

PREVENTION OF DKA

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General Population Screening for Type 1 Diabetes

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Disclosures

- **Advisory Board for Insulet (past), Sanofi (re: combination therapies in stage 3 T1D)**
- **DSMB member for TArgeting Type 1 Diabetes Using POLyamines (TADPOL)**

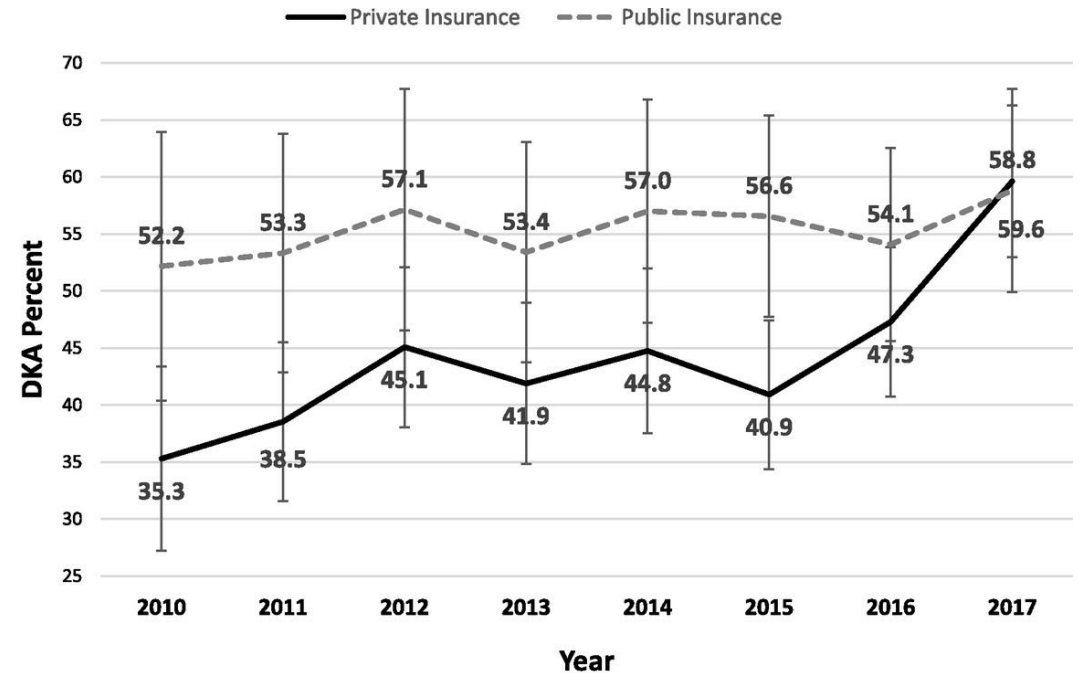
Journey to Eliminate Diabetes-related Ketoacidosis (DKA)

- 1. DKA rates with and without screening programs**
- 2. Short & long-term benefits of DKA reduction**
- 3. Limitations of screening in DKA prevention**
- 4. Opportunity for education**

DKA Rates Worldwide Are Increasing

- 17-77% DKA at diagnosis of type 1 diabetes (T1D)**

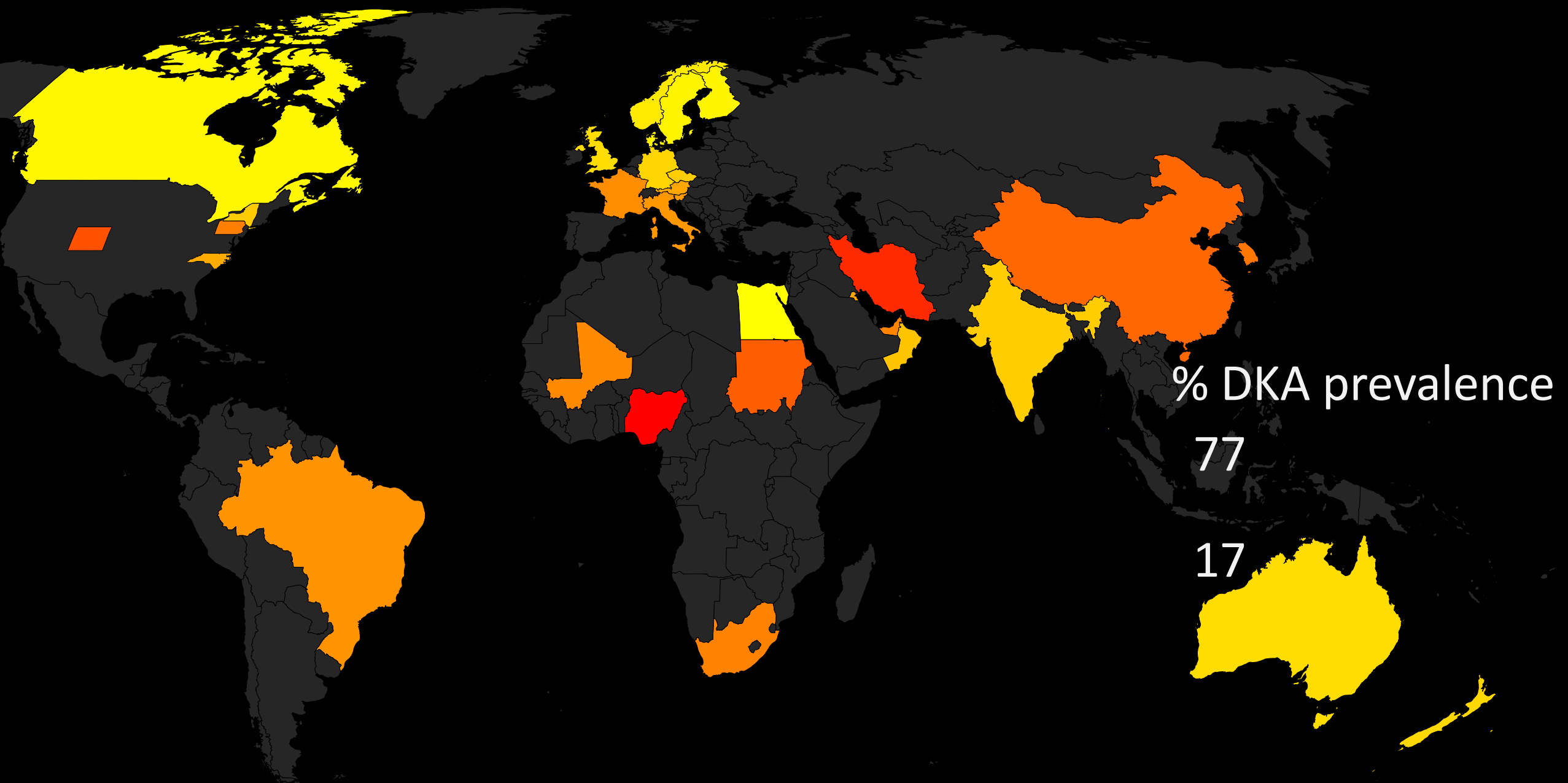
Cherubini et al. Diabetologia 2020;63(8):1530-1541
 Hekkala et al. Diabetes Care 2010;33(7):1500-2
 Nakhla et al. CMAJ. 2018;190(14):E416-E421
 Mencher et al. Global Pediatric Health 2019;6
 Choleau et al. Diabetes Metab 2014;40(2):137-42
 Zayed H. Int J Clin Pract 2016;70(3):186-95
 Ata et al. BMC Endocr Disord 2023;23:193
 Shaltout et al. Sci Rep 2016;6:27519
 Li et al. Front Pediatr 2022;10:888370
 Negrato et al. Diabet Med. 2012;29(9):1142-7
 Praveen et al. Pediatr Diabetes. 2021;22(1):40-46
 Aminzadeh et al. Prim Care Diabetes. 2019;13(1):43-48
 Lee et al. J Korean Med Sci. 2017;32(2):303-309
 Bogale et al. Endocrinol Diabetes Metab. 2020;4(2):e00186



DKA/total

Public insurance	36/69	48/90	48/84	55/103	57/100	69/122	73/135	70/119
Private insurance	48/136	74/192	87/193	80/191	81/181	90/220	105/222	124/208

G. Todd Alonso et al. Diabetes Care 2020;43(1):117-121



% DKA prevalence

77

17

DKA Rates Are Reduced by 90% in Research Screening Programs

- **2.0 - 6.1% DKA at diagnosis of T1D**

Sooy et al. JCEM 2024;dgae158

Ziegler et al. JAMA 2020;323:339-51

Winkler et al. Pediatr Diabetes 2012;13(4):308-13

Hekkala et al. Pediatr Diabetes 2018;19(2):314-319

Nakhla et al. JAMA Pediatr 2021;175(5):518-520

Jacobsen et al. Diabetes Care 2022;45(3):624-633

Wentworth et al. Pediatr Diabetes 2022;23(8):1594-1601

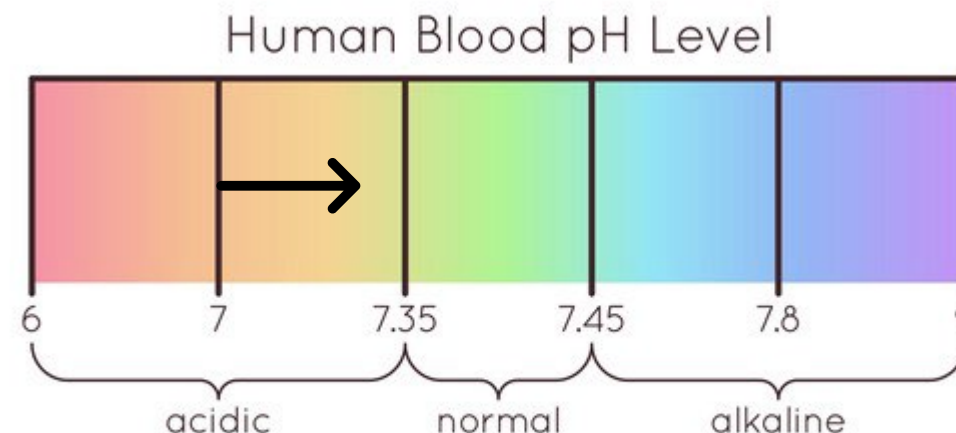
Lundgren et al. Pediatr Diabetes 2014;15(7):494-501

- **Including fewer episodes of severe DKA (1.2% vs 16.2%)**

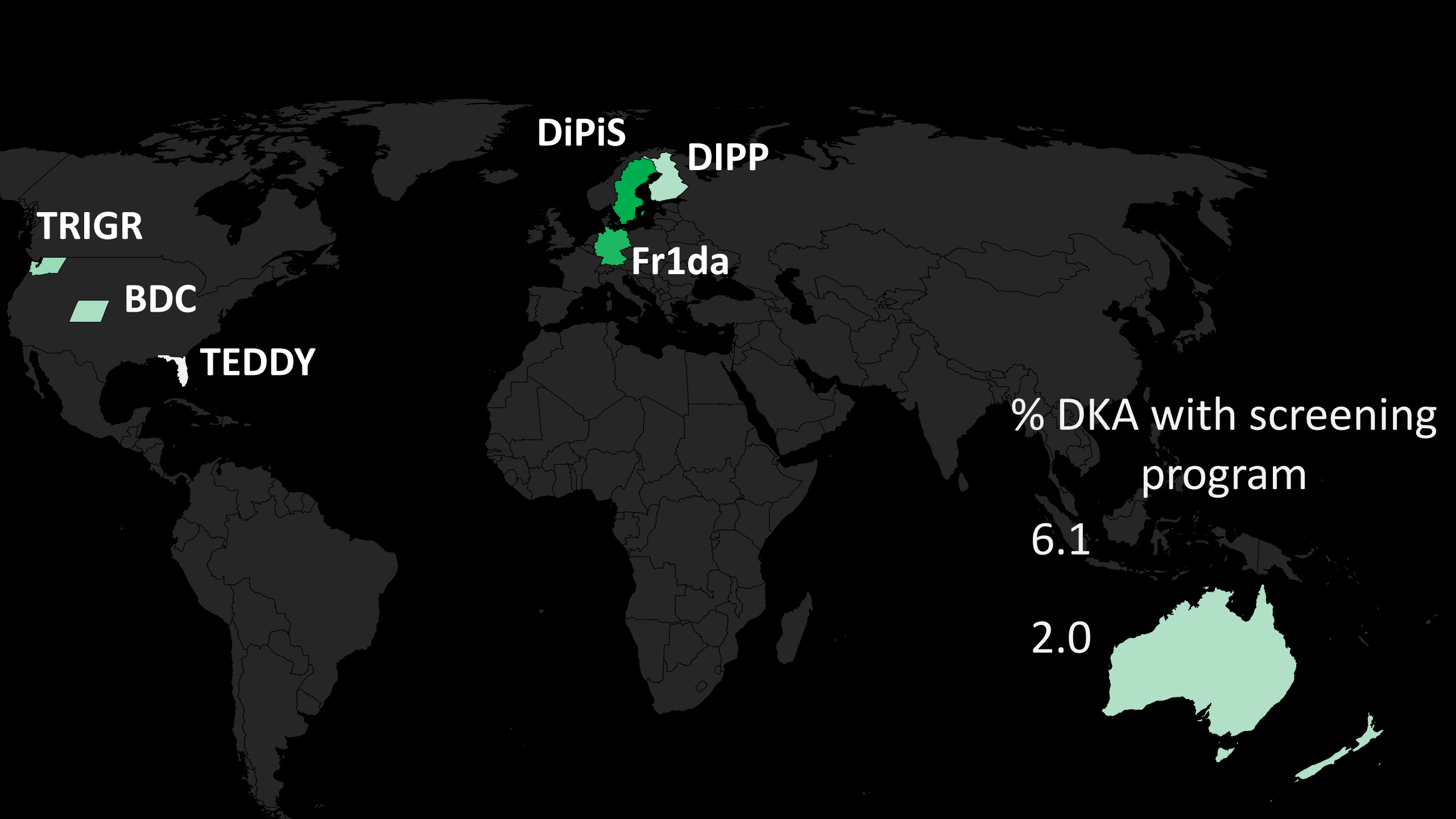
Sooy et al. JCEM 2024



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TRIGR

BDC

TEDDY

DiPiS

DIPP

Fr1da

% DKA with screening program

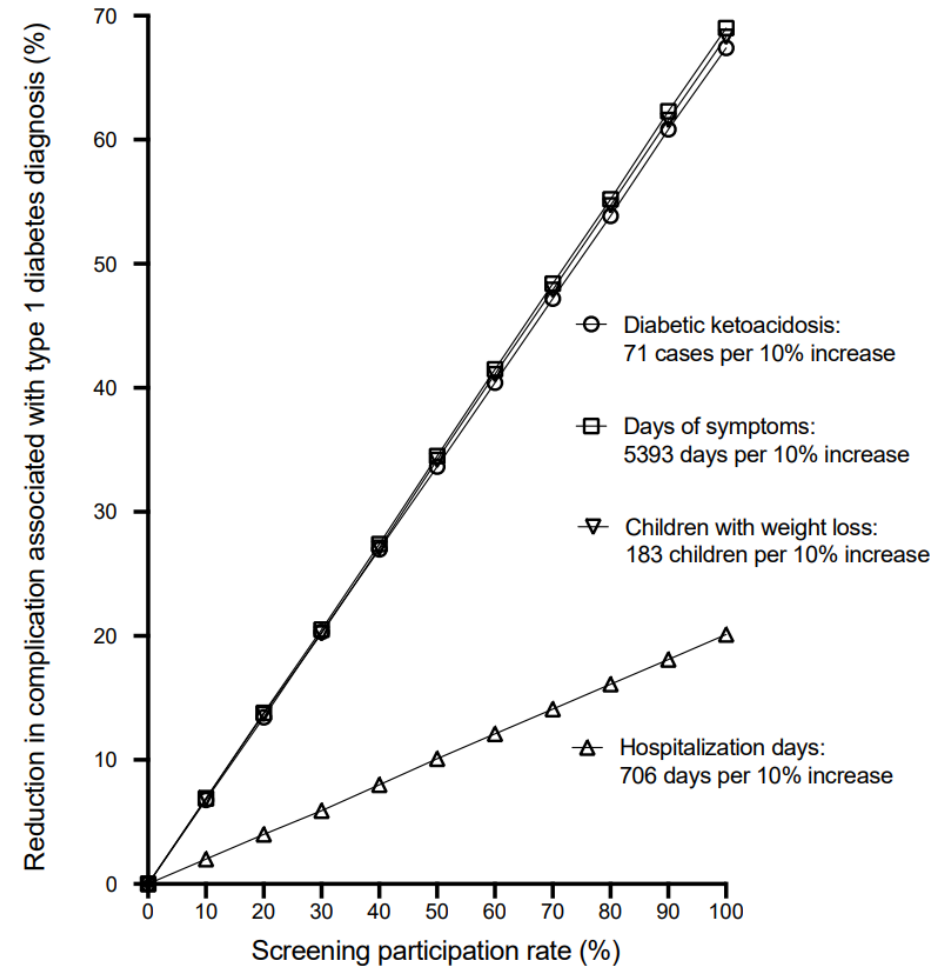
6.1

2.0

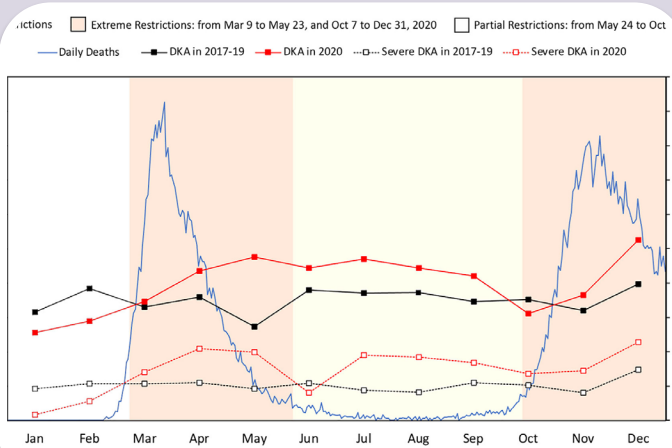
DKA Rates in General Population

Screening Programs – We Don't Know Yet

- **DKA reduction projected to be correlated with screening participation**

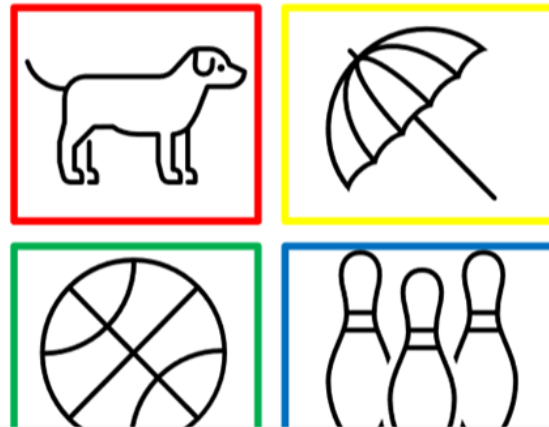


Short-term Benefits of DKA Reduction



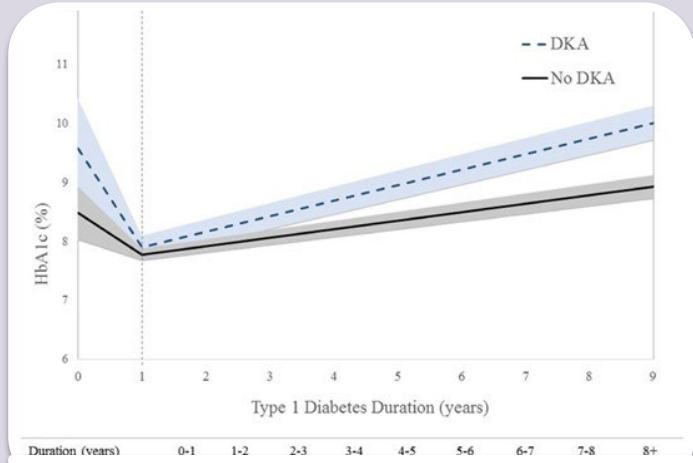
Mortality Reduction

Cherubini et al. Front Endocrinol (Lausanne) 2022;13:878634



Morbidity Reduction

Ghetti et al. Diabetes Care 2020;43(11):2768-2775



Lower HbA1c

Duca et al. Pediatr Diabetes 2019;20(2):172-179

Long-term Benefits of DKA Reduction



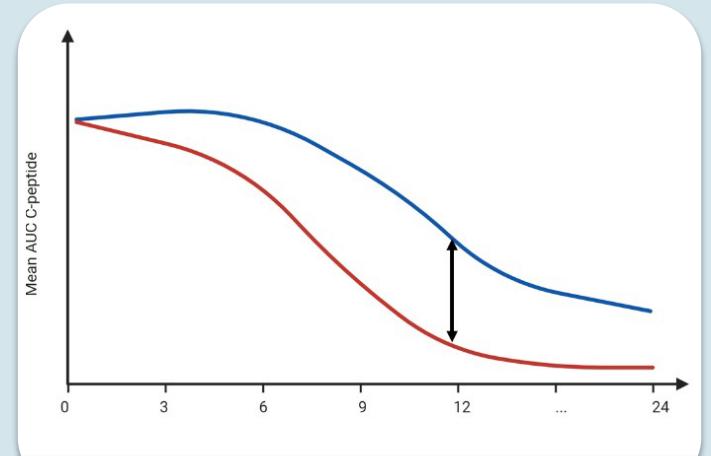
Hypoglycemia
Reduction

Lachin et al. Diabetes
2014;63(2):739-48



Complications
Reduction

Lachin et al. Diabetes
2014;63(2):739-48



C-peptide
Preservation

Lachin et al. Diabetes
2014;63(2):739-48

DKA Varies by Enrollment and Participation Status

In TEDDY

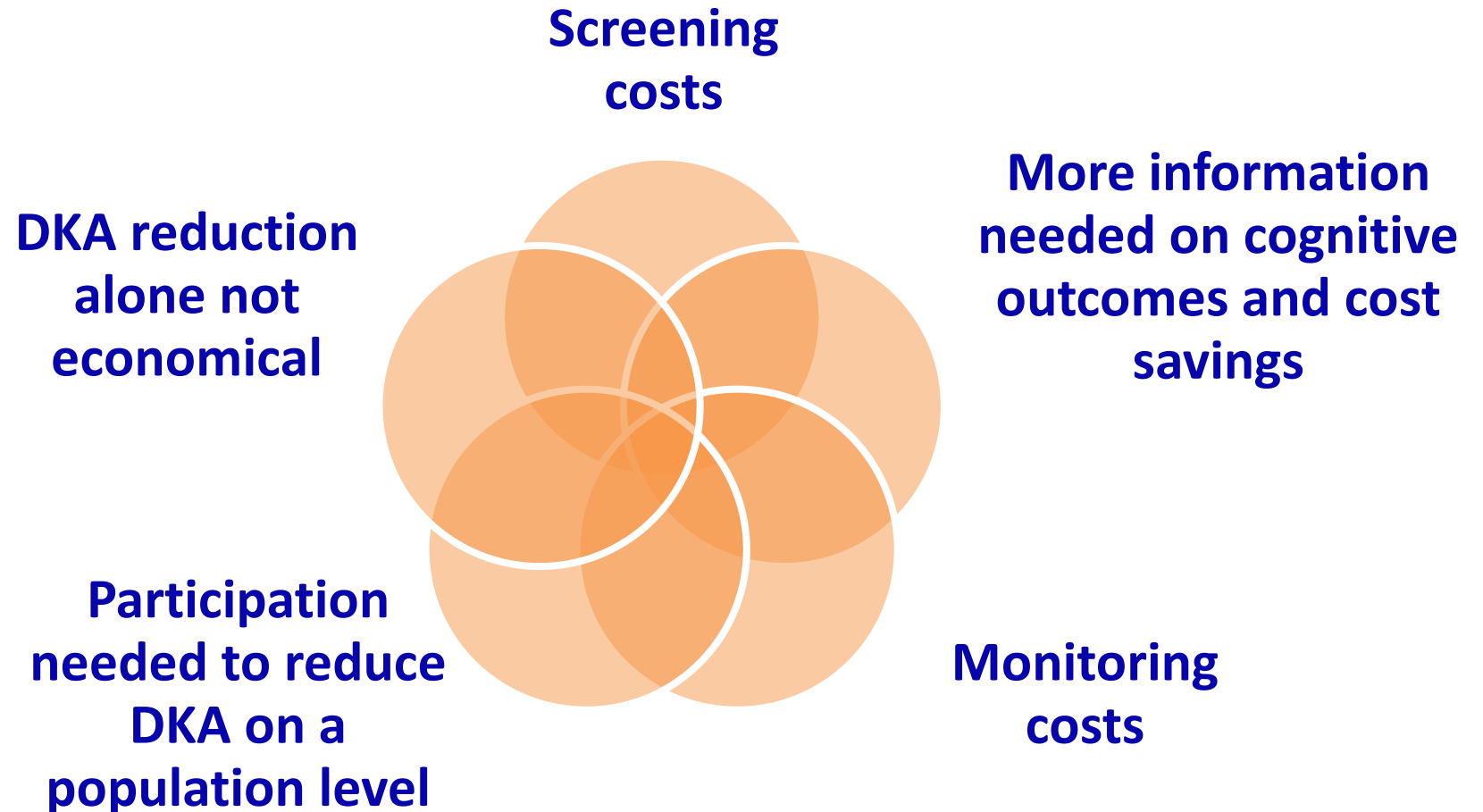
- 83% of participants in regular monitoring
- Median time between the last blood draw and diagnosis visit within TEDDY:
 - 10.2 months (IQR 2.3-37.1) with DKA
 - 2.0 months (IQR 0.7-3.5) without DKA (p<0.0001)

In Colorado (BDC)

DKA prevalence by participation status:

- Active 4.9%
- Inactive 21.4%**
- Community 48.5%
(p<0.001)

Cost/Benefit of DKA Prevention is Mixed



Ziegler et al. JAMA.

2020;323(4):339-351

McQueen et al. Diabetes Care.

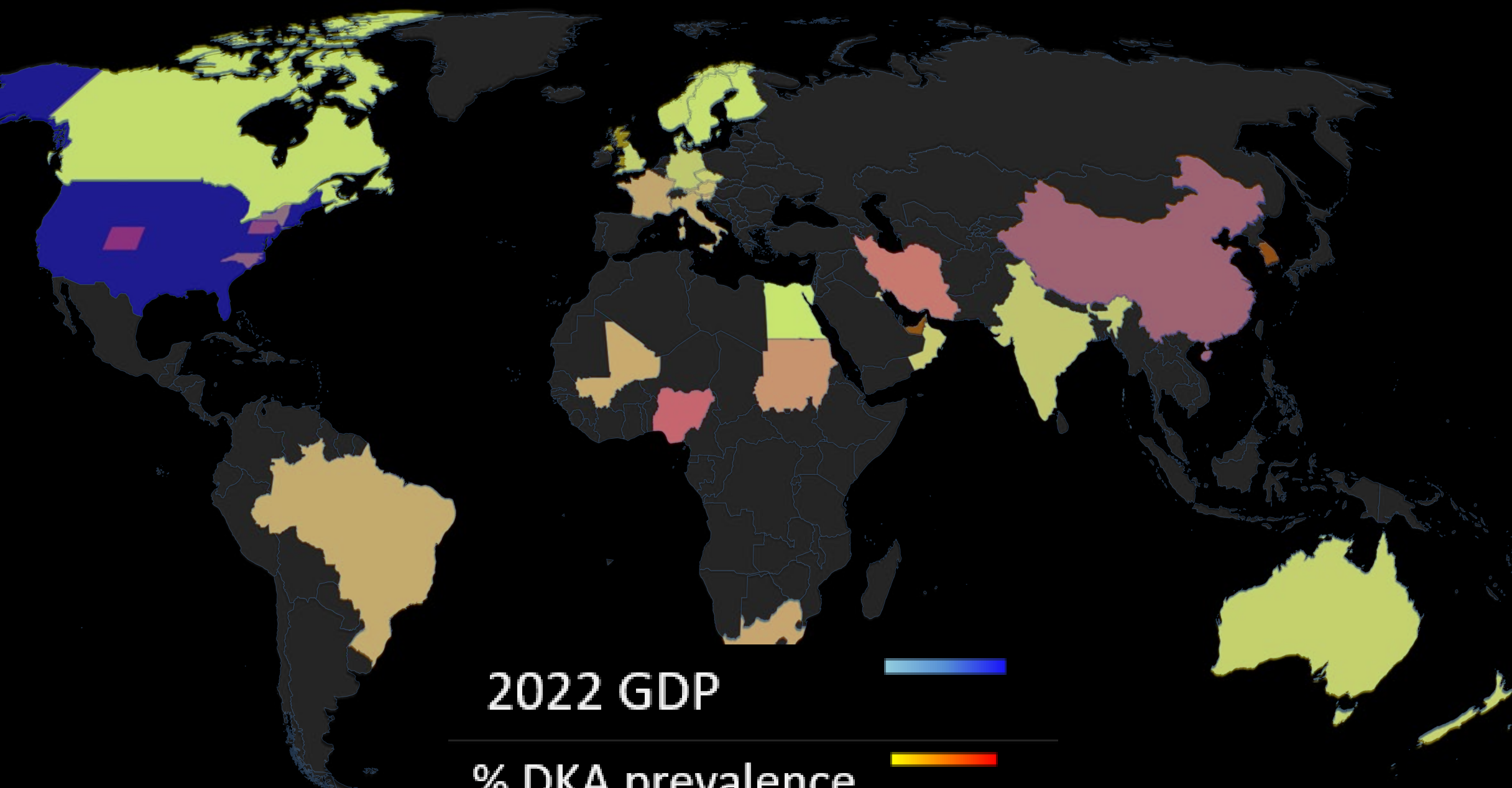
2020;43:1496-503

Meehan et al. Pediatr Diabetes.

2015;16(8):565-72

Ghetti et al. Diabetes Care.

2020;43(11):2768-2775



2022 GDP



% DKA prevalence



Education Can Reduce DKA Rates

- Education about symptoms and importance of early diagnosis
 - 8-year campaign in Italy
 - 2-year intervention in Australia

Vanelli et al. Diabetes Care 1999;22:7-9

King et al. Pediatr Diabetes. 2012;13:647-651



Summary of DKA Prevention with T1D Screening

Pro

- Fewer episodes of DKA (*in the research setting*) and thus lower
 - Morbidity
 - Mortality
 - HbA1c
 - Severe hypoglycemia
 - Rates of complications

Con

- Not exclusively cost effective
- Efficacy in general population not yet known
- Participation rates in screening *and monitoring*
- Access and equity