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# IQECAD INFORMATION MEETING

- *"Last results from IQECAD (data from 2023)"*,
  Dr Thierry Mouraux, from CHU UCL NAMUR.
- *"The Swedish Childhood Diabetes Registry SWEDIABKIDS"*
  Prof. Åkesson Karin, from Linköping University,
- *"Retinopathy : the adolescents' cases"*
  Dr. Ann-Pascale Guagnini, Cliniques universitaires Saint-Luc

**24/04/2025**

**Hotel Crowne Plaza - Da Vincilaan 4**

**1831 Brussel**

**Suchsia Chao, Sciensano**

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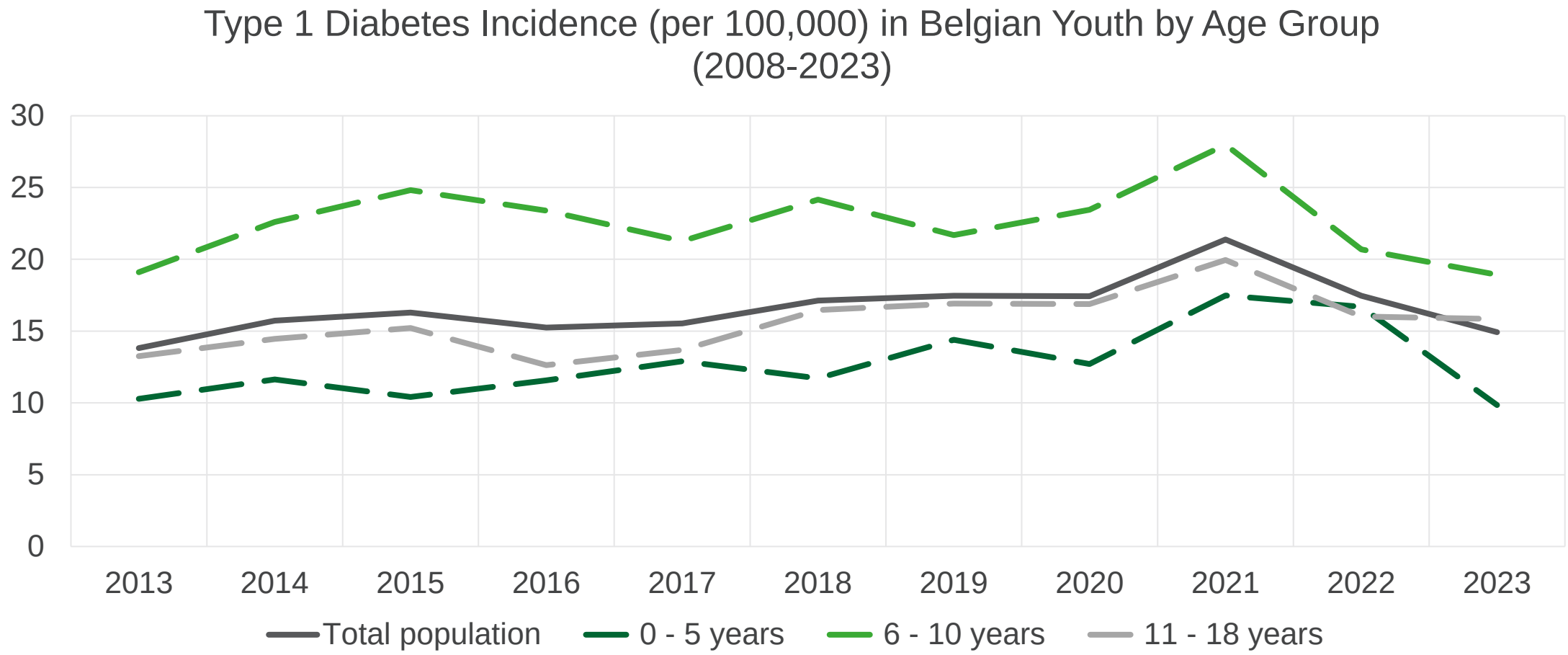
# Epidemiology



# Epidemiology:T1D Incidence (per 100,000) in Belgian

# Epidemiology:potential reasons for a falling incidence

1. **Delayed Diagnoses:** Disruptions in healthcare during early COVID-19 may have caused undiagnosed T1D cases, with a 2021 spike reflecting delayed diagnoses rather than a true increase.
2. **Pediatric Healthcare Access:** Parental hesitancy to seek care during the pandemic likely reduced early diagnosis of T1D in children.
3. **Viral Triggering:** A 2021 T1D surge may reflect increased viral exposure acting as a trigger, which declined as immunity rose and transmission decreased.
4. **Behavioral Changes During Lockdowns:** Pandemic-related lifestyle changes in children may have influenced T1D onset, with reduced effects as routines normalized.

# Covid 19 peak = delayed diagnosis ?

- Diagnosis in type 1 diabetes: mean time = 25 days (from symptom onset until perceiving the need to seek medical advice)

- initial phases of COVID-19 pandemic (2020) : healthcares services disrupted…
- BUT :
    - significantly higher frequency of DKA at onset (increased incidence of severe DKA)
    - **Increased number of new onset T1D persist throughout the second year of pandemic**

# Covid 19 = viral triggering ?

What's the relation between COVID-19 infection and T1D ?
How COVID-19 plays a role in the increased incidence ?

- viral infection and T1D: environmental factors = potential triggers for auto-immune attack

  * COVID 19: lung injuries but other organ dysfunction observed (intestine, kidney… pancreas)
  * SARS-CoV-2: activation of the immune system, synthesis of a plurality of autantibodies
  * SARS-CoV-1(2003): high blood glucose levels (no corticoids) could persist up to 3 years after recovery…. Long term injury to β cells
  * incidence T1D <18, 30 days after COVID19 higher than those without COVID-19 infection
  * meta-analysis: after COVID 19, patients of all ages and sexes had an elevated incidence and relative risk for a new diagnosis of diabetes
  * DPV registry: increase in the incidence of T1D in children during the COVID 19 pandemic: peak incidence occuring 3 months after the peak covid incidence

# Covid 19 = viral triggering ?

- in COVID 19 different pathways : exact pathophysiology ? Unclear

  - ***direct cells destruction***
  * COVID19 directly infects β cells and affects β cells function
  * pancreatic cells highly permissive to SARS-CoV-2 infection
  * endocrine and exocrine cells can be infected (autopsy)
  * infection reduced the number of insulin-secreting granules
  * + damage from inflammation induced by infection

  - ***autoimmune mechanism***
  * patients with COVID19: marked increases in auto-antibody reactivity against immunomodulatory proteins compared wiht uninfected individuals

# Covid 19 = viral triggering ?

- in COVID 19 different pathways : exact pathophysiology ? Unclear

  - ***insulin resistance***
  * induced by inflammation affecting metabolic organs
  * decreased levels of adiponectin

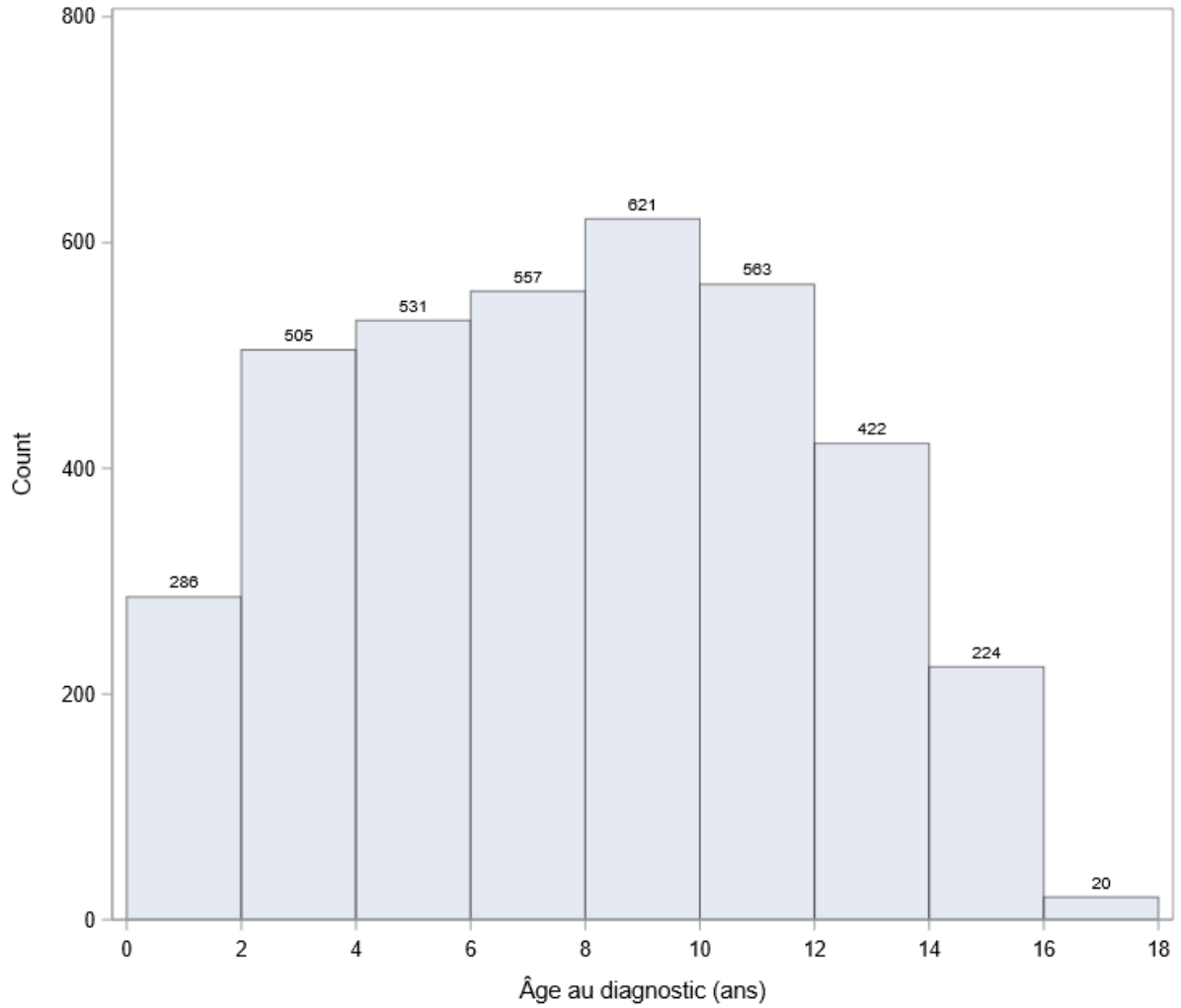
  ***- Hypercoagulabity***
  * damage to pancreatic vessels

  ***- classic β cells autoimmunity***
  * no increase in T1D negative β cells auto-antibodies

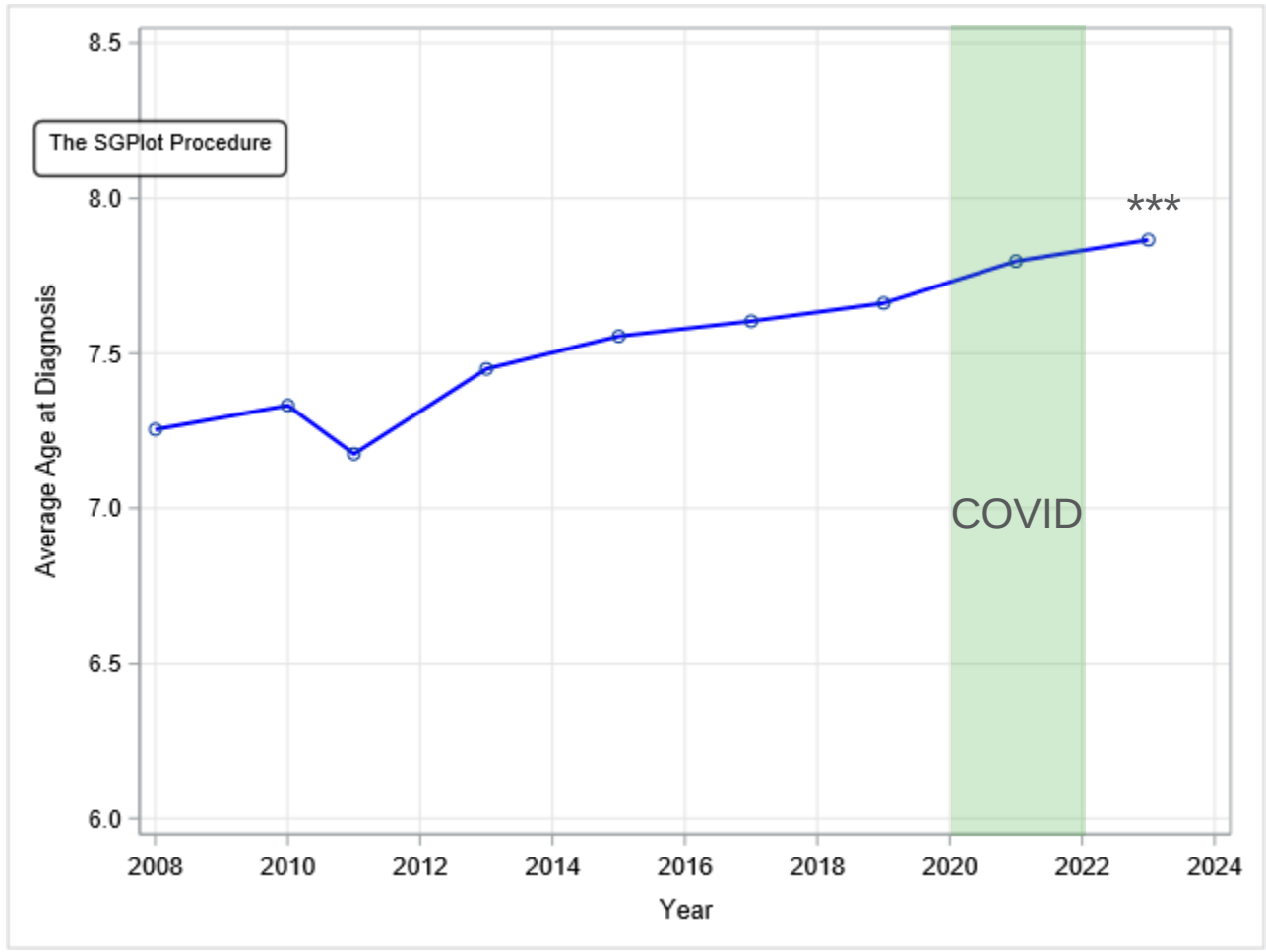
  - ***accelerator hypothesis***
  *german study: population with 2 auto-antibodies: incidence T1D in COVID 19 /-/ : 8.6% versus 14 % in COVID 19 +

# COVID = Viral triggering ?

## Age of diagnosis distribution in 2013

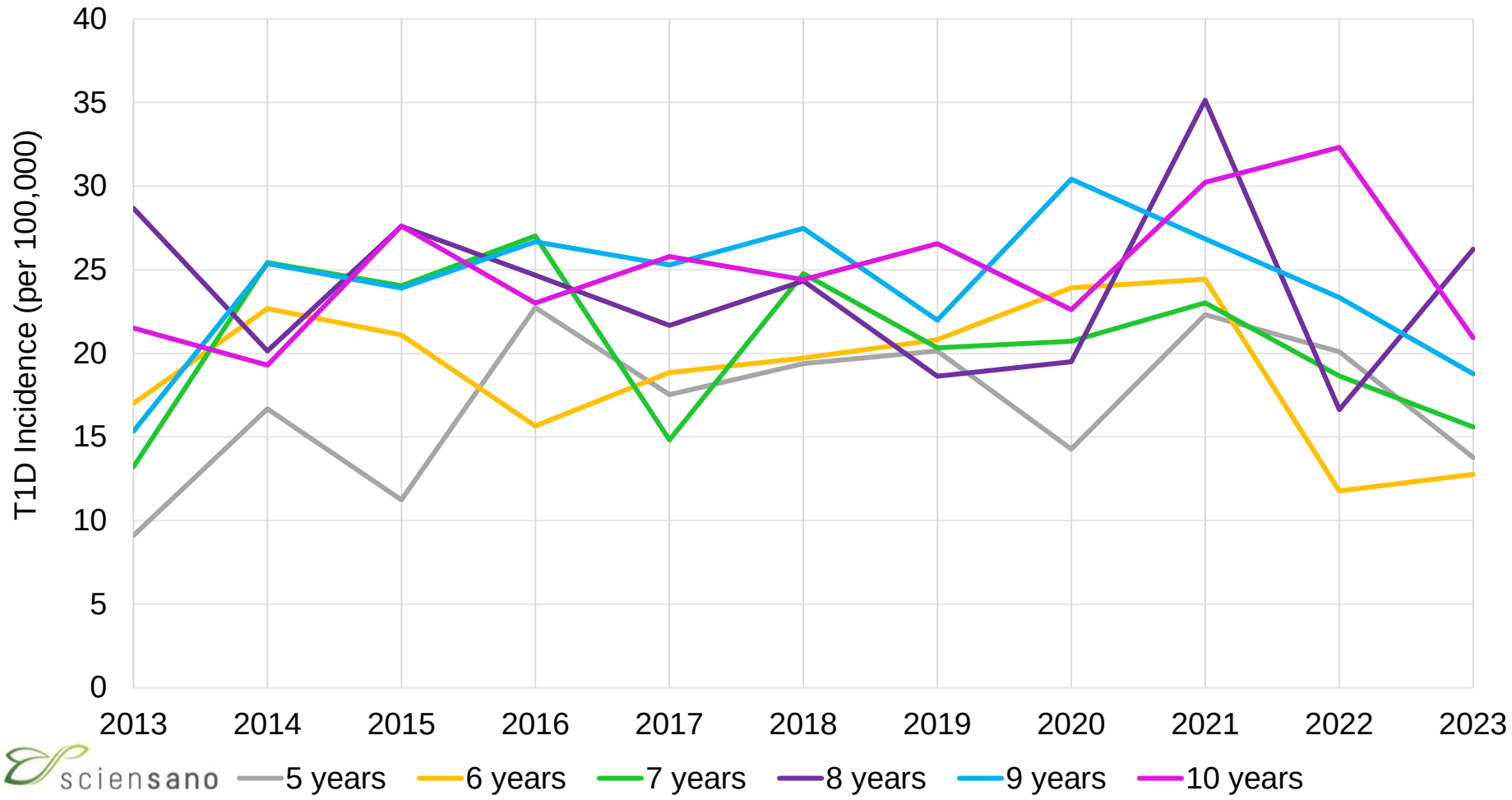



## Age of diagnosis evolution



# COVID = Viral triggering ?

**Epidemiology:T1D Incidence (per 100,000) in Belgian: detailed stratification for age**

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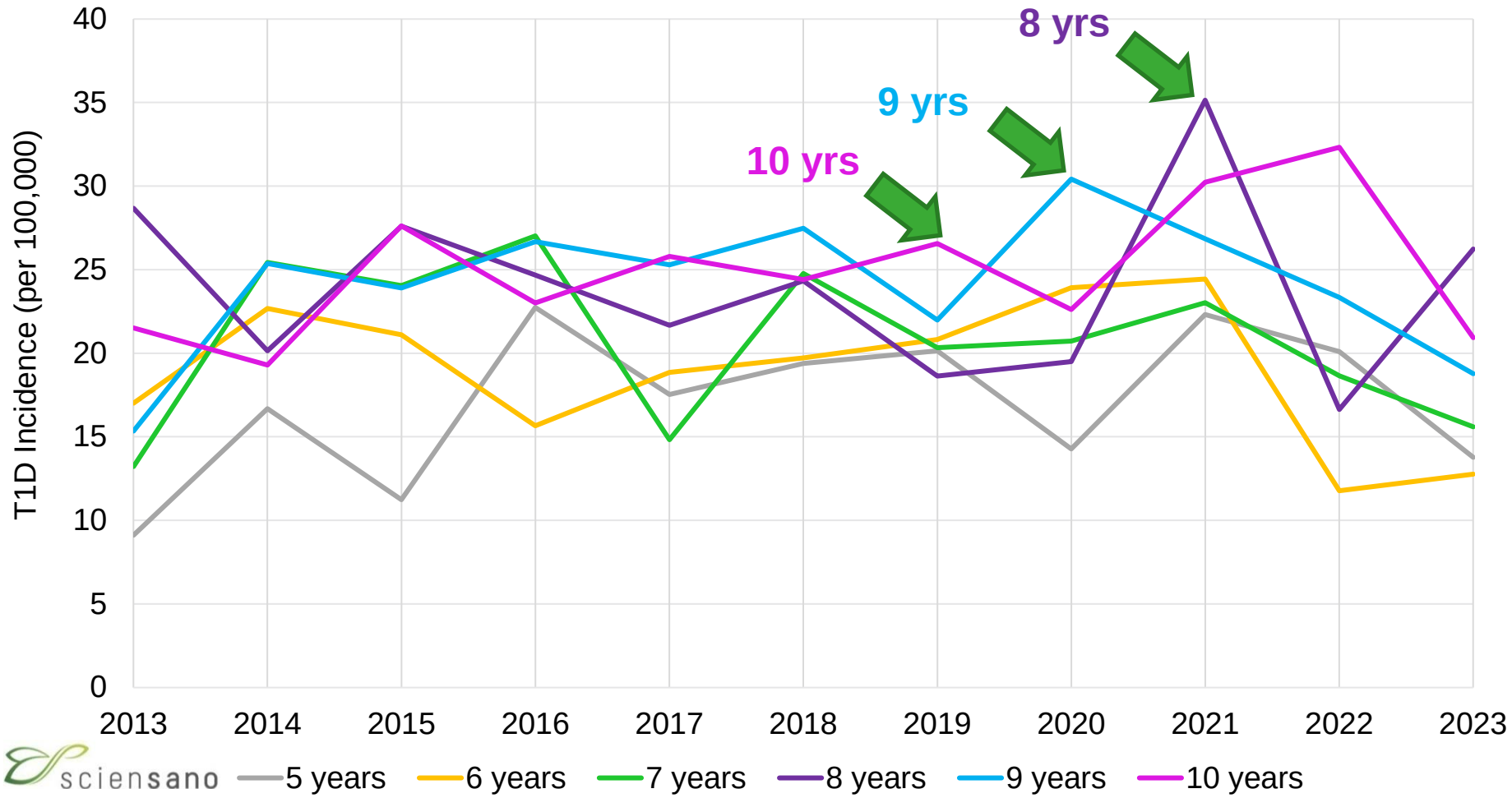


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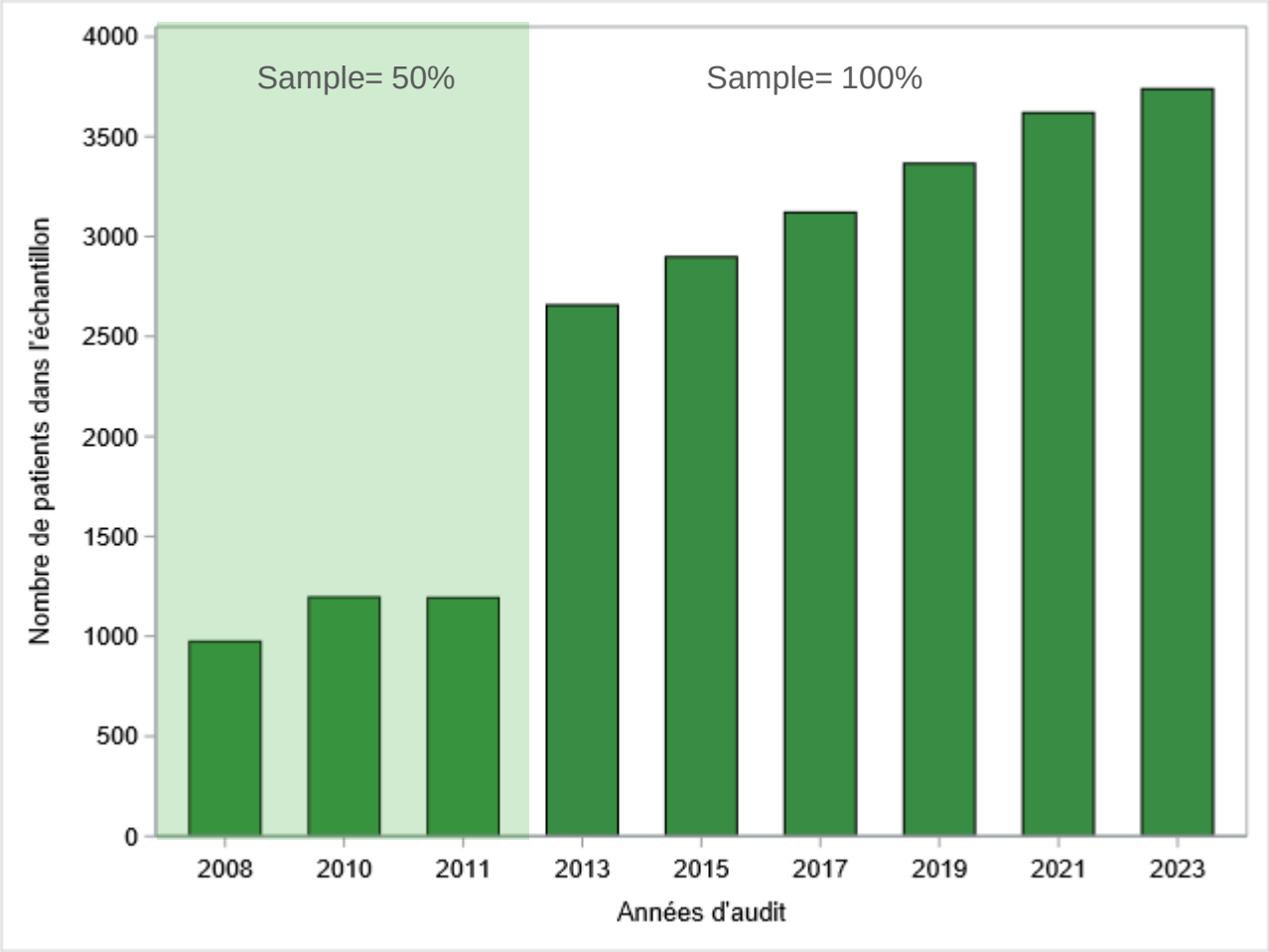
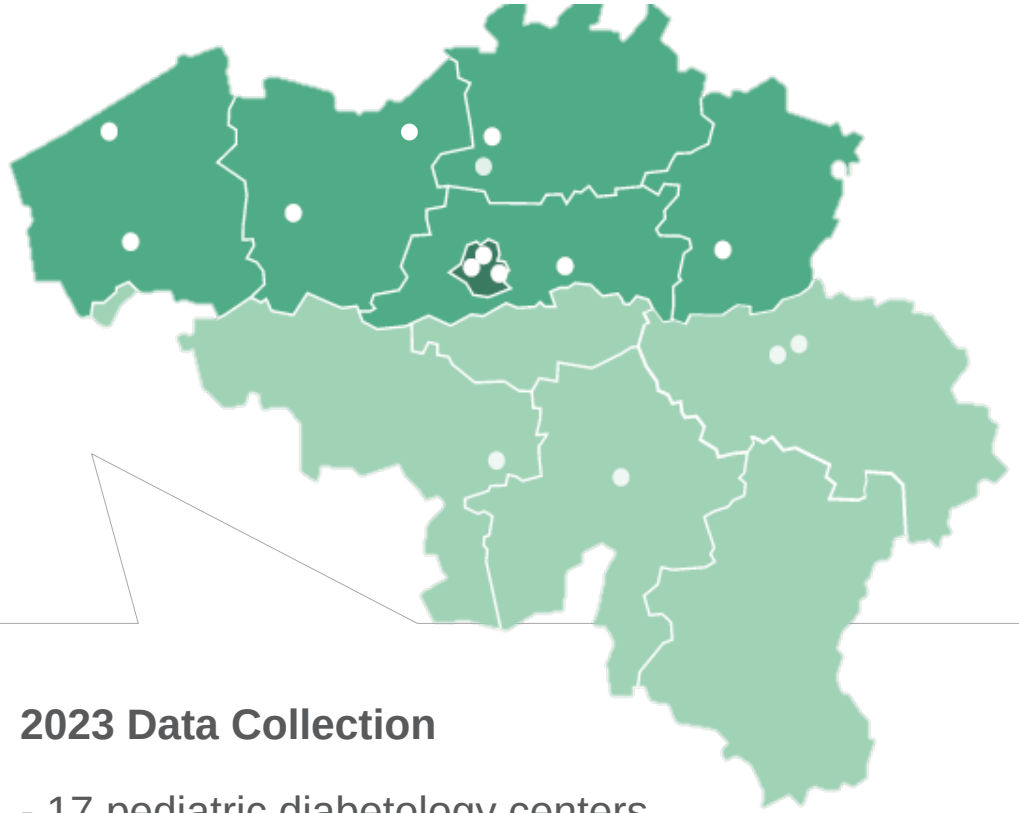
# Audit 2023



**2023 Data Collection**

- 17 pediatric diabetology centers
- 3739 patients with T1D & < 19 years were recorded
- 95.5 % of eligible patients were included

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# Characteristics of the population (2008-2023)

## Socio-demographic in 2023

52% 48%

No gender effect

13.6

Median age: 13.6 yrs

No gender effect

Age at diagnosis: 7.9 yrs

No gender effect

Diabetes duration : 4.5 yrs

Puberty : 2/3

Nuclear family: 3/4

2 non-caucasian parents : 1/3

Communication problems: 1/5

## Developpement

Z-score height median : -0.16

Z-score weight median: 0.40

IMC IMC

Z-score BMI median : 0.56

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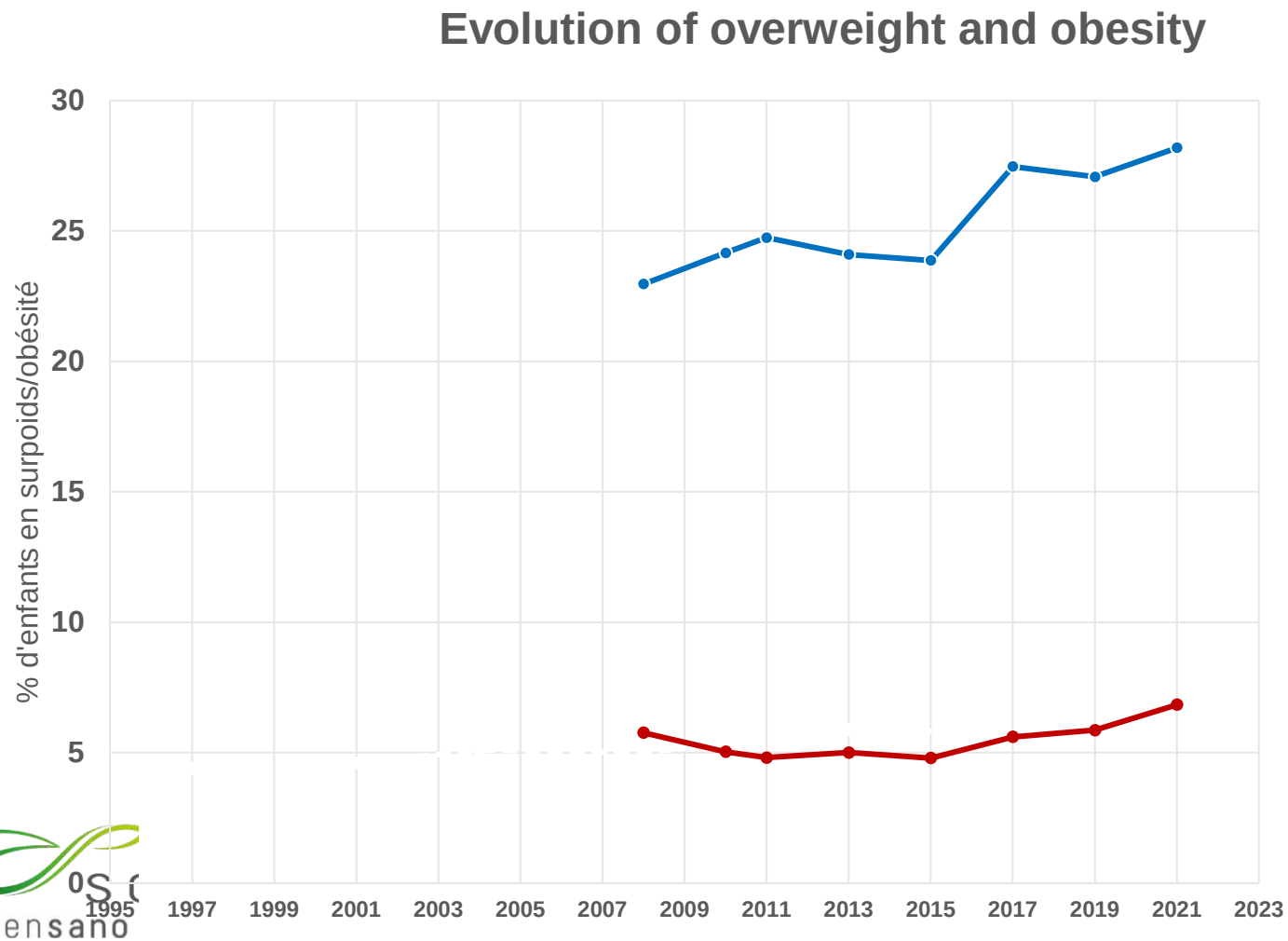
# IPQE-EAD
# Overweight and obesity



# IPQE-EAD
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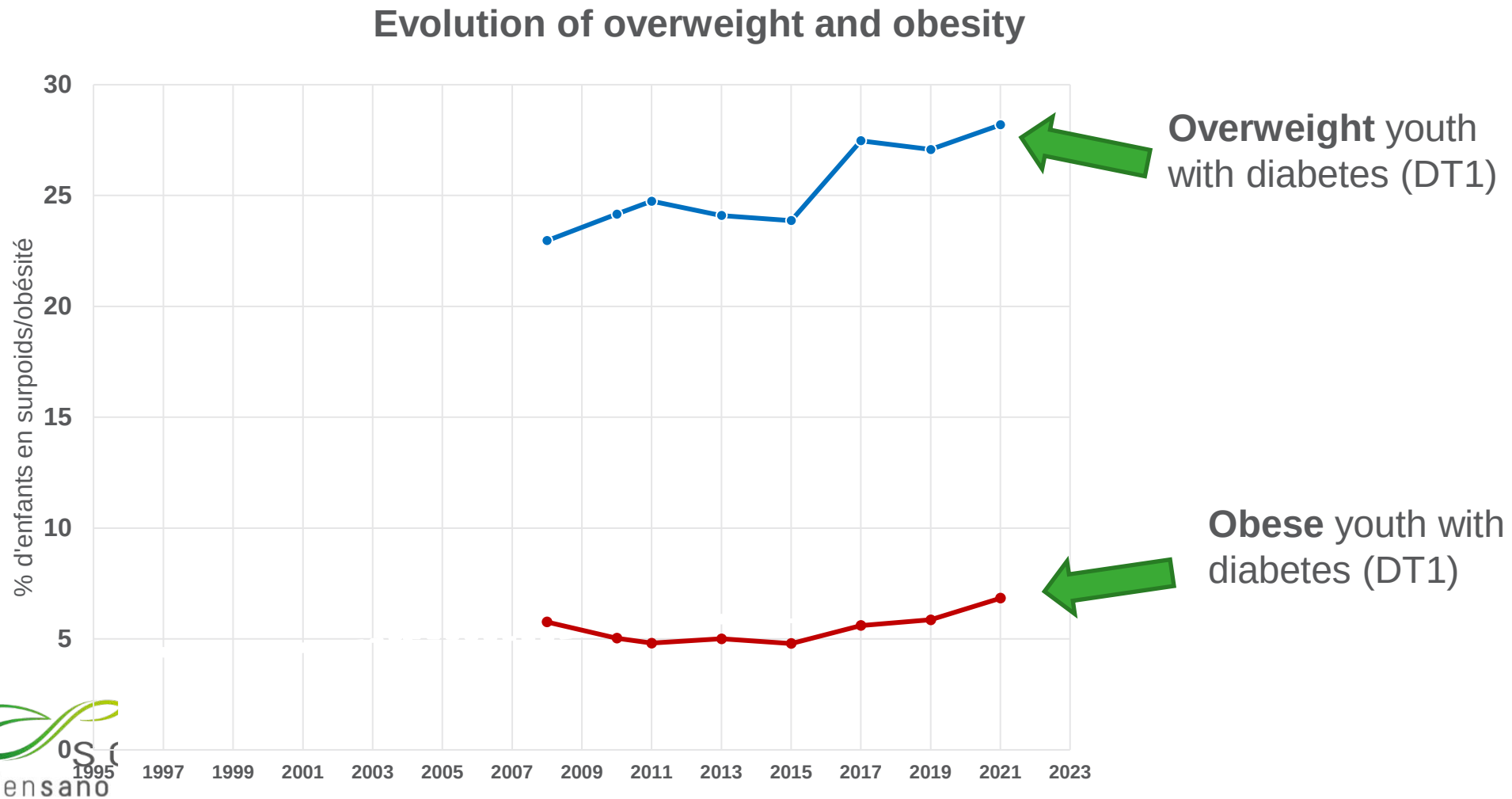

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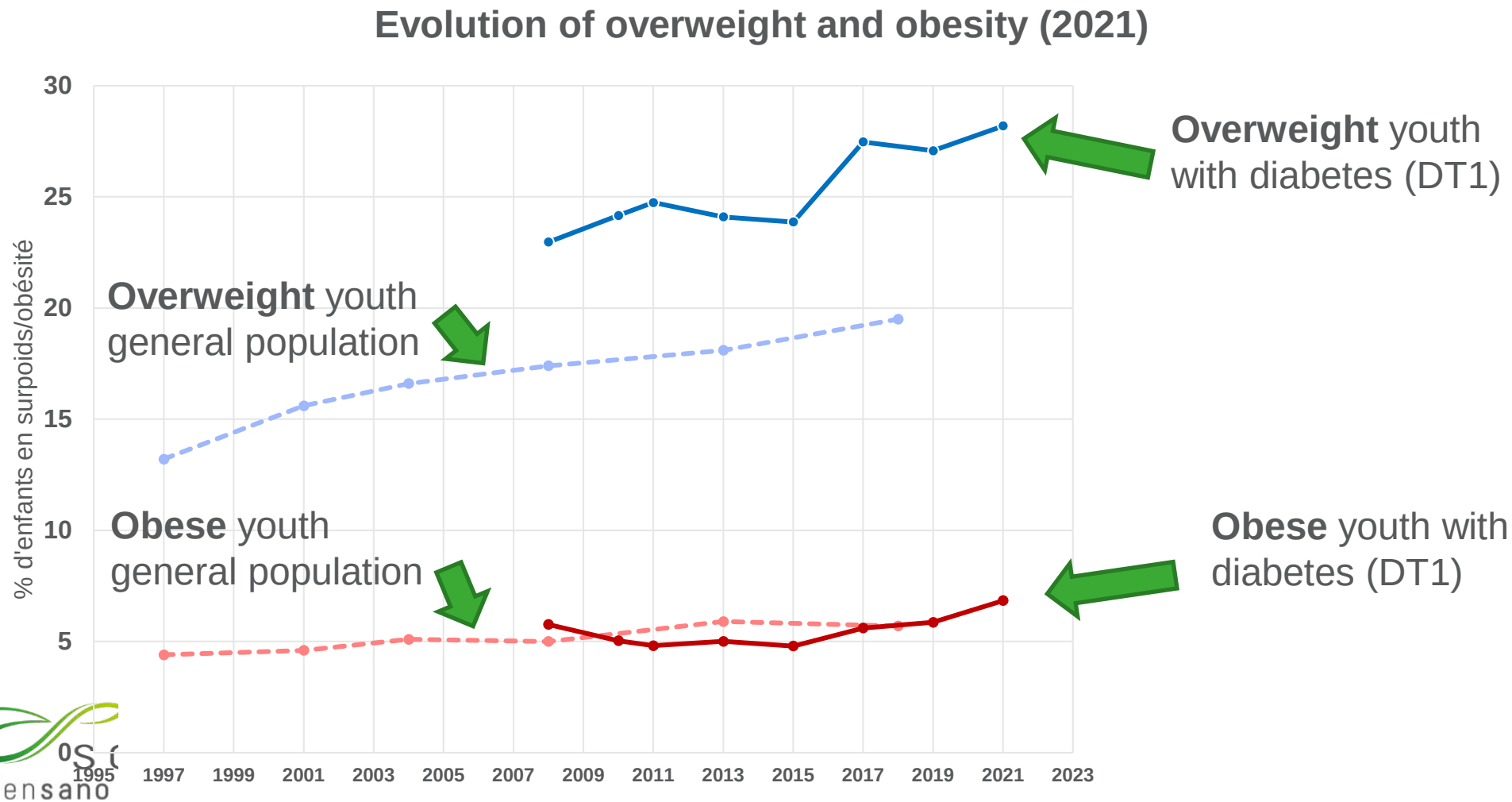

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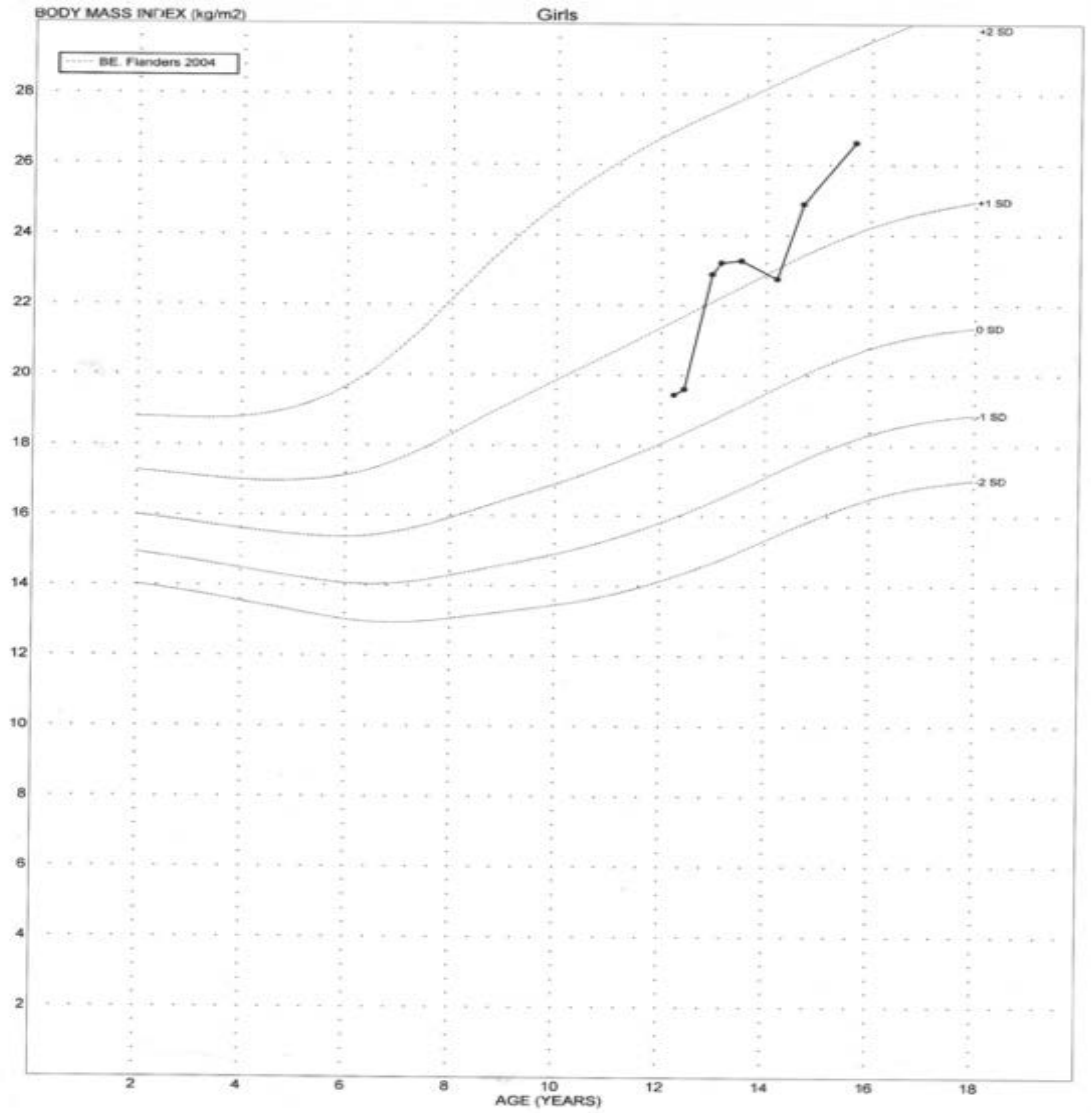
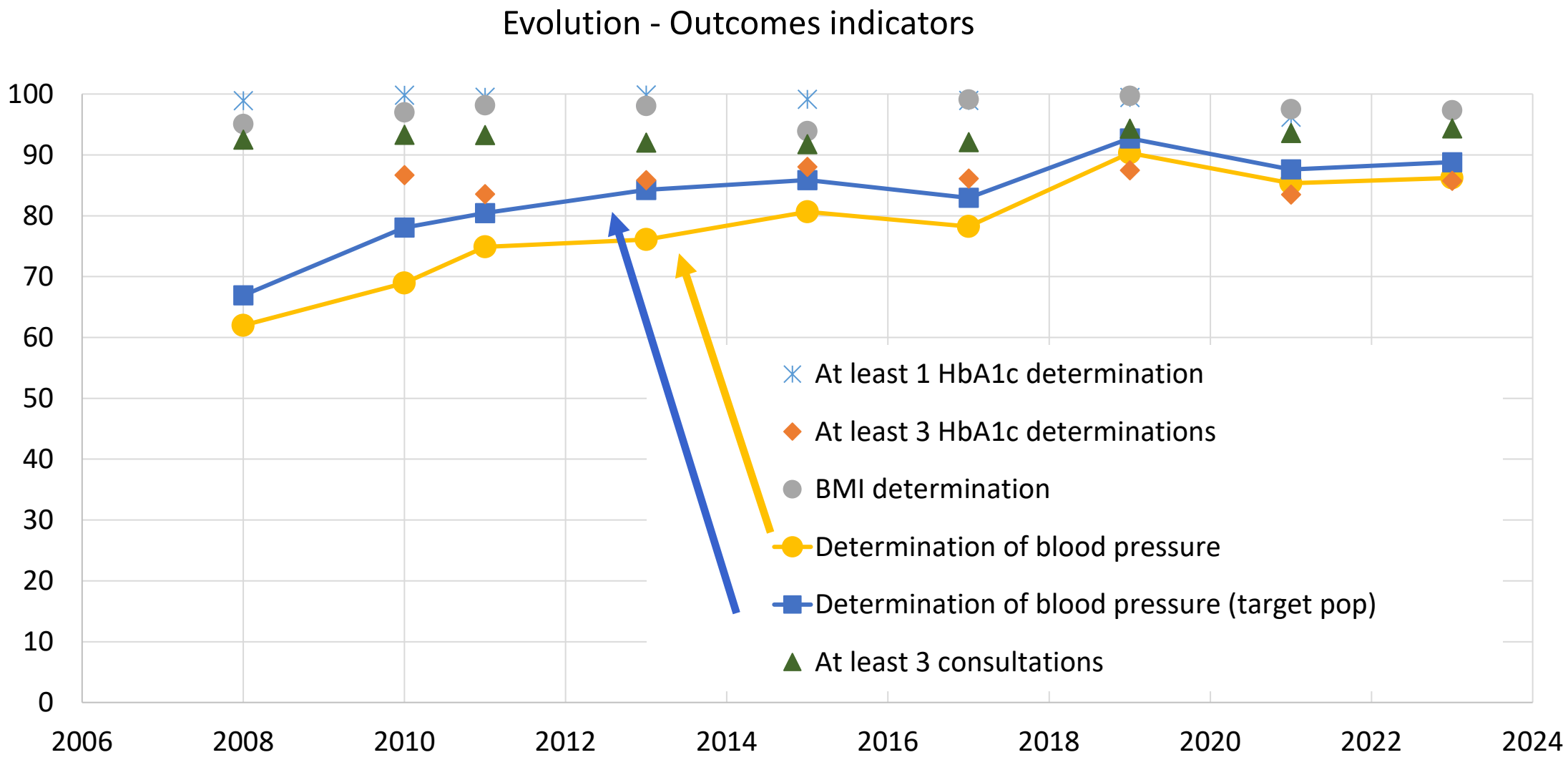


# Audit 2008-2023: Process indicators



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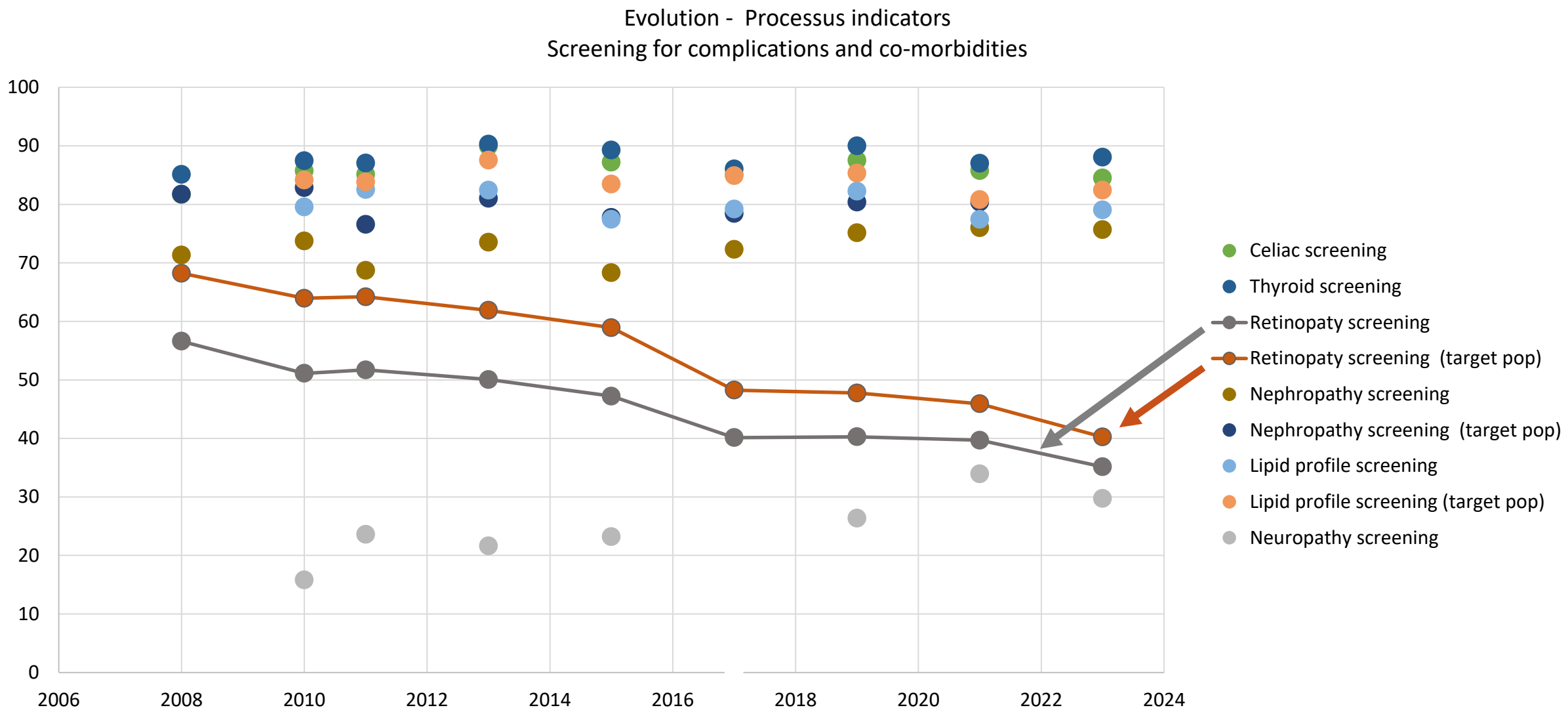
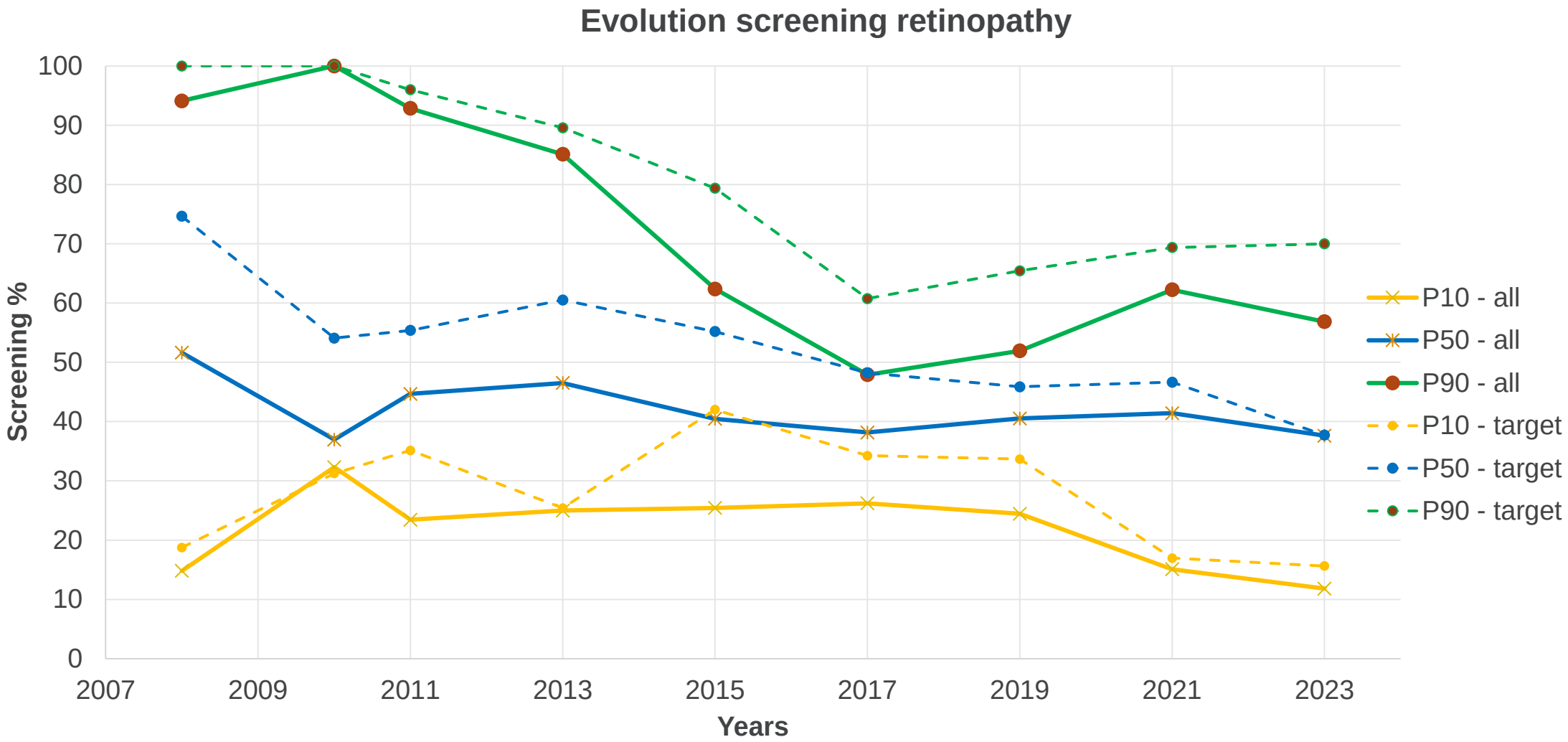
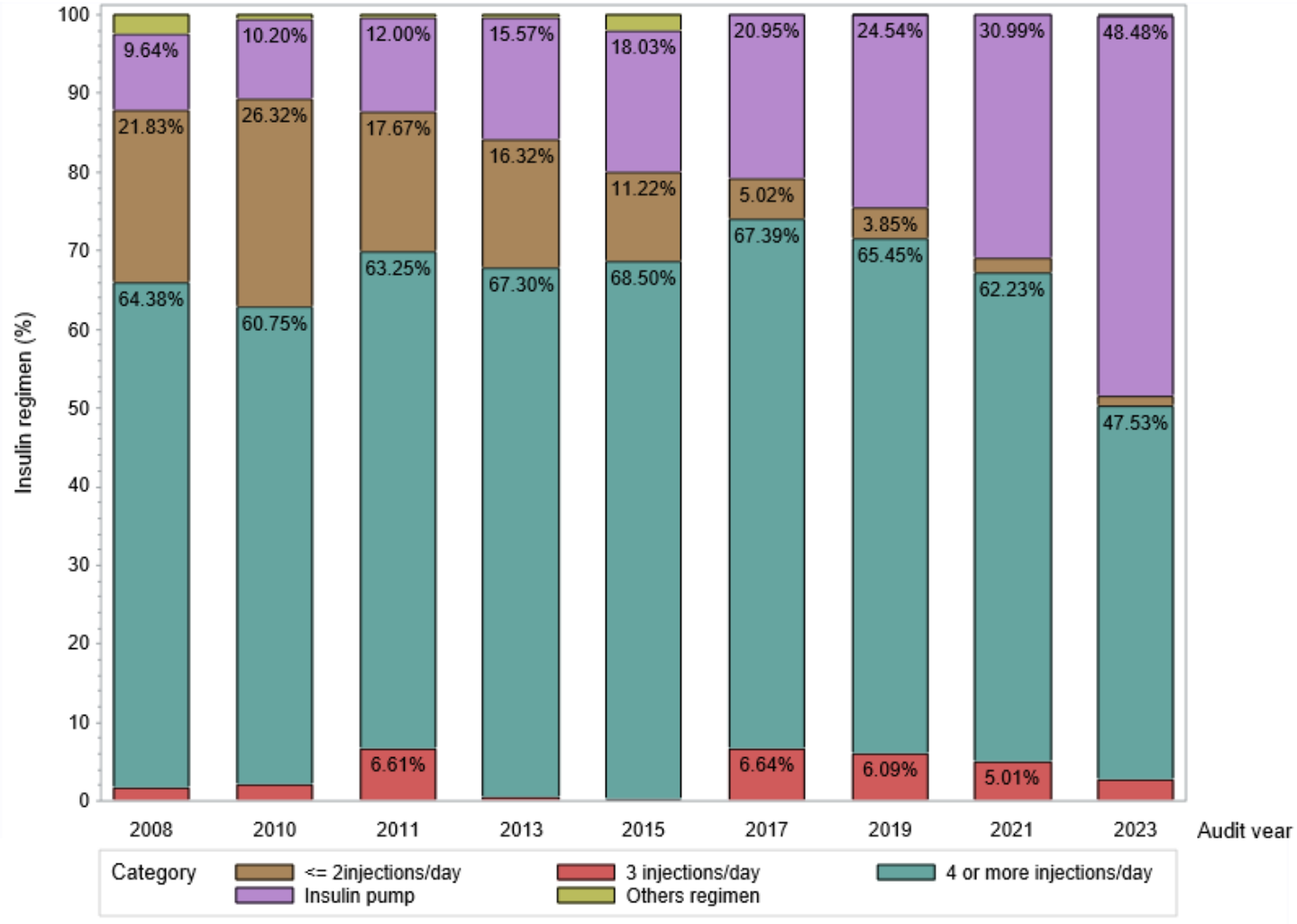


# Decrease in screening for retinopathy



# Insulin regimen evolution

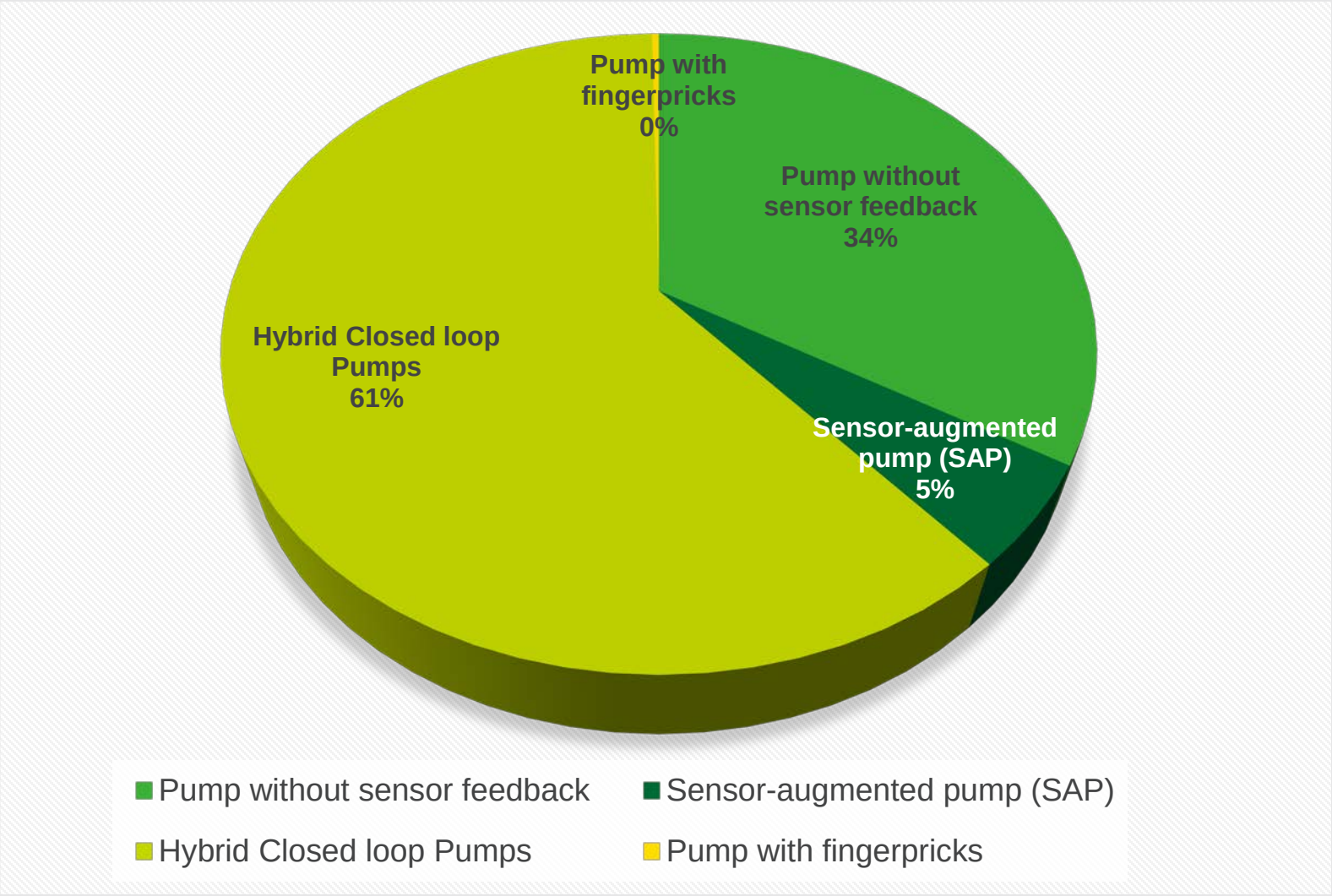



**Since 2008:**

- Increase of the use of the insulin pump.
- Decrease of the use of the “<2 inj/day”.
- The older the patient, the more intensive the treatment

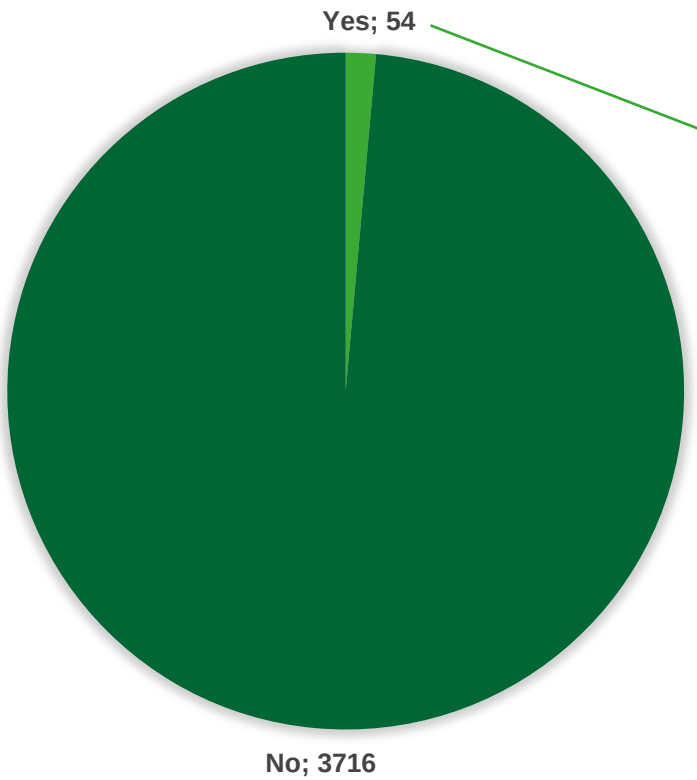
➔ Increase in the use of diabetes technologies associated with lower HbA1c. Use of a pump system was associated with the best HbA1c (adjusted for psychosocial-distress)

# Type of technology used (2023)

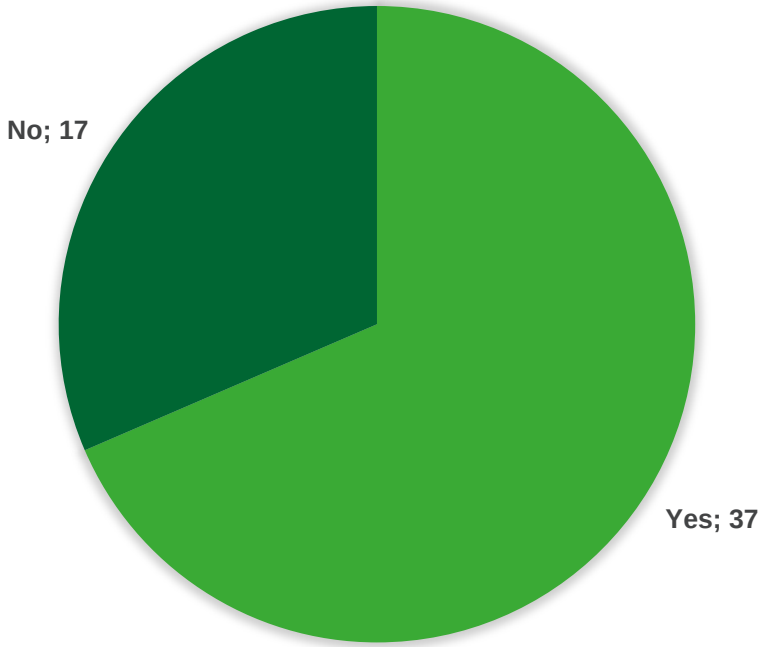


# Interventional clinical study (2023)

**HAS THE PATIENT EVER PARTICIPATED IN AN INTERVENTIONAL CLINICAL STUDY TO SLOW THE DEVELOPMENT OF DIABETES?**




**IN INTERVENTIONAL CLINICAL STUDY IN 2023 ?**

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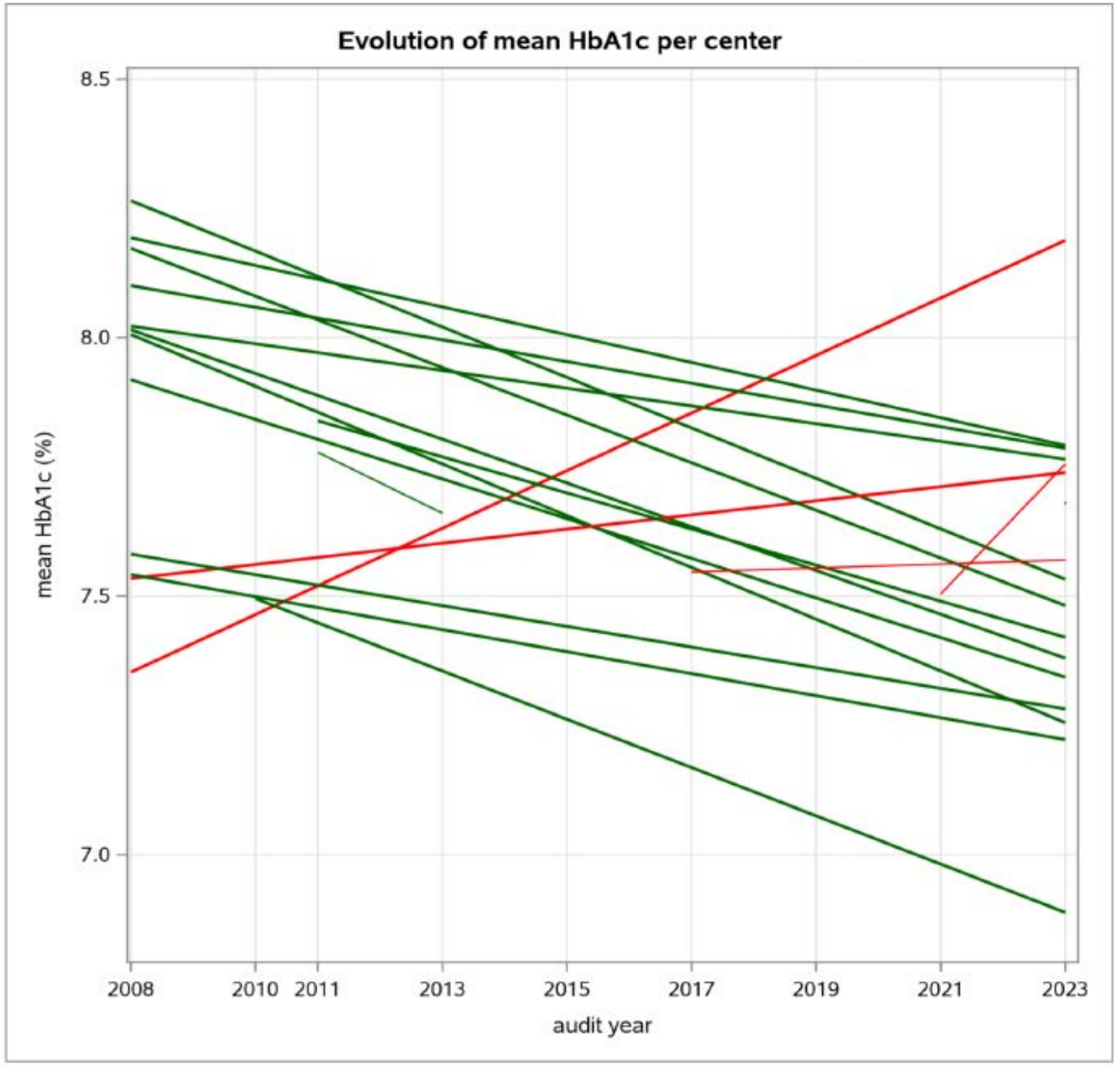
# HbA1c Evolution

- Available in your personalized feedback.
- An improvement in HbA1c was observed in 14 out of 17 centers.
- For 8 centers, this decrease was statistically significant (lines in **bold**)
- For 4 centers:
  HbA1c increased over time BUT had the lowest level in 2008.

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# Slido – scan the QR code to join

**Slido code: 291 291 4**

1. What is the ideal value of HbA1c in your center ?
2. What is the realistic value of HbA1c in your center ?
3. Is the HbA1c ideal value different in the different age groups ?
4. Do you think that all the members of your team has the same ideal value of HbA1c ?
5. How many times a year the patient has an appointment with the physician ?

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# Identifying Barriers to Better HbA1c Control

- Variation between pediatric diabetic center, particularly in terms of HbA1c

**Aims:**

- **Better understand the reasons for these variations**
- **Explore ways of remedying them wherever possible**
- Some centers have been contacted to discuss their current scores in order to better understand the possible reasons for not achieving better HbA1c control over time.

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# Identifying Barriers to Better HbA1c Control

The Hvidore Study Group on Chilhood Diabetes

Strategies that might be important in improving the quality of pediatric diabetes care

## Persistent Differences Among Centers Over 3 Years in Glycemic Control and Hypoglycemia in a Study of 3,805 Children and Adolescents With Type 1 Diabetes From the Hvidøre Study Group

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PHILIP HOUGAARD, PHD, DSC[3]
HELLE LYNGGAARD, MSC[3]
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MIRJANA KOCOVA, MD, PHD[13]
PEDRO MARTUL, MD, PHD[14]
NOBUO MATSUURA, MD, PHD[15]
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EUGEN J. SCHOENLE, MD, PHD[17]
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PETER G.F. SWIFT, MD, FRCP[19]
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FOR THE HVIDØRE STUDY GROUP ON CHILDHOOD DIABETES

*Diabetes Care* 24:1342–1347, 2001

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# Identifying Barriers to Better HbA1c Control

**The Hvidore Study Group on Chilhood Diabetes**

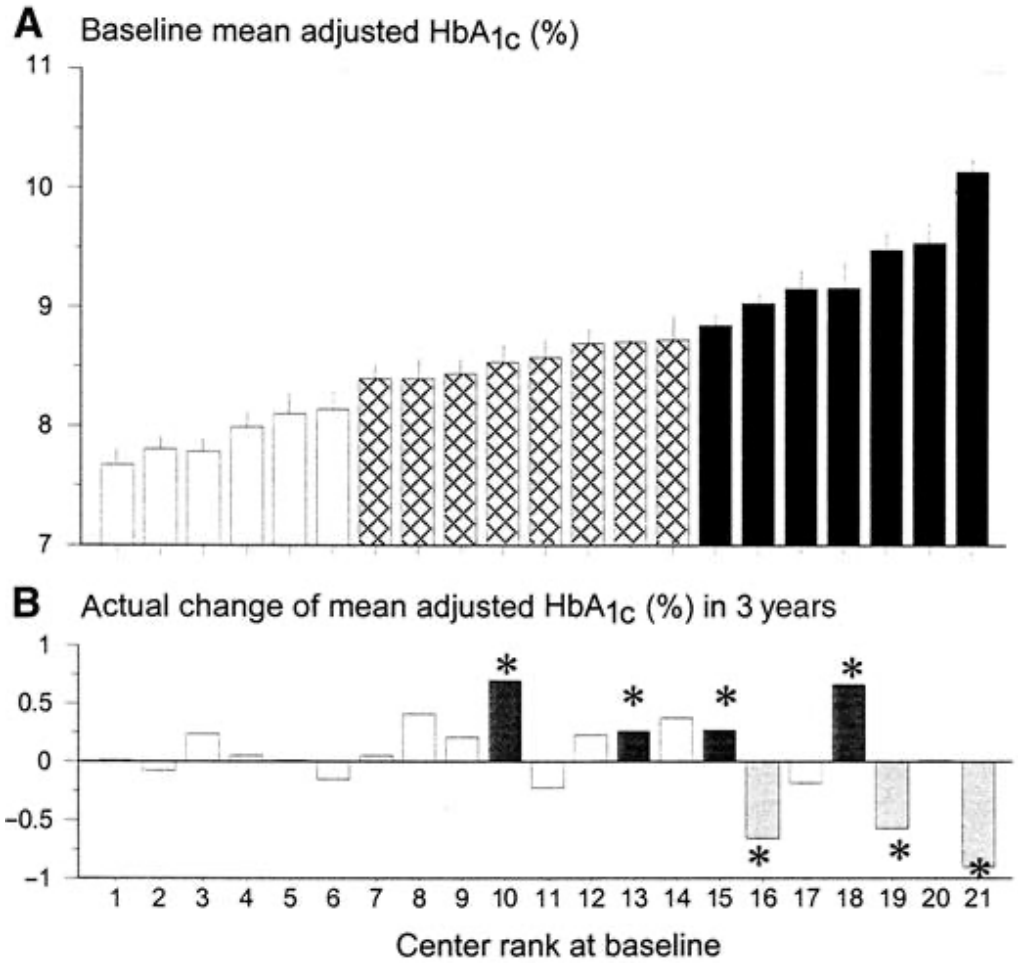
Post DCCT (conventional vs intensive treatment)

21 centers :

- 3-8 / 1995 : 2101 patients 11-18 y
- 3-9 / 1998 : 2040 patients 11-18 y

Mean HbA1c : 1995 = 8.62 % 1998 = 8.67 %
14 centers : no change
3 centers improved (2 with increased insulin dosis)
4 centers deteriorated (2 with increased insulin dosis)

Insulin dosis increased in 12 centers : no significant effect
Number of daily injections increased in 11 centers : no effect
BMI increased : 11/11 (injections increase) vs 6/10



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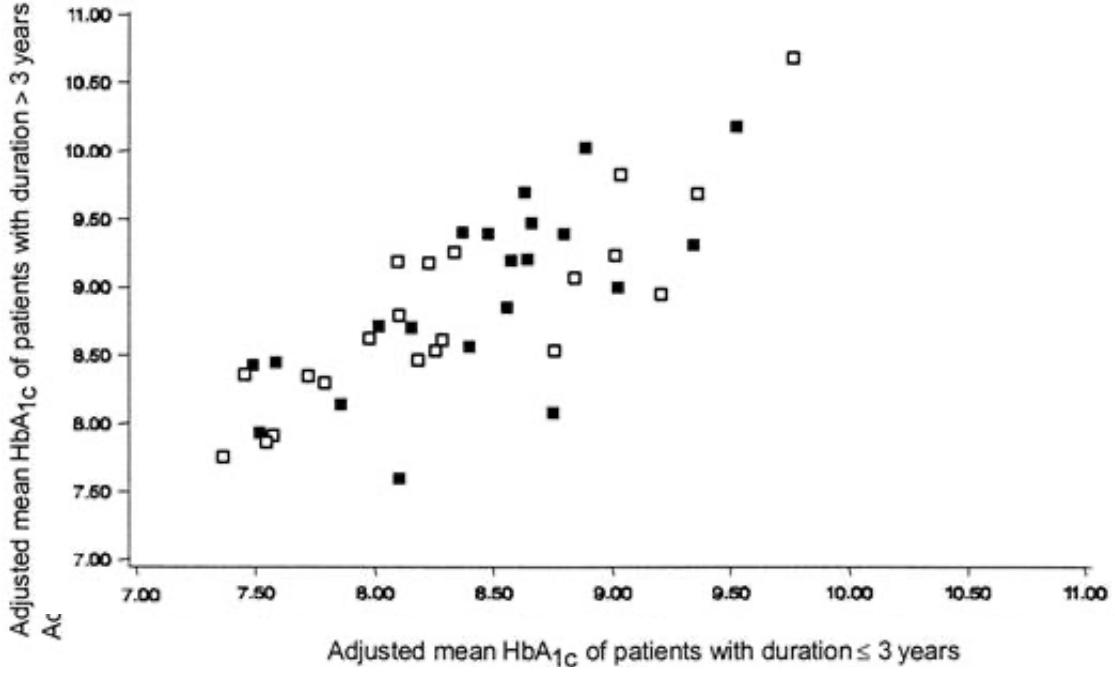
**The Hvidore Study Group on Chilhood Diabetes**

Post DCCT (conventional vs intensive treatment)

21 centers :

- 3-8 / 1995 : 2101 patients 11-18 y
- 3-9 / 1998 : 2040 patients 11-18 y

Better control in the first 3 years  shows a better long term control




**CONCLUSIONS :**

- Heterogeneity of T1D itself at onset (geographic location, HLA DR3, DR4 distributions,) : no association
- Ethnic or cultural differences  appear to be of lesser importance than other factors (eg : socioeconomic)
- Low socioeconomic level and minority status related to poor glycemic control
- Heterogeneity of patient populations (immigrants, minorities) : significant influence in some centers and not in others

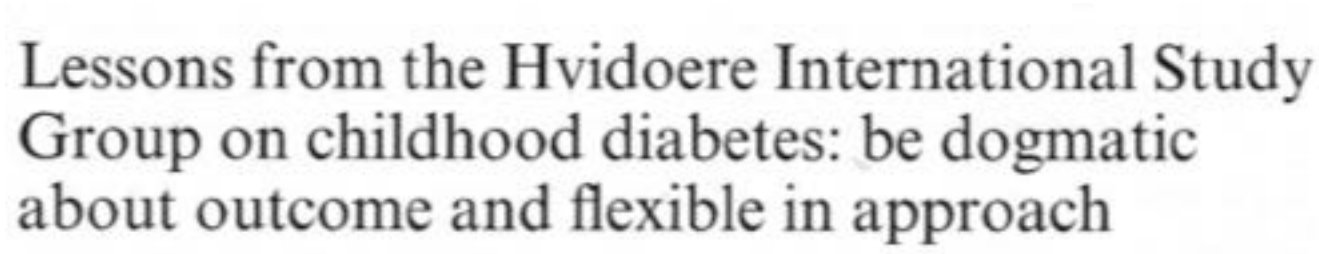
# Identifying Barriers to Better HbA1c Control

**The Hvidore Study Group on Chilhood Diabetes**

1998 : 2nd study

- Good metabolic control is associated with better quality of life among adolescents and their parents
- Adolescent girls, single parent families and ethnic minorities : poorer metabolic control and poorer QOL
- Better HbA1c associated with better QOL
- Overall mean HbA1c : 8.9 %
- Change to MDI = increased relative mean insulin dose, increased BMI
- 14 centers mean HBA1c unchanged; 3 improved and 4 deteriorated
- Centers with the lowest HbA1c values had the lowest rates of severe hypoglycemia and better QOL

# Identifying Barriers to Better HbA1c Control


Lessons from the Hvidoere International Study Group on childhood diabetes: be dogmatic about outcome and flexible in approach

Cameron FJ, de Beaufort C, Aanstoot H-J, Hoey H, Lange K, Castano L, Mortensen HB, the Hvidoere International Study Group. Lessons from the Hvidoere International Study Group on childhood diabetes: be dogmatic about outcome and flexible in approach.
Pediatric Diabetes 2013: 14: 473–480.

Lessons for team leaders :
***change is difficult***

Lessons for individual doctors :
***it's not what you do, it's how you do it***

Lessons for members of teams :
***unanimity of purpose is everything***

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# Identifying Barriers to Better HbA1c Control

Table 2. Percentage of professionals in each centre team reporting HbA1c target range for centre

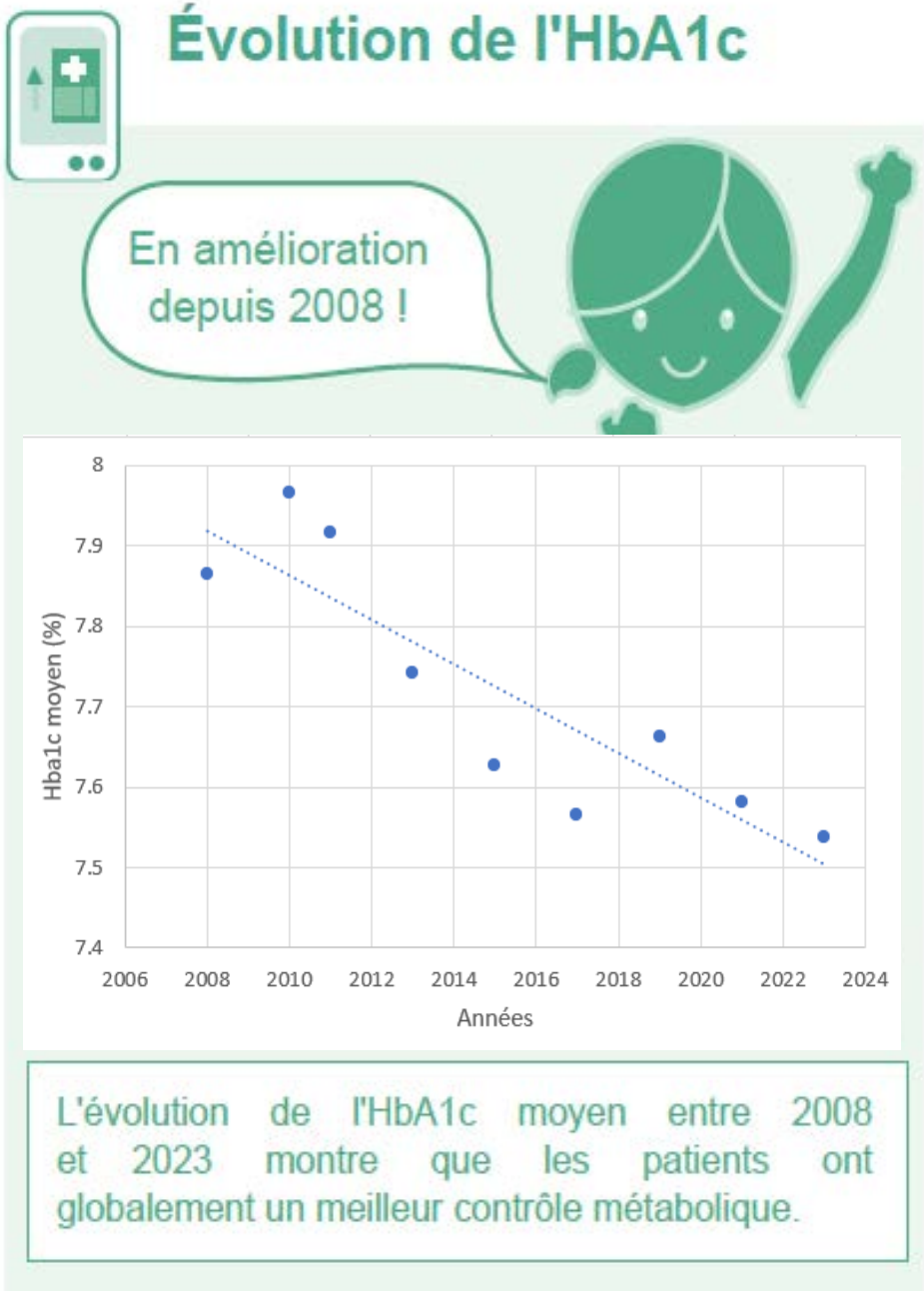
| Centre mean HbA1c (SD) | Target <7.0 (%) | 7.0–7.4 (%) | 7.5–7.9 (%) | 8.0–9.0 (%) | No specific target (%) | Number of team members completing | Number of adolescents completing |
|---|---|---|---|---|---|---|---|
| 7.4 (1.1) | 100 | | | | | 8 | 142 |
| 7.6 (1.1) | 100 | | | | | 3 | 124 |
| 7.7 (1.1) | 20 | 40.0 | 40 | | | 5 | 68 |
| 7.7 (1.2) | | 100 | | | | 5 | 129 |
| 7.8 (1.1) | 17 | 83 | | | | 6 | 191 |
| 7.9 (1.1) | | | 57 | 43 | | 7 | 104 |
| 8.0 (1.4) | 53 | 43 | 6 | | | 22 | 192 |
| 8.0 (1.2) | | 100 | | | | 2 | 28 |
| 8.1 (1.2) | | 100 | | | | 7 | 84 |
| 8.2 (1.2) | | 60 | 40 | | | 6 | 78 |
| 8.2 (1.1) | | 40 | 40 | 10 | 10 | 10 | 200 |
| 8.2 (1.3) | 33 | 44 | 22 | | | 10 | 100 |
| 8.3 (1.2) | 20.0 | 60 | | 20 | | 5 | 78 |
| 8.4 (1.7) | | 60 | 20 | 20 | | 5 | 119 |
| 8.4 (1.3) | | 80 | 20 | | | 7 | 92 |
| 8.6 (1.6) | | 20 | 20 | 60 | | 7 | 65 |
| 8.8 (1.7) | | 33 | 44 | 22 | | 9 | 101 |
| 8.8 (1.6) | | | | 100 | | 6 | 66 |
| 8.8 (1.2) | | | 75 | 25 | | 9 | 86 |
| 9.0 (1.4) | | | 60 | 20 | 20 | 8 | 109 |
| 9.1 (2.0) | | 20 | 60 | 20 | | 5 | 113 |

# HbA1c Evolution

- **<u>Recommended cut-offs over time:</u>**

- 2005 : < 6 years : 7.5-8.5 %
  6-12 years : < 8 %
  13-19 years : < 7.5 %

- 2015 : < 7.5 % may be appropiate accross all pediatric age group
- 2018 : < 7% (and < 6.5 % for selected patients)
- 2022 : preschool children who have access to modern diabetes care can safely achieve hbA1c < 6.5 %
- 2024 : HbA1c target of ≤6.5% for those who can safely reach that target with the support of advanced technologies (CGM and AID) and/or where the pursuit of the lower target does not add burden such that quality of life is impacted.



# Barriers to HbA1c Improvement – Identified Themes

### Healthcare System Factors

- High workload and administrative burden on care teams
- Possible changes in HbA1c targets over time
- Less frequent screening and follow-up of secondary outcomes

### Healthcare Provider Factors

- Understaffing (doctor & nurse shortages, sick/maternity leaves)
- High staff turnover impacting follow-up
- Hesitancy to use insulin pumps in high-HbA1c patients *(+/- 29% vs. 45% in the other centers*)
- Time-consuming coordination with external stakeholders (schools, social services)

### Patient Factors

- High % of teenagers → adherence challenges, engagement difficulties
- Early transfer of responsibility from parents to children
- High % of patients with learning difficulties/mental health concerns
- Language barriers affecting communication *(3x higher than average in one cente*r), non Caucasian ethnicity (*twice as high as the average in one center)*
- Highest rates of overweight/obesity (in P90)
- Low motivation or "technology fatigue" (loss of enthusiasm for CGM)?
- Misuse or misunderstanding of pump functions (e.g. Medtronic correction boluses)

# Conclusion

1. HbA1c improves over time in Belgium
2. Insulin regimen evolution: pump regimen improves HbA1c
3. Some centers have difficulties to improve HbA1c but they can !!
4. COVID 19  pandemic has modified the incidence of T1D in children
5. Overweight is still an issue.

# The End


- Presentations are available on our Sciensano website