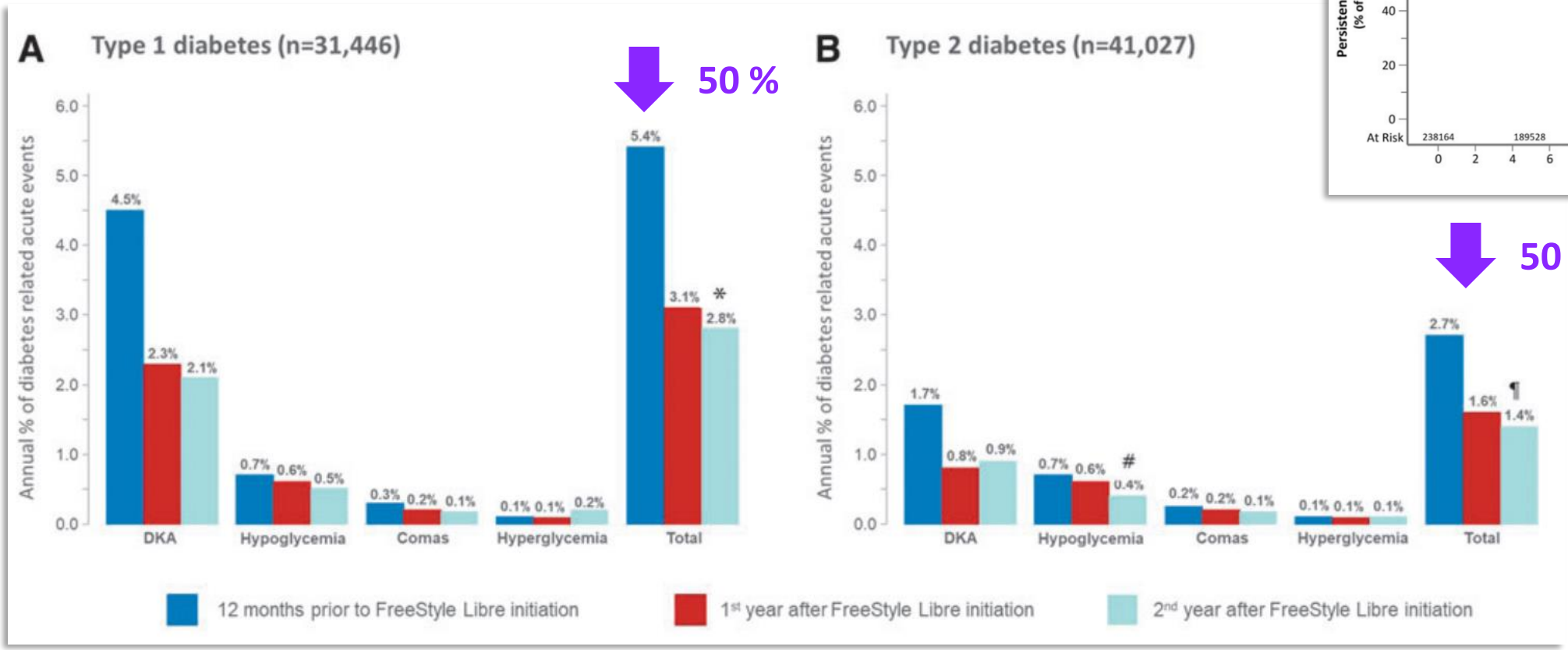
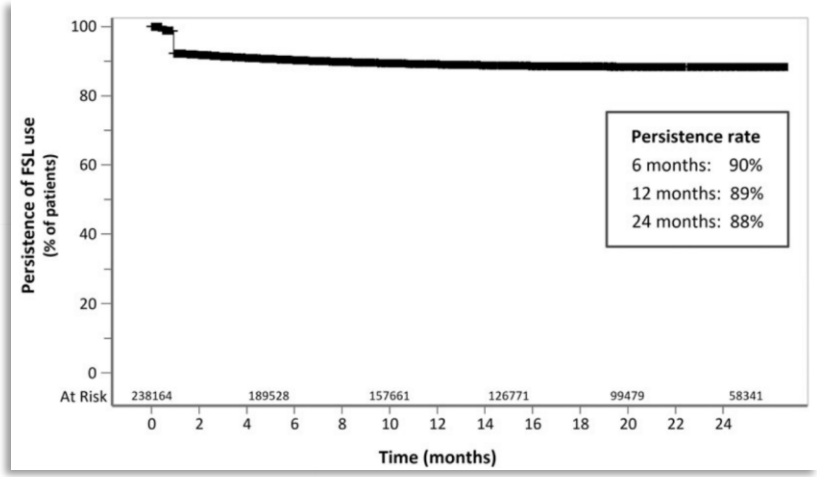
Diabetes Care 2021;44(6):1368–1376

50th Anniversary ISPAD 2024 LISBON, PORTUGAL | OCTOBER 16-19 Inclusion & Innovation in Pediatric Diabetes

A 2 AÑOS...

Caída marcada de las complicaciones agudas de la diabetes con monitoreo flash de glucosa luego de 2 años de su inicio: análisis extendido del estudio RELIEF



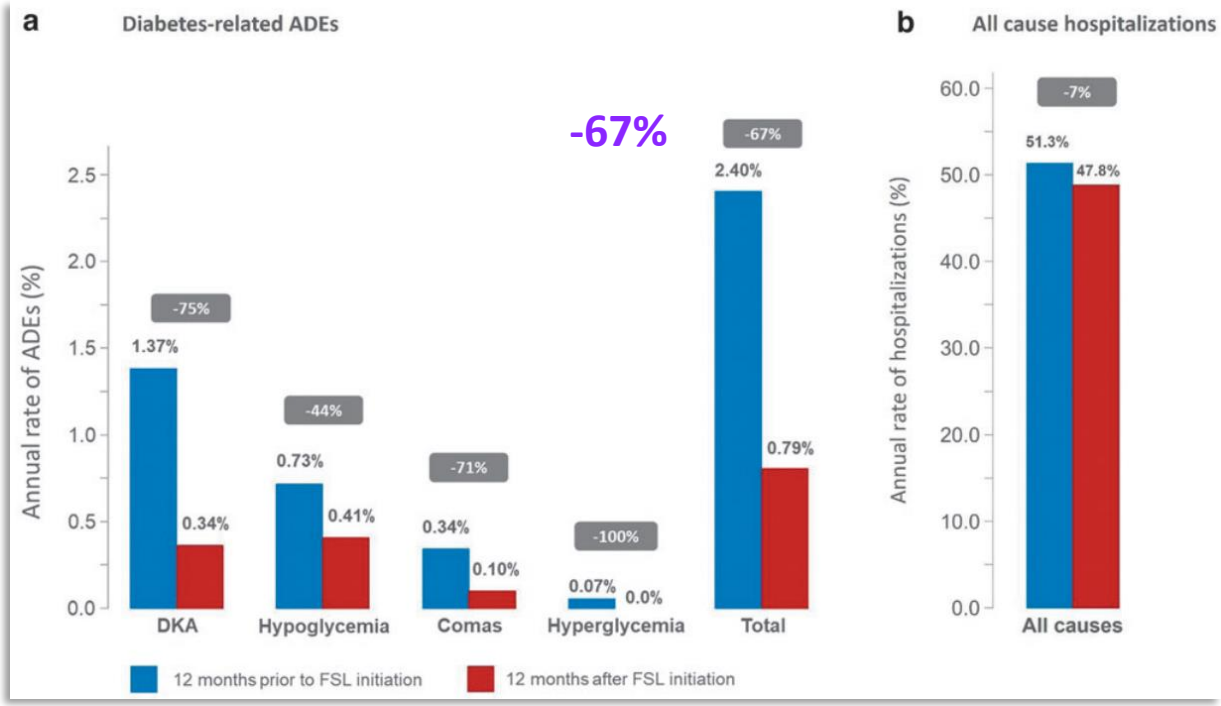


50 %

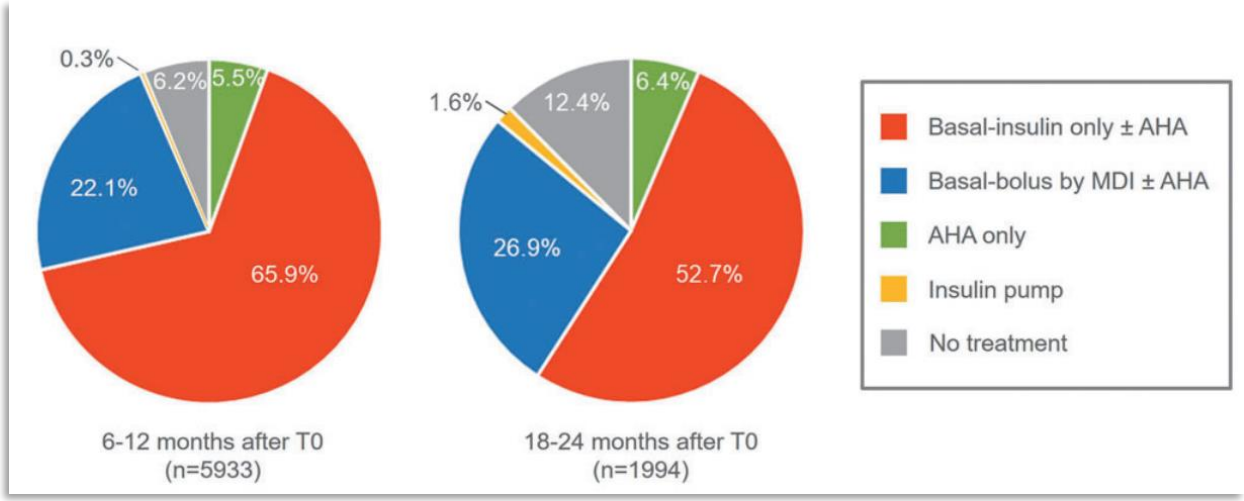
Diabetes Technology & TherapeuticsVolume 24, Issue 9September 2022Pages603-679

En DT2 con insulina basal...

Marcado descenso de las complicaciones agudas de la diabetes luego del inicio del dispositivo Libre Free Style en pacientes con diabetes tipo 2 con insulina basal en Francia



Intensificación de la terapia



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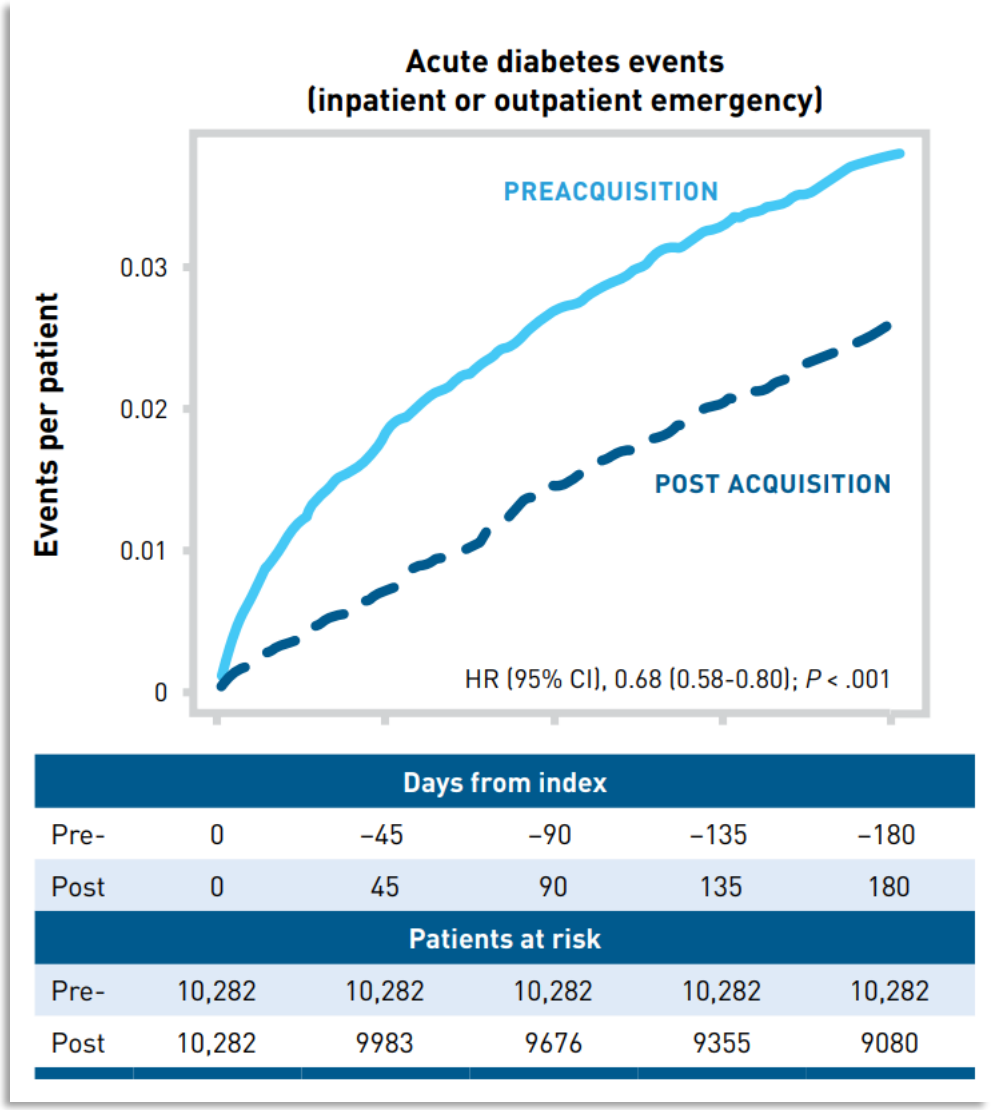
Diabetes Technology & Therapeutics 2023; Vol. 25, No. 1

50th Anniversary ISPAD 2024 LISBON, PORTUGAL | OCTOBER 16-19 Inclusion & Innovation in Pediatric Diabetes

Monitoreo continuo flash se asocia con reducción de los eventos durante el tratamiento no intensivo de la diabetes

Characteristic	Value
N	10,282
Follow-up in days, median (10%, 90% deciles)	171 (152, 182)
Age in years, mean (SD)	53.1 (9.6)
Aged 18-49 years	32.3%
Aged 50-64 years	62.5%
Aged ≥65 years	5.2%
Gender (male)	51.9%
Comorbidities	
Hypertension	80.6%
Obesity	55.6%
Pulmonary disease	24.5%
Depression	24.2%
Hypothyroid disease	21.5%
Anemia	19.2%
Liver disease	18.5%
MI or coronary artery disease	15.8%
Peripheral vascular disease	10.8%
Renal disease	9.6%
Heart failure	6.9%
Insulin usage status	
Insulin (basal/NPH/premixed)	38.7%
Noninsulin therapy	61.3%
Noninsulin diabetes medications	
Biguanide	71.2%
Sulfonylurea	30.4%
GLP1 agonist	30.3%
SGLT2 inhibitor	26.2%
DPP4 inhibitor	20.6%
TZD	7.4%
Meglitinides	1.6%
Alpha-glucosidase inhibitor	0.4%



Days from index					
Pre-	0	−45	−90	−135	−180
Post	0	45	90	135	180
Patients at risk					
Pre-	10,282	10,282	10,282	10,282	10,282
Post	10,282	9983	9676	9355	9080

DT2 con o sin insulina

-32%

Am J Manag 2021; 27 (11): e372-e377

Monitoreo continuo de glucosa:

Facilita el manejo de la diabetes ✓

Reduce costos ✓

¿Predice mejor las complicaciones?

Un ejemplo…

Asociación entre control glucémico medido con monitoreo continuo de glucosa y marcadores urinarios de enfermedad renal en diabetes: Hyogo Diabetes Hypoglycemia Cognition Complications study

Table 1 Characteristics of the study participants

	T2DM			NDM ($N=39$)	P
	Normo-albuminuria ($N=166$)	Microalbuminuria ($N=58$)	Macroalbuminuria ($N=21$)		
Male, %	67.5	67.2	76.2	46.2	0.050
Age, years	68 (62–72)	68 (62–72)	71 (65–74)	71 (68–74)*	0.008
Duration of T2DM, years	11.5 (5.3–21.0)	12.5 (9.3–24.0)	17.0 (9.0–24.0)	0 (0–0)**	<0.001
BMI, kg/m^2	24.0 (21.9–25.7)	24.4 (23.0–27.7)	24.9 (22.4–27.6)	23.9 (22.1–26.1)	0.185
SBP, mmHg	126.0 (115.0–137.0)	129.0 (118.3–140.8)	138.0 (130.0–146.0)*	130.5 (121.5–139.0)	0.027
DBP, mmHg	75.0 (68.0–82.0)	78.0 (71.0–83.0)	75.0 (70.0–92.0)	78.0 (70.5–83.0)	0.319
UA, mg/dL	5.2 (4.4–6.1)	5.2 (4.5–6.1)	5.6 (5.2–6.7)	5.2 (4.8–6.1)	0.183
HbA1c, % [mmol/mol]	7.0 (6.6–7.5) [52]	7.2 (6.8–7.7) [55]	7.1 (6.4–7.8) [54]	5.9 (5.7–6.1) [40]**	<0.001
GMI, %	6.7 (6.2–7.1)	6.8 (6.3–7.3)	7.0 (6.2–8.0)	5.9 (5.7–6.0)**	<0.001
TIR, %	78.2 (69.2–87.6)	77.8 (61.6–88.2)	73.9 (41.7–87.4)	93.8 (91.1–97.4)**	<0.001

Acta diabetol 2024 Apr;61(4):413-423

Un ejemplo…

Asociación entre control glucémico medido con monitoreo continuo de glucosa y marcadores urinarios de enfermedad renal en diabetes: Hyogo Diabetes Hypoglycemia Cognition Complications study

			Model 1		Model 2	
	Crude OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
UAlb/Cr						
HbA1c	1.424 (1.073–1.889)	0.014	1.125 (0.806–1.571)	0.490	1.127 (0.807–1.574)	0.483
GMI	1.710 (1.259–2.324)	0.014	1.484 (1.066–2.067)	0.019	1.485 (1.067–2.067)	0.019
TIR	0.980 (0.967–0.992)	0.002	0.985 (0.971–0.998)	0.029	0.985 (0.971–0.998)	0.029
TIT	0.981 (0.970–0.992)	<0.001	0.986 (0.974–0.998)	0.021	0.986 (0.974–0.998)	0.021
TAR	1.021 (1.009–1.034)	<0.001	1.015 (1.002–1.029)	0.028	1.015 (1.002–1.029)	0.028
TBR	0.974 (0.929–1.021)	0.275	0.989 (0.938–1.042)	0.677	0.988 (0.937–1.042)	0.665
SD	1.023 (1.003–1.042)	0.020	1.023 (1.000–1.046)	0.052	1.022 (1.000–1.046)	0.053
CV	0.998 (0.960–1.036)	0.907	1.007 (0.961–1.056)	0.760	1.007 (0.960–1.056)	0.776
GRI	1.013 (1.003–1.024)	0.012	1.012 (1.001–1.024)	0.037	1.012 (1.001–1.024)	0.038

TIR mantiene su valor predictivo
HbA1c lo pierde

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Acta diabetol 2024 Apr;61(4):413-423

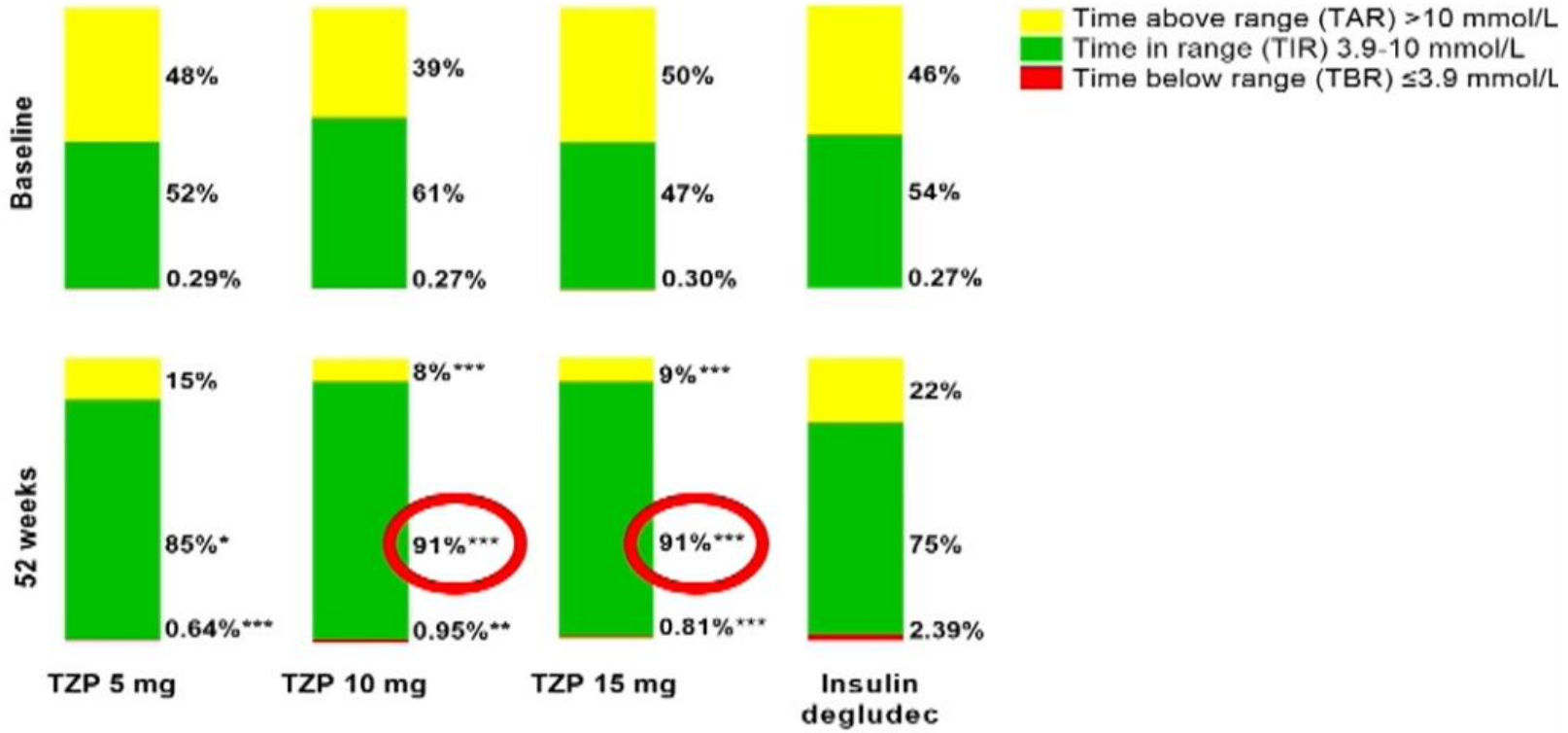
MCG: Los objetivos

MÉTRICAS: Tiempo de rango estrecho (TITR) en DT2

DT2 con agonista dual GLP-1 y GIP: tirzepatide
TIR: 70-180 mg/dl

TIR >90%

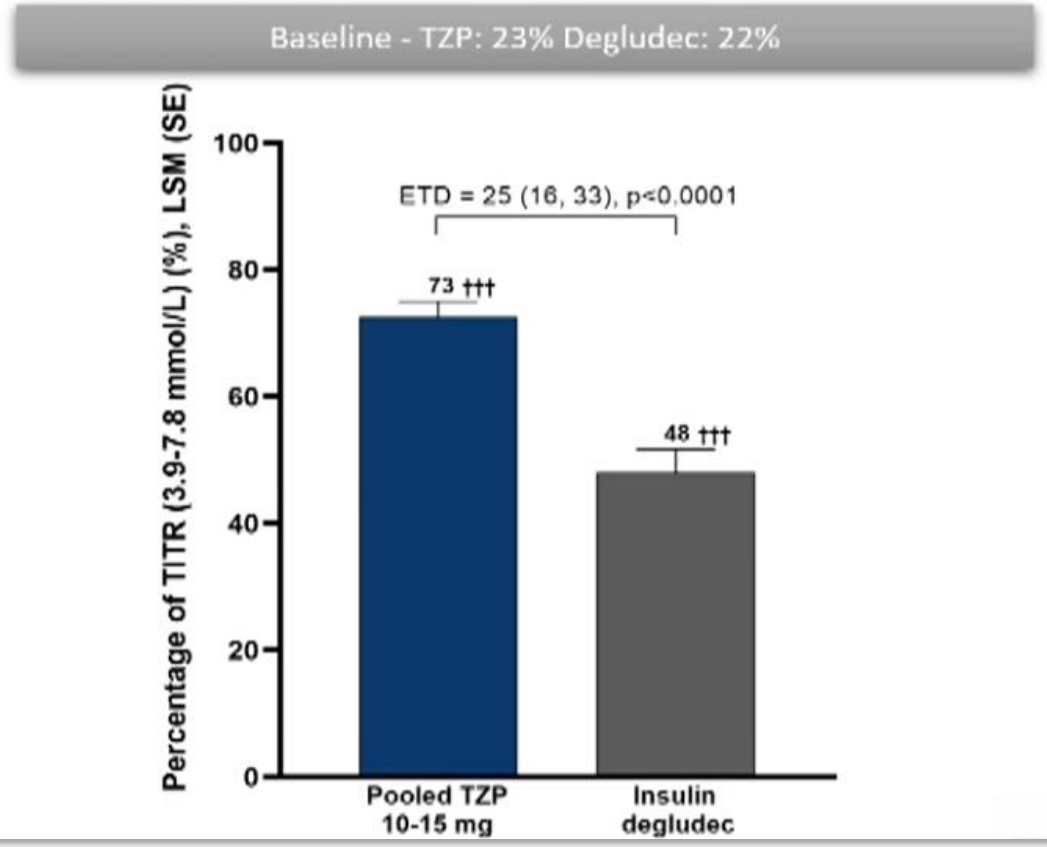
Se necesita un marcador más ajustado



Lancet diabetes Endocrinol 2022; 10 (6): 407-417

TITR: 71-140 mg/dl a las 52 semanas

TITR: 73%



Lancet diabetes Endocrinol 2022; 10 (6): 407-417

La pérdida inicial en DT2 corresponde al TITR

GMI <6,5%

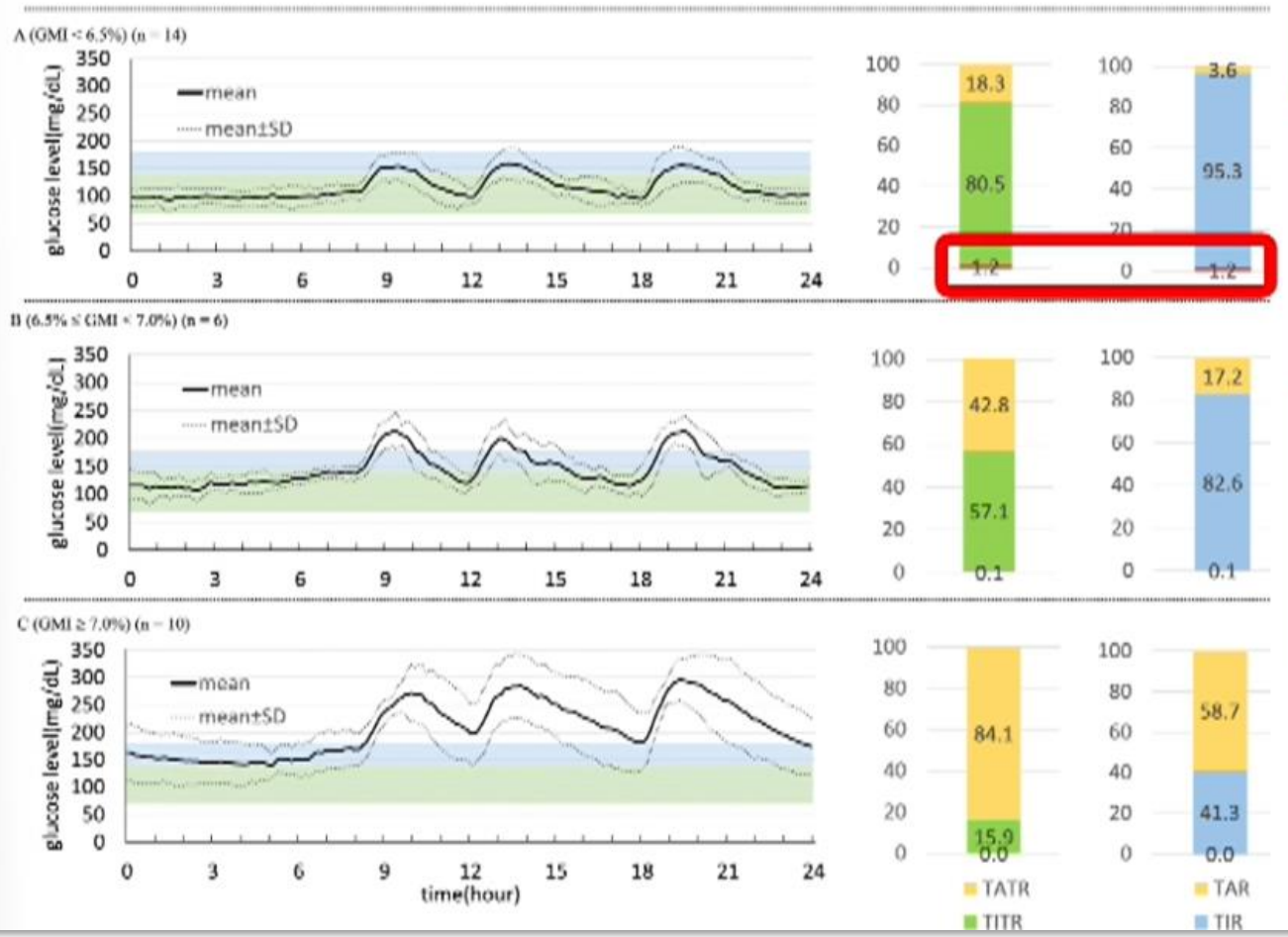
GMI 6,5%-<7%

GMI 7% o más

Exploring time in tight range targets (TITR) in drug-naive Japanese individuals with type 2 diabetes

Mizuki Ishiguro[1] · Kiyotaka Ando[2] · Rimei Nishimura[1]

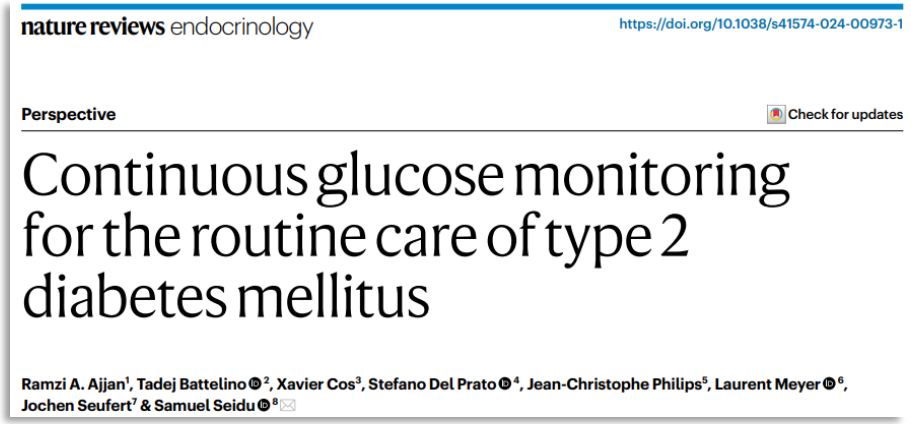
Acta Diabetologica
Published online: 19 March 2024
https://doi.org/10.1007/s00592-024-02247-8



TITR/TIR	ΔTITR	ΔTIR
0.84	Comp.	Comp.
0.69	1.8 x -23.4%	-12.7%
0.38	1.2 x -64.6%	-54.0%

TITR: nuevo objetivo para “control óptimo” y potencialmente “remisión” de DT2

Perspectivas


nature reviews endocrinology
https://doi.org/10.1038/s41574-024-00973-1
Perspective
Check for updates

Continuous glucose monitoring for the routine care of type 2 diabetes mellitus

Ramzi A. Ajjan[1], Tadej Battelino[2], Xavier Cos[3], Stefano Del Prato[4], Jean-Christophe Philips[5], Laurent Meyer[6], Jochen Seufert[7] & Samuel Seidu[8]

Cambio de paradigma hacia el uso de MCG en DT2:

- En todos **al inicio**.
- **Uso continuo**: tratamiento con insulina o insulinotrópicos.
- **Uso intermitente**: pacientes sin insulina, cada 3 meses, para reforzar educación, evaluar cambios en el tratamiento, evaluar riesgo de complicaciones microvasculares.

¿En pediatría? Poca evidencia

Asegurarse de utilizar dispositivos de calidad (como MCG integrados avalados por FDA)

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Consenso próximo a salir:

¡No es la versión final!
no concluido

DT2 sin insulina:

- Con resultados glucémicos subóptimos: MCG al menos 6 meses.
- Para todos, considerar uso intermitente durante 14 días, cada 3 meses.

- Objetivos: TIR >70%, TAR <25%, TMAR <5%, TBR <4%, salvo riesgo particular de hipoglucemias: objetivo individualizado.
- **Para el que alcanza un TIR >70%, sobre todo con expectativa de vida larga: TITR >50%**

- Es apropiado utilizar MCG en DT2 aun sin insulina si se sospecha hipoglucemia.

- Puede usarse el MCG para educación o como herramienta motivacional para mantener una concordancia terapéutica y apoyar intervenciones como mejoras en alimentación, actividad física y ejercicio.

Rol de aGLP-1 e iSGLT2 en el tratamiento de la DT2 pediátrica

Amy Shah,Cinncinnati, Ohio (EE.UU.)

Profesora de Pediatría, Universidad de Cincinnati. Médica de la División Endocrinología del Hospital de Niños de Cincinatti. Directora del Programa de Dt2 en adolescentes.

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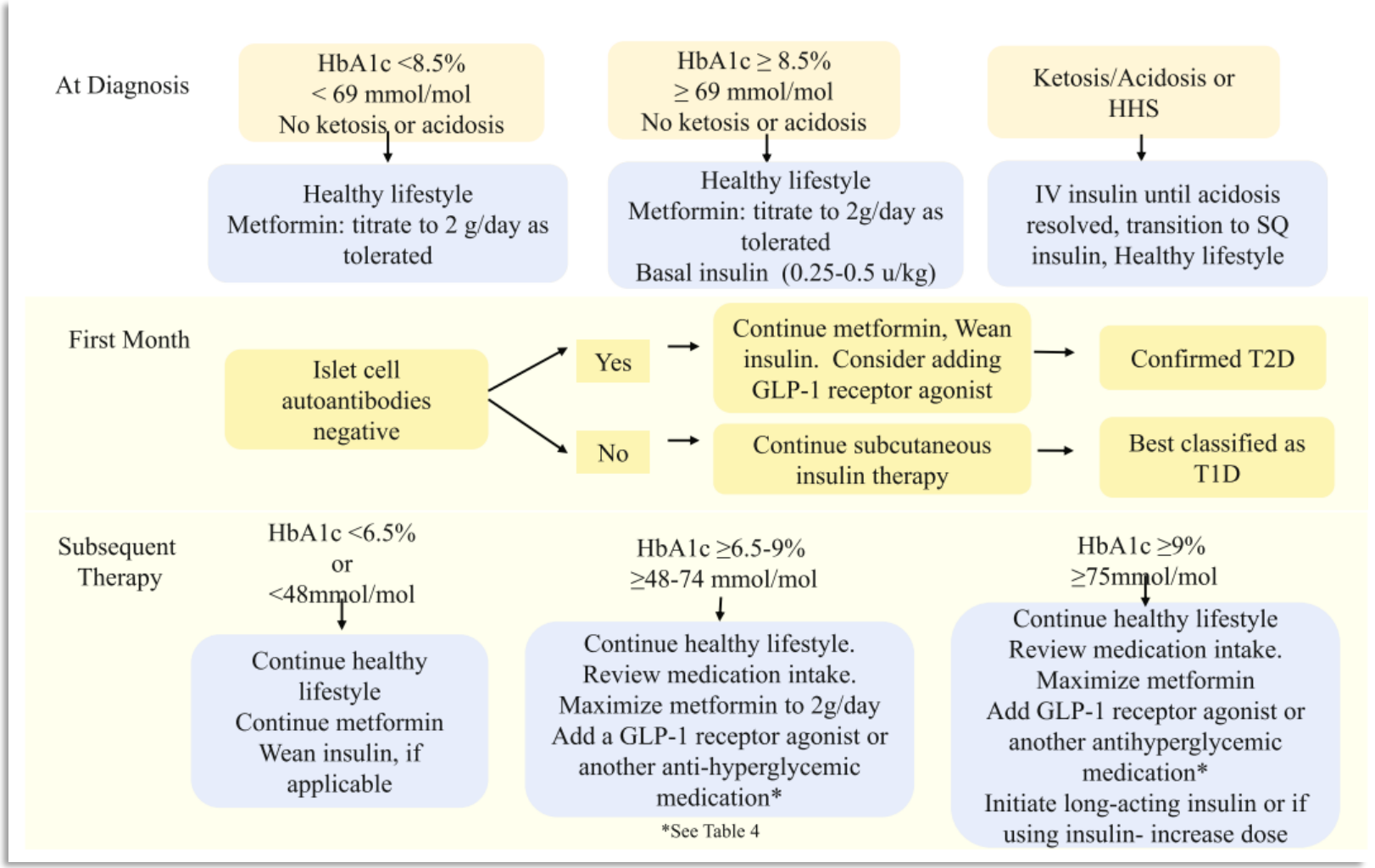
¿Qué cambiará en las guías ISPAD?



Pediatr Diabetes 2022; 23 (7): 872-902

AR GLP-1e iSGLT-2: Resumen de evidencia en adultos

	AR GLP-1	iSGLT-2
Administración	Inyectable 1/d o 1/sem	Oral 1/d
Hb A1c %	↓0,7-1,7	↓0,3-1,2
Peso/IMC	↓2-5 kg	↓1,5-3 kg
TA sistólica	↓2-5 mm Hg	↓3-5 mm Hg
Lípidos	↓C-LDL, LDL pequeñas y densas , triglicéridos.	↓Triglicéridos, ↑C-HDL
Enfermedad renal	sí	sí
Enfermedad cardiovascular	ACV, eventos ateroscleróticos	Insuficiencia cardíaca
Eventos adversos	Gastrointestinales (náuseas, distensión, dolor abdominal)	Infección genital (común) CAD euglucémica
Costo	$$$$	$$$

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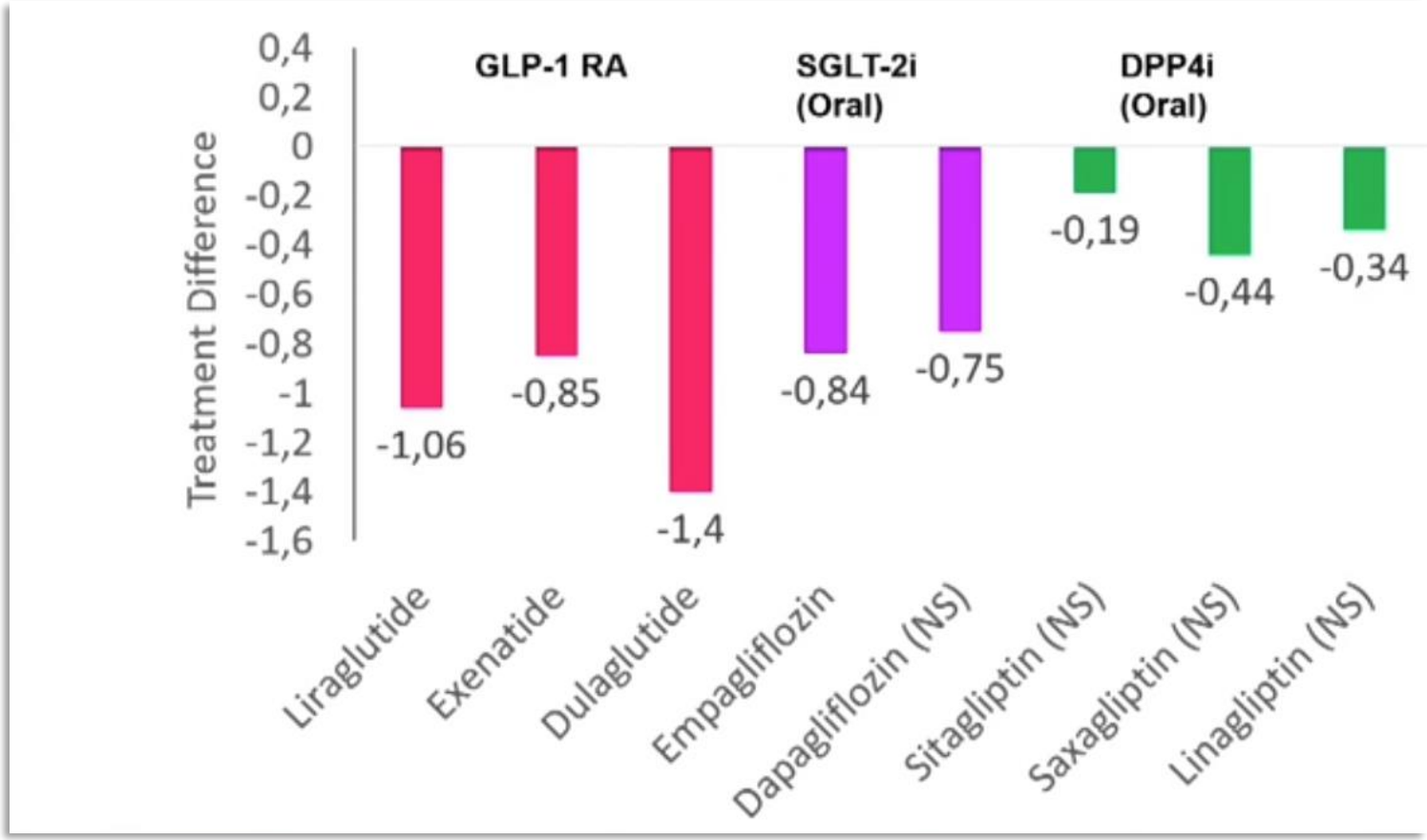
Palmer SC. BMJ. 2021 Jan 13;372:m4573
Rolek B. J Cardiovasc Dev Dis 2023 30; 10(8): 322

Estudios pediátricos GLP-1 e iSGLT2
DET HbA1c



Tamborlane. N Engl J Med 2019; 381:637-646.
Tamborlane . Diabetes Care 2022; 45(8): 1833-1840
Arslanian N Engl J Med 2022; 4:387(5): 433-443

Laffel. Lancet Diabetes Endocrinol 2023; 11(3): 169-181.
Tamborlane. Lancet Diabetes Endocrinol 2022; 10(5): 341-350.

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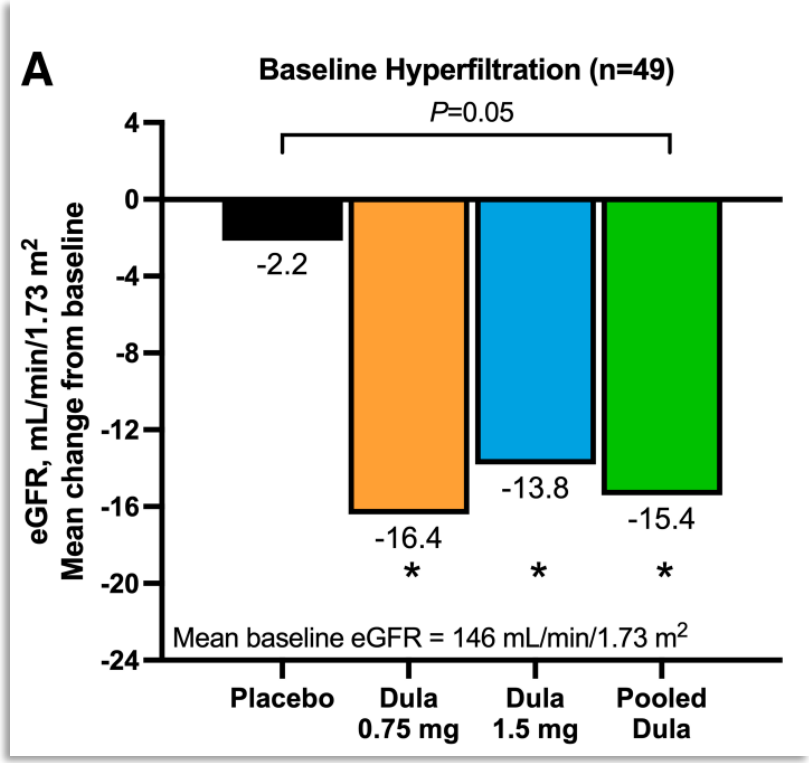
Resultados secundarios

- Sin diferencia en peso, lípidos, HTA, complicaciones relacionadas a DT (no significativas o no estudiadas).
- **Dulaglutida**:
  - Mejoría en lípidos
  - Mejoría en hiperfiltración



Diabetes Care 2024;47(9):1617–1621

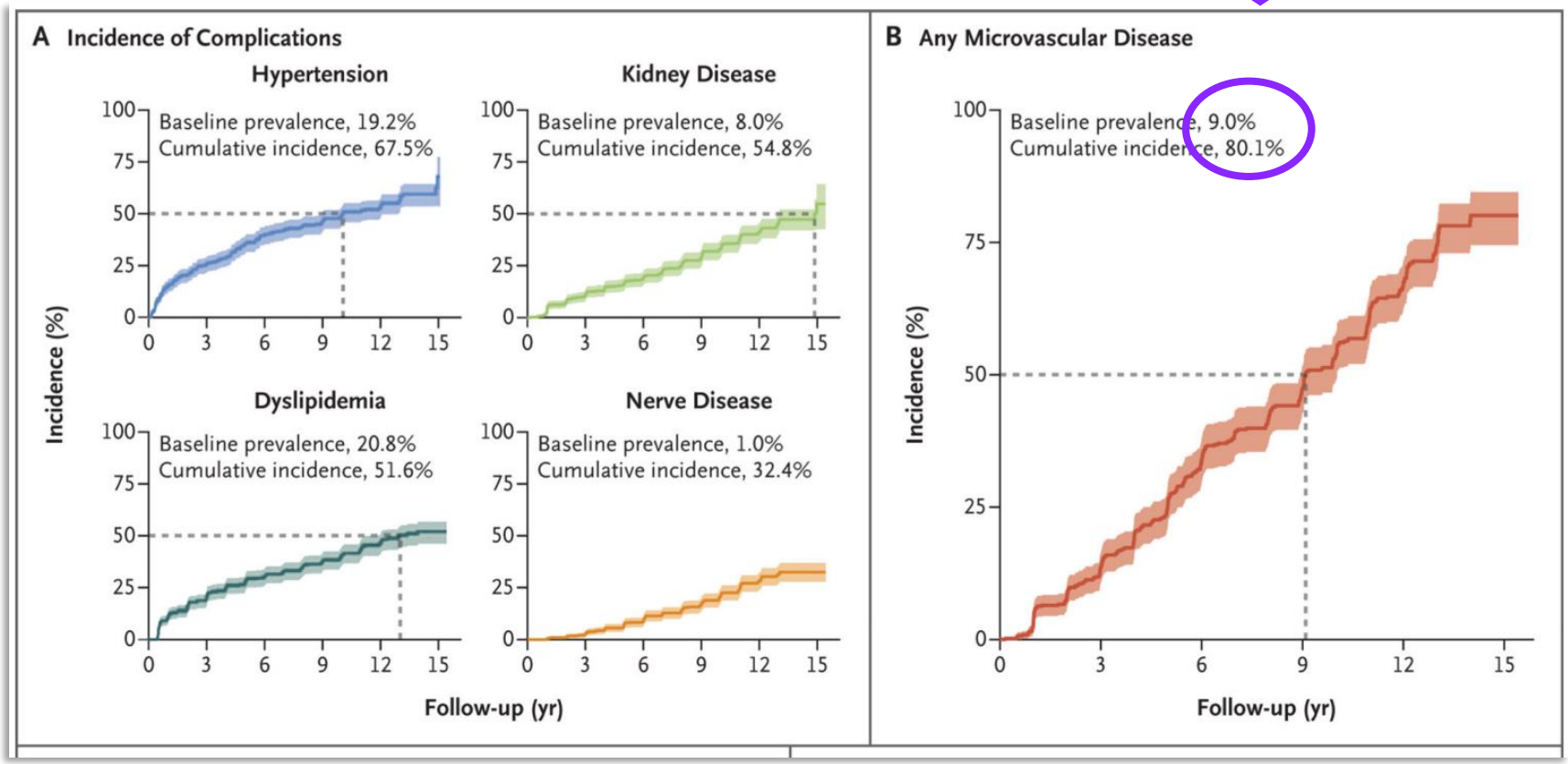
¿Por qué actualizar las guías?

- Metformina: falla 51,7% (media de seguimiento 3,8 años)
- Altas tasas de complicaciones

80%

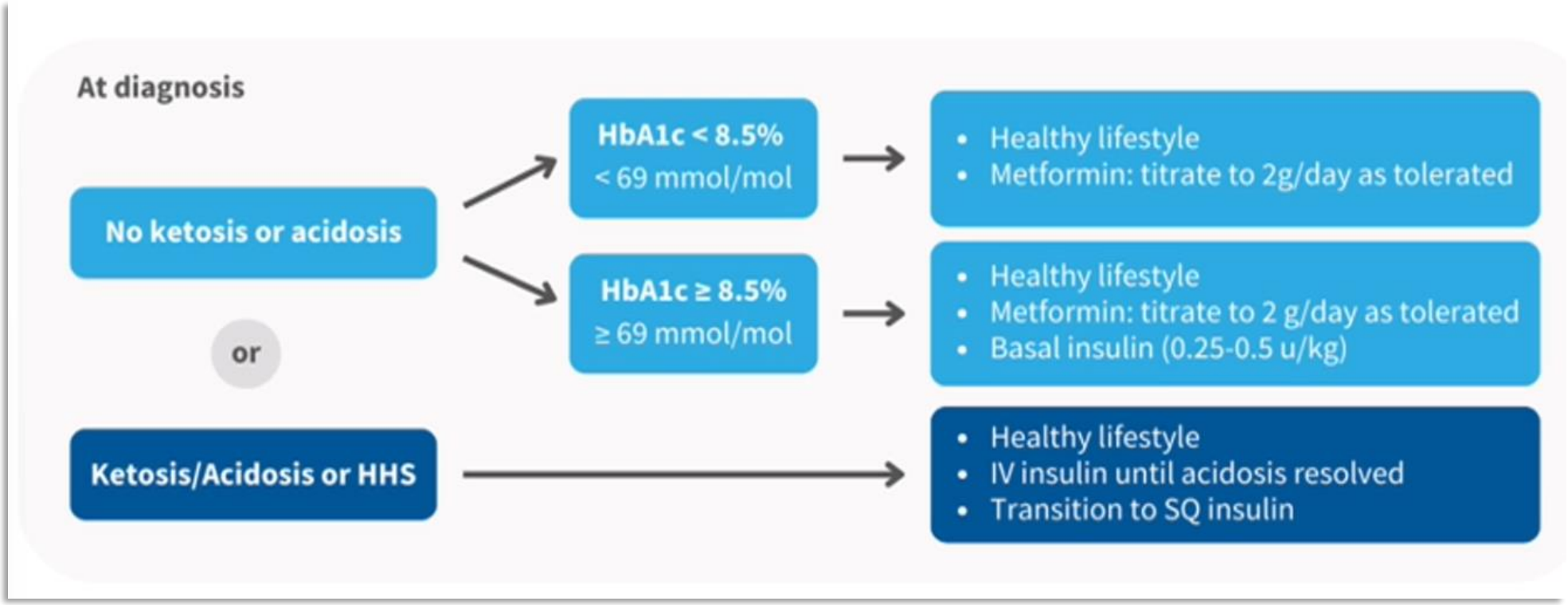
Estudio TODAY

- Edad media: 26 años
- Tiempo medio desde el diagnóstico: 13 años



N Engl J Med 2012;366:2247-2256 N Eng J Med 2021; 385:416-426.

No cambia el manejo inicial



Metformina sigue siendo 1° línea: efectiva en el 50%, segura, económica

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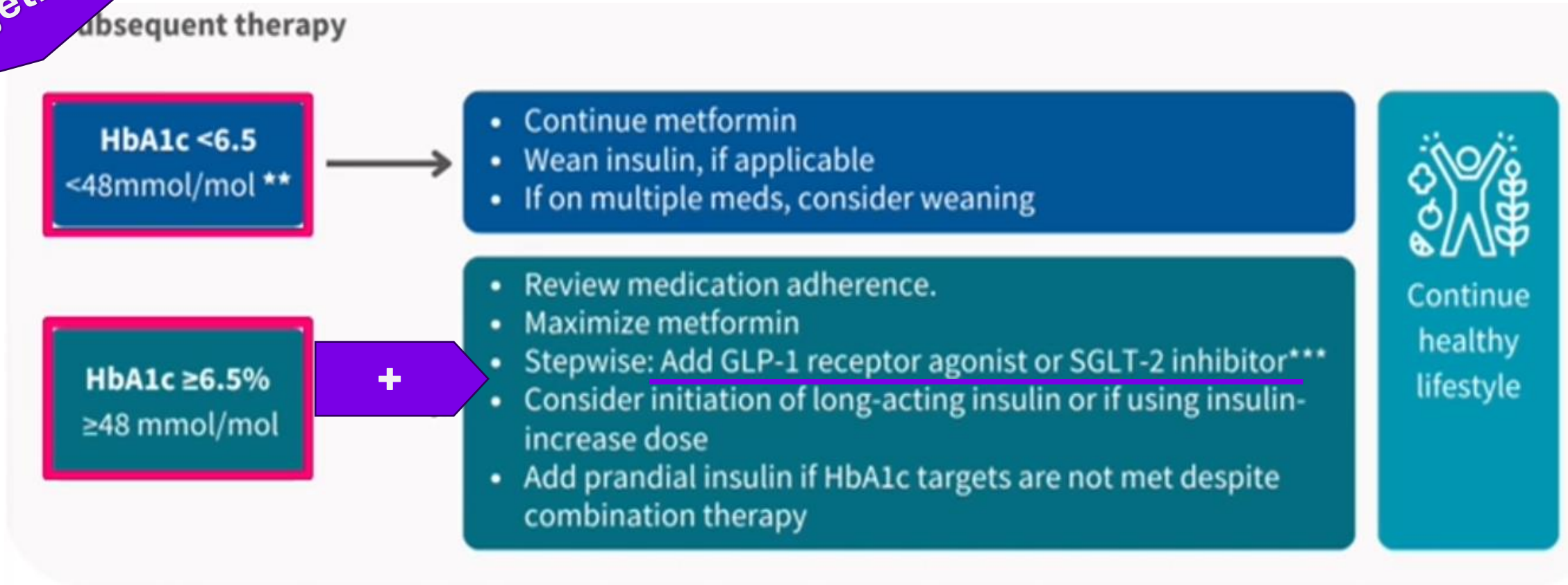
¿Qué cambia?

objetivo



¿Cómo elegir la 2° medicación?

Preferencias individuales:

- Vía de administración
- Dosificación
- Efectos colaterales (ej GI, ITUs frecuentes)
- Grado de reducción de glucosa requerido
- Costos, cobertura, aprobación por la entidad regulatoria.
- Presencia de comorbilidades

¿AR GLP-1 o iSGLT2?

Consideración clínica	Terapia potencial
A1c elevada	AR GLP-1 o iSGLT2, >8,5%: insulina basal
Fobia a las agujas	iSGLT2
Dificultad para tragar comprimidos	AR GLP-1
Disminuir número de pastillas	Terapia combinada (metformina/empa)
Efectos adversos con metformina	iSGLT2
Dislipidemia	AR GLP-1 (Dulaglutida)
Anormalidades renales	AR GLP-1 (Dulaglutida), pero tal vez iSGLT2
Pérdida de peso	iSGLT2 o AR GLP-1?
MASLD	iSGLT2 o AR GLP-1?

¿Por qué no elegir uno primero?

- La respuesta es diferente que en adultos:

  -Tal vez se necesiten dosis más altas, estudios de mayor duración, enfocados no solo a la HbA1c, sino a otros resultados.

- Todavía hay muchas preguntas sin respuesta:

  -Capacidad de disminuir el deterioro de la célula beta.

  -Impacto en las comorbilidades/complicaciones relacionadas con la diabetes.

- Terapia combinada
- Nuevos agentes (terapias duales o triples)

Diabetes 2 en jóvenes: **RESUMEN**

HACIA UN MEJOR CONTROL	ACTUALIZACIÓN EN TRATAMIENTO
MCG EN DT2	**NUEVAS GUÍAS ISPAD**
○ Fundamento ○ Evidencia ○ Métricas	○ Objetivos ○ Tratamiento farmacológico

Es necesaria más evidencia pediátrica

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Diabetes 2 en jóvenes: **RESUMEN**

EL MCG DEBERÍA ESTAR DISPONIBLE PARA LAS PERSONAS CON DT2

- Uso continuo
- Uso intermitente
- TITR

OBJETIVO:
HbA1c <6,5%

FÁRMACOS DE 2° LÍNEA:
AR GLP-1 o iSGLT2

Es necesaria más evidencia pediátrica

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Gracias por su atención


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La educación a través de las distintas etapas de la diabetes

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Florencia Grabois

- Médica pediatra
- Especialista en Nutrición Infantil UBA
- Docente de medicina Infantil UNCO
- Educadora Certificada en Diabetes UNSAM
- Hospital Provincial Neuquén
- Comité de Pediatría SAD
- Comité de Educación SAD

- **Conflictos de interés:**

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Agenda

ESCUELA

Grupo de interés especial

Mejorando el tiempo escolar

Gun Forsander

ADOLESCENCIA

Empoderando adolescencias vía educación en diabetes y apoyo Transición

Steven James

SCREENING

Qué aprendimos sobre los programas de screening

Jéssica Melin

OTRAS CONDICIONES ASOCIADAS

Desafíos para el manejo de diabetes con otras condiciones asociadas

Eduardo Calliari

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Grupo de interés especial

ESCUELA

Are Australian students with type 1 diabetes safe at school? A consumer perspective

Type selection
Preferred Presentation Type: Poster presentation

General data
Category: 4.b: Diabetes at School

Title
Title: Are Australian students with type 1 diabetes safe at school? A consumer perspective

Abstract text
Introduction: The death of an Australian student whilst in the custody of the school in 2019 has led to workplace safety regulators examining management of Type 1 Diabetes (T1D) in schools.
Objectives: To seek consumer views on safety concerns for students with T1D during school time and school-related activities.
Methods: Consumers were invited to partake of a deidentified on-line survey on school safety incidents in April 2024 using Typeform software. Participants were sourced from the community of Australia's largest independent consumer organization, the Type 1 Foundation. Results were quantified and qualitative responses about safety concerns were categorized by the authors into medical safety (risk of harm), workplace safety (lack of requisite training), discrimination (lack of equal opportunity) and negligence (lack of execution of duty of care). Qualitative responses could be classed on more than one category.
Results: 652 people responded from all Australian States comprising parents (84%), students (6%) and teachers (6%). 65% of respondents expressed safety concerns about a student with T1D. Of those reporting safety concerns, there was no significant State based difference nor significant differences between students attending a public school (64%), catholic school (66%) or independent school (56% p=0.052). The most common source of guidance for all respondents was the student's medical team (33%) followed by the national "Diabetes in Schools" program (26%). Qualitative responses of safety concerns were categorized by medical safety (69%), workplace safety (73%), discrimination (38%), and negligence (64%).
Conclusions: Consumers have significant concerns about safety of students with T1D in Australian schools, especially related to medical safety, compliance with workplace safety, duty of care and discrimination.
An Australian "comprehensive" national program for students with Type 1 Diabetes has failed to satisfactorily address safety issues.
Schools rely primarily on medical teams to advise school staff.

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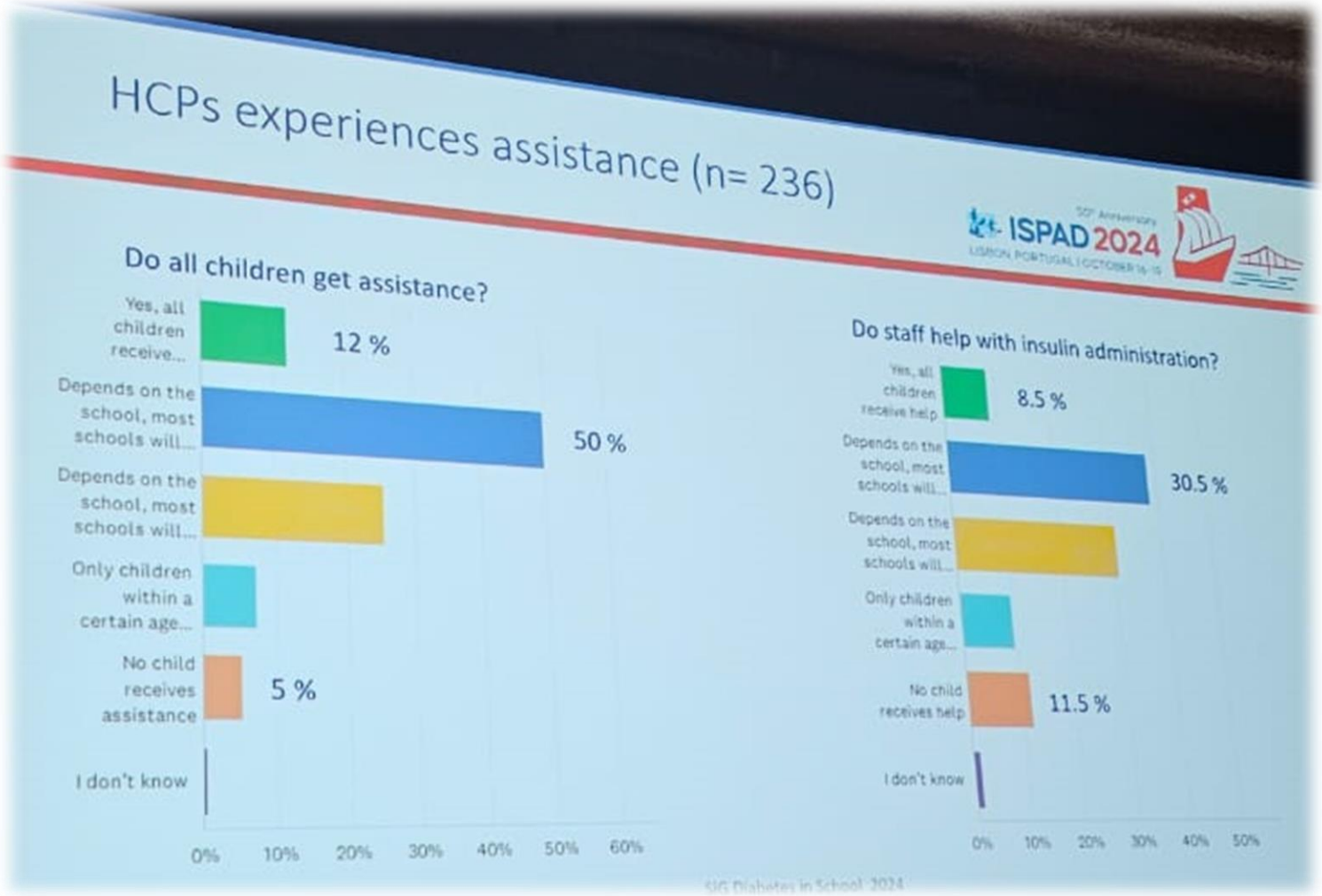
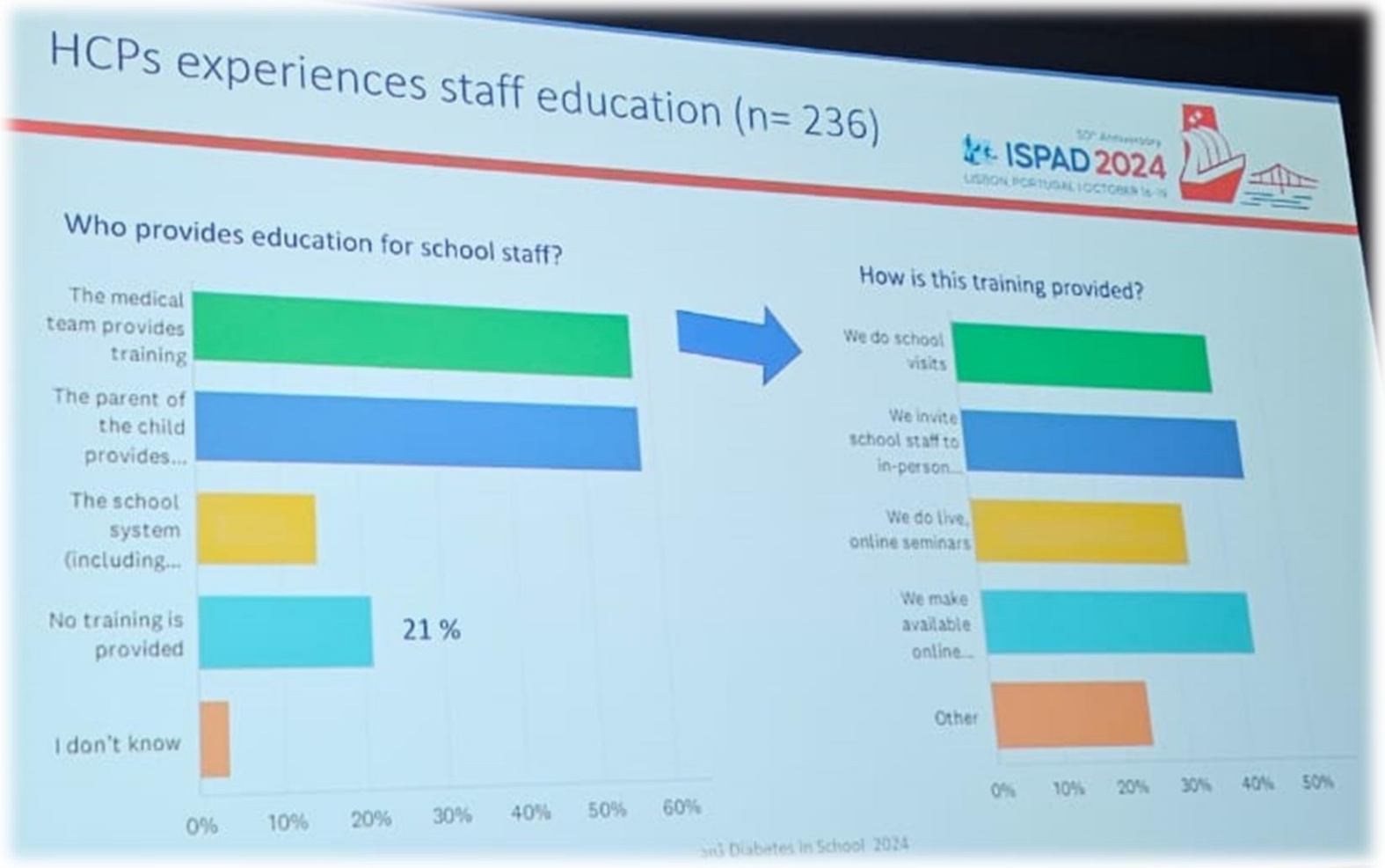
Grupo de interés especial



ESCUELA

Grupo de interés especial



Grupo de interés especial

ESCUELA

JENIOus-CwD diabetes in schools research project: a worldwide survey on type 1 diabetes (T1D) management in children and adolescents in schools

Type selection

Preferred Presentation Type: Oral presentation

General data

Category: 4.b: Diabetes at School

Title

Title: JENIOus-CwD diabetes in schools research project: a worldwide survey on type 1 diabetes (T1D) management in children and adolescents in schools

Abstract text

Introduction: T1D management in schools is challenging and publications tend to be regional with a small number of participants.

Objectives: To assess the experiences of families of children and adolescents (C/A) with T1D during school time globally.

Methods: Cross-sectional online survey-based study. A 41-question Google Forms survey aimed at families of T1D C/A, supported by ISPAD-JENIOUS and the ISPAD Diabetes in Schools Special Interest Group. The questionnaire was developed in English, translated into 13 languages, and promoted through email and social media. The inclusion criteria were: 1) T1D 2) age below 19 years 3) school attendance. The countries were divided according to the UN geographic regions and the World Bank income classification.

Results: Preliminary data was collected from May/2023 to February/2024. There were 6,556 responses from 54 countries, 50%(n=3,304) from Europe, 37%(n=2483) Americas, 9%(n=595) Asia and 2% (n=165) Africa. High-income countries: 53%, upper-middle-income countries: 39%, lower-middle and low-income countries: 6%. Mean age(SD) was 10.7y(3.81); diabetes duration: 4.3y(3.4); females: 49.1%(n=3,223). Families reducing work hours because of diabetes: 52.8%; in children < 6 years: 63%. 50.4% reported reducing insulin dosage to avoid hypoglycemia, and 16% that the child misses school due to diabetes at least once a month. School support: 54.8% did not have someone at school responsible for diabetes care, and 48.1% did not have a diabetes management plan. Overall, 19.2% are dissatisfied with the school´s support, and 49.4% think it can improve.

Conclusions: This is the largest study conducted worldwide to assess diabetes care in school settings. School personnel have limited knowledge about diabetes, and there is a high incidence of family members reducing work hours to assist their C/AwD at schools due to a lack of support. Our results revealed that there is an urgent need to improve diabetes management support in schools. These results can help develop strategies locally and internationally.

ESCUELA

Mejorando el tiempo escolar

MISIÓN DE LA ESCUELA PARA TODOS

- Aprender
- Estar seguros
- Jugar
- Acceso al agua
- Acceso a la comida

MISIÓN DE LA ESCUELA PARA UN NIÑO CON DBT

- Empoderar para que prosperen académica y socialmente y administren su salud

Más oportunidades

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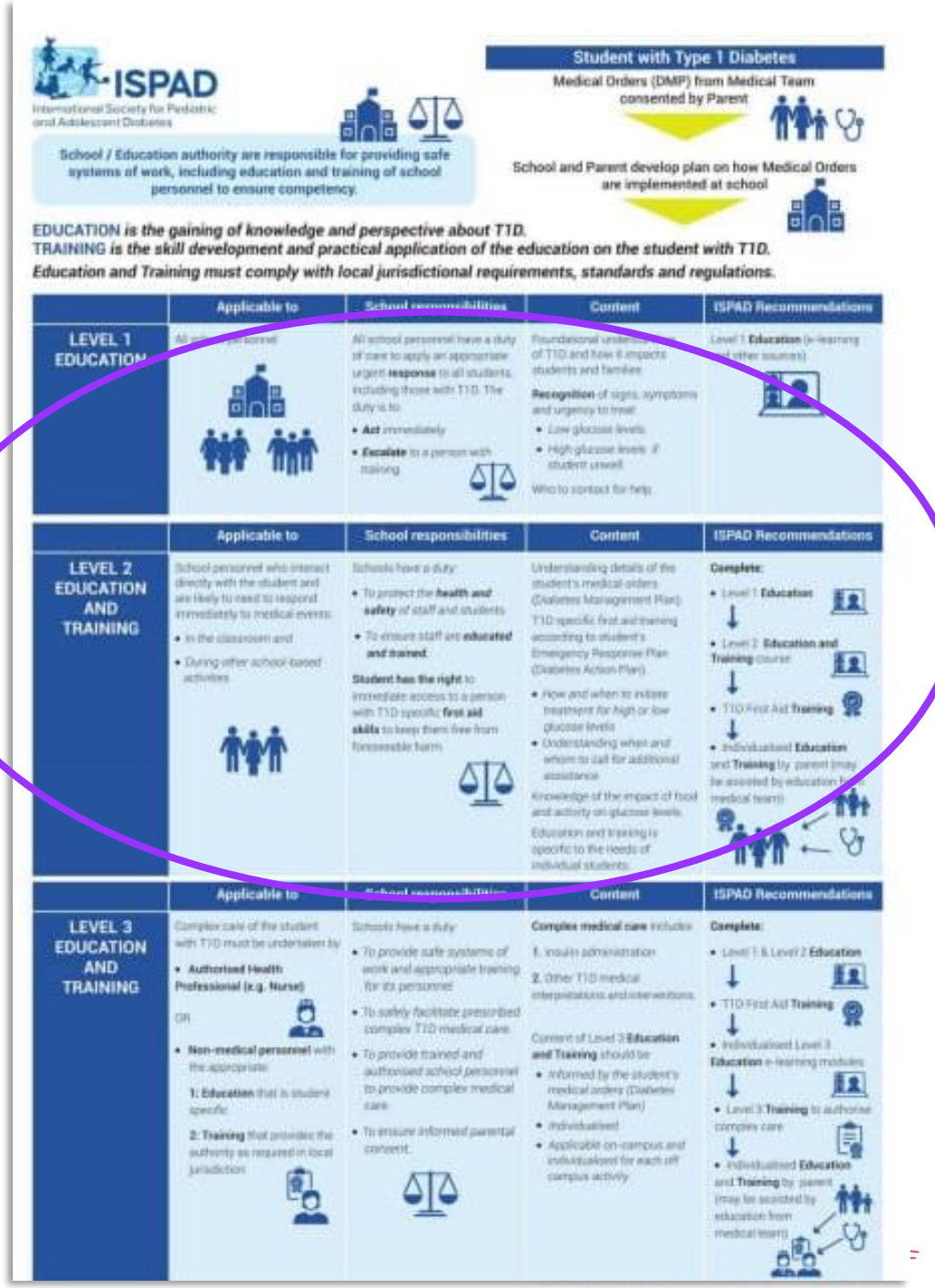
Declaración de posición sobre la diabetes tipo 1 en las escuelas 2024

- ✓ La educación es la adquisición de conocimientos y perspectivas sobre DT1
- ✓ El entrenamiento es el desarrollo de habilidades y la aplicación práctica de la educación en un estudiante con DM1
- ✓ La educación y el entrenamiento deben cumplir con los requisitos, estándares y regulaciones jurisdiccionales locales.

Plan de manejo de diabetes



Results

- 146 respondents (from across 29 countries); 52.1% of the study population heralded from high-income, 25.3% from upper-middle-income, and 22.6% from lower-middle and low-income countries
- 61.6% were people with diabetes, and 38.3% were adult carers of a person with diabetes
- People with diabetes were mainly female (54.1%), had a mean±SD age of 18.5±3.6 years, and were diagnosed at the age of 9.0±4.4 years. 58.2% were receiving paediatric diabetes care
- 84.2% respondents had received education on managing diabetes independently
- 38.4% reported having received information about the transfer from pediatric to adult-based diabetes healthcare settings

SCREENING

¿Qué aprendimos sobre los programas de screening?

To screen or not to screen ???

The issue is what to do!! ” **Mosse Philip**

Pros & Cons of screening for Type 1 diabetes

- Educated families
- Early diagnosis
- Lower prevalence of DKA
- Feeling of satisfaction and reassurance
- Opportunity to participate in prevention studies

- Overprotection of the child
- Children treated as ill
- Negative impact on parent-child relationship
- Worry and anxiety

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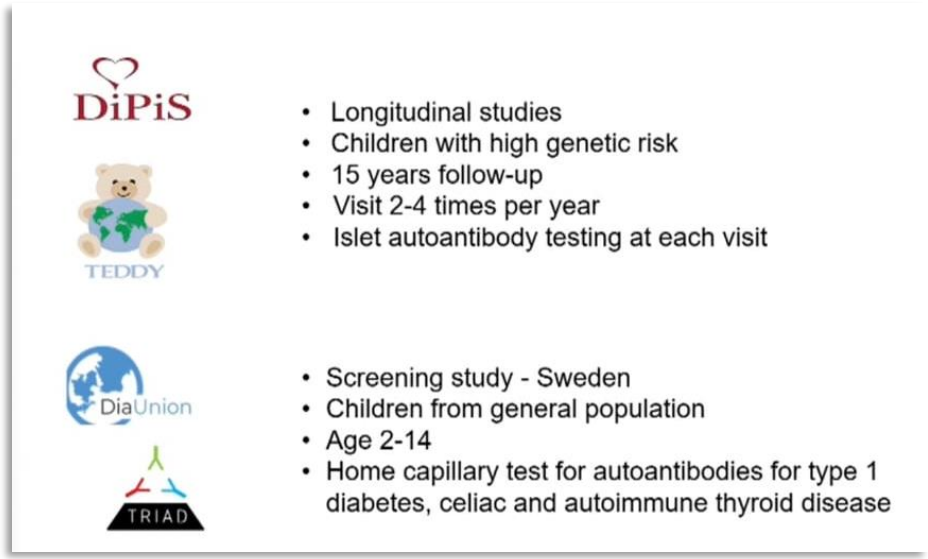
Ansiedad



Anxiety

- Increases after information about genetic risk and islet autoantibody positivity
- Decreases over time especially for those who remain negative for islet autoantibodies
- Difference between mothers and fathers
- Factors associated with anxiety:
  - -First degree relative
  - -Ethnic minority status
  - -Low education level
  - -Accurate risk perception of the child´s T2D risk
  - -Positive for islet autoantibodies

Ansiedad

Anxiety – after IA screening

- FR1DA: Screening in Germany, 2-6 years old children, between 2015-2019.
  - Increased PHQ-9 scores in mothers to IA+ children, declined after 1 year.
  - The PHQ-9 is a screening tool for depression

(Ziegler, JAMA. 2020)

- ASK: Screening in Colorado, US.
  - Increased anxiety in parents to IA+ children at first follow-up visit. Remined elevated at visit 2 but started to trend down.

(O'Donnell, Diabetes Care. 2023)

LUND UNIVERSITY

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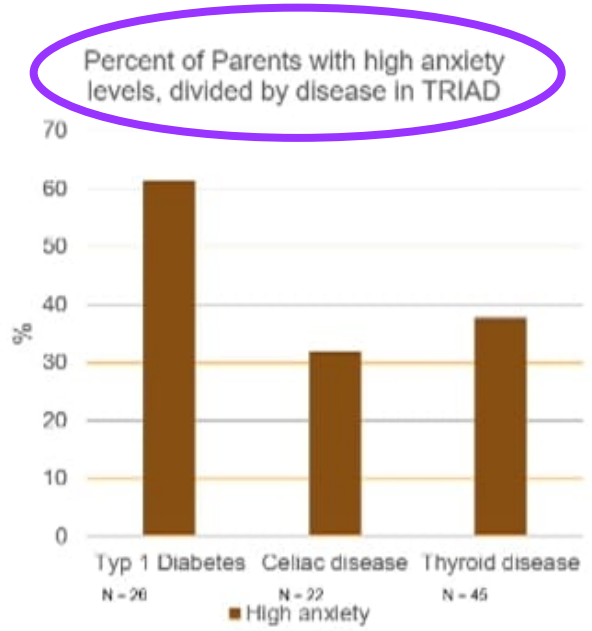
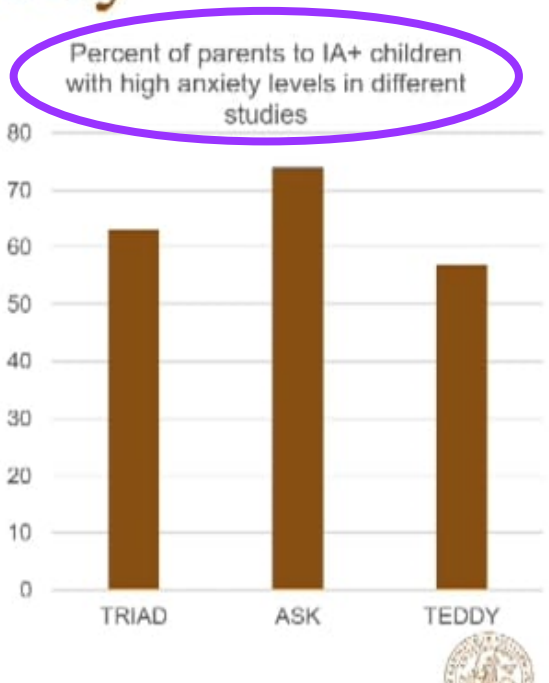
Ansiedad

Anxiety – TRIAD study

- 6-item short form of the SAI
- Scores >40 – High anxiety
- T1D, Celiac and Thyroid disease
- 2 time-points
  - After information on results
  - After 1 year





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Risk communication

- Challenging!
- Underestimation is common
- Parents risk perception accuracy may decrease over time
- Important for retention and compliance

Strategies in TEDDY:

- Documented annual risk information
- Different materials and methods
- Ask questions
- Underestimation notification

"Percent - 70%"

"70 children out of 100 within 10 years"

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Strategies

- Time
- Staff consistency
- Information & Education
  - In different ways and format
  - Repeated
  - Ask questions

CONDICIONES ASCOIADAS

Diabetes y otras condiciones asociadas

SME. DOWN

Diversos mecanismos genéticos asociados a su fisiopatología debido a la trisomía

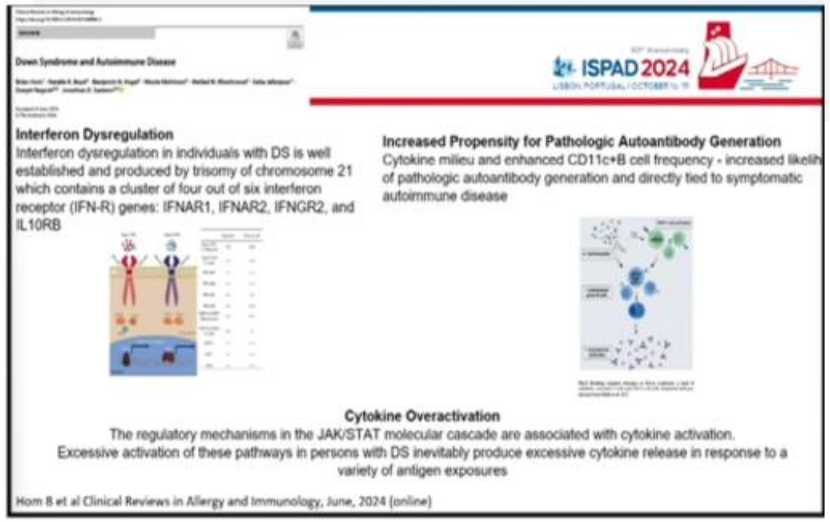
ADHD

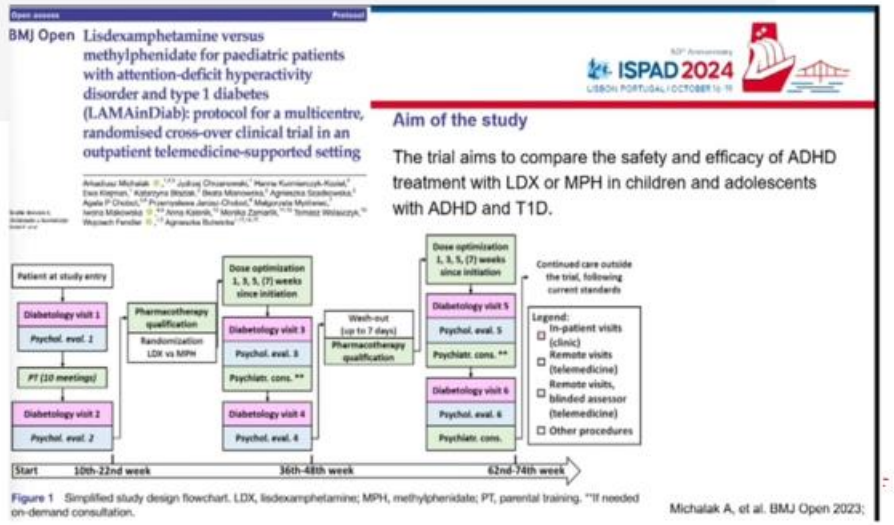
Distintos mecanismos debidos a la medicación

TEA

Impacto ambiental, genético

Medicación (risperidona)





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Mensajes Clave

ESCUELA

SENDAS
PMD
Declaración de posición sobre DT1 en las escuelas 2024

Gun Forsander

ADOLESCENCIA

Falta evidencia para poder afrontar los desafíos que implica la transición

Steven James

SCREENING

Los programas de screening deben incluir educación y apoyo al grupo familiar

Jessica Melin

OTRAS CONDICIONES ASOCIADAS

T21
SDAH
TEA

Requieren estrategias de educación individualizada

Eduardo Calliari

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Muchas Gracias

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Muchas gracias

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