Nearly Half of Children with New-Onset Type 1 Diabetes Do Not Receive Autoantibody Testing, Though Rates Are Rising

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Key Findings:

- Among children newly diagnosed with type 1 diabetes, 54.5% underwent at least one autoantibody test during the six months before or after the diagnosis. Of those tested, 70.6% had at least one positive result and 44.6% tested positive for two or more autoantibodies.
- Among autoantibody tests performed for children diagnosed in 2025, GAD65 had the highest positivity rate at 61.7%, followed by ZnT8 at 60.6%, and IA-2 at 56.1%. Insulin autoantibody positivity was the lowest at 24.3%.
- Testing before diagnosis has remained uncommon but nearly doubled between 2017 and 2025, with GAD65 rising from 2.4% in 2017 to 4.2% in 2025. Similar increases were seen across all five autoantibodies studied.
- Testing after diagnosis also rose across all autoantibodies; GAD65, the most common, climbed from 31.2% in 2017 to 46.6% in 2025, while ZnT8 saw the steepest increase, from 3.3% to 35.1%.

Type 1 diabetes is one of the most common chronic diseases in children,[1] driven by an autoimmune process in which the body's immune system attacks and destroys the insulin-producing cells of the pancreas. This attack can be detected through blood tests for islet autoantibodies, which are proteins that indicate the immune system is targeting the pancreas. The American Diabetes Association (ADA) began recommending measuring the four of these autoantibodies (GAD65, IA-2, insulin, and ZnT8) in 2025 to confirm an autoimmune cause and distinguish type 1 diabetes from other forms.[2,3] Confirming the autoimmune basis of diabetes matters because treatment and monitoring differ by diabetes type, and because an estimated 10–15% of children clinically diagnosed with type 1 diabetes test negative for all measured autoantibodies, a result that can prompt evaluation for monogenic or other non-autoimmune diabetes.[4] Confirming autoimmune status is increasingly important as teplizumab has been approved to delay the progression from early-stage type 1 to clinical type 1 diabetes in autoantibody-positive individuals.[5] Despite the clinical value of autoantibody testing, real-world testing practices might vary, and the extent to which children newly diagnosed with type 1 diabetes receive this workup is not well described.

We studied 68,439 children newly diagnosed with type 1 diabetes between January 2017 and December 2025. We measured how often the four ADA-recommended autoantibodies plus islet cell antibodies, an older test, were tested in the six months before and after diagnosis, the share of tests that were positive, and the number of positive autoantibodies per child.

Of the children studied, 54.5% had at least one autoantibody test in the six months before through six months after diagnosis, while 51.2% were never tested for any autoantibody. This might somewhat understate the gap, since some results are returned as free text or scanned documents rather than discrete values and would not be counted here. Among the children who were tested, 70.6% had at least one positive result and 44.6% were positive for two or more autoantibodies.

Autoantibody Testing and Positivity Rate Among Children with Type 1 Diabetes

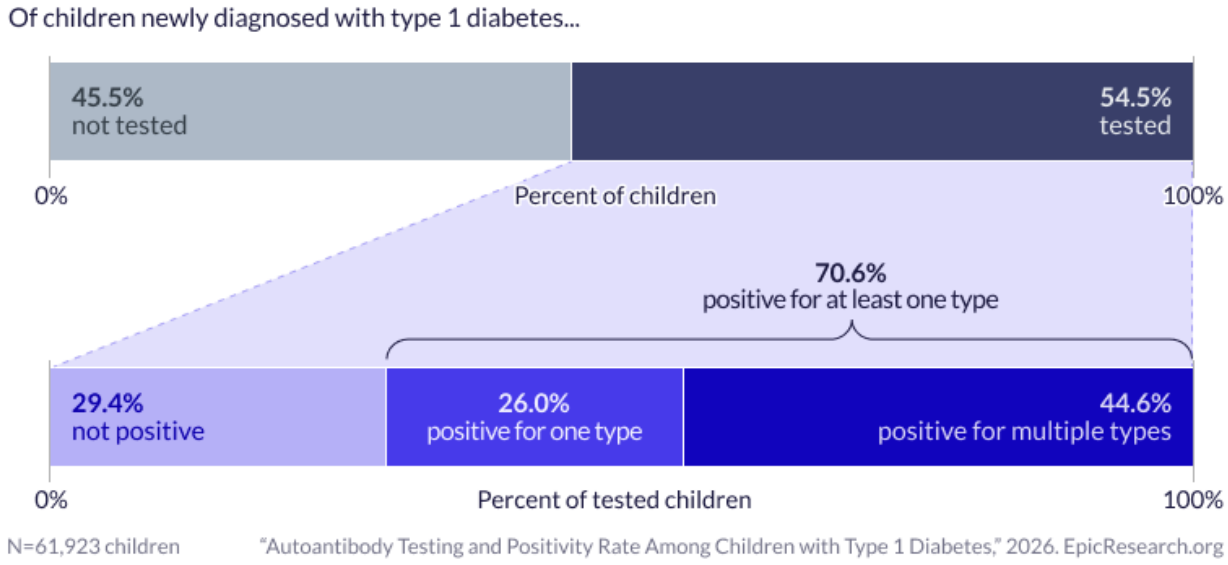

Figure 1. The share of autoantibody testing among children with new-onset type 1 diabetes and the positivity rate of those who were tested.

Among autoantibody tests performed for children diagnosed in 2025, positivity varied by type. GAD65 had the highest positivity rate at 61.7%, followed closely by ZnT8 at 60.6% and IA-2 at 56.1%. Islet cell antibodies were positive in 31.4% of tests and insulin autoantibodies in 24.3%. Indeterminate results occurred among 13.7% of insulin autoantibody tests, which might reflect known challenges with insulin autoantibody assay standardization.[6] These patterns underscore the importance of testing for multiple autoantibodies because no single test identifies every child with autoimmune diabetes.

Autoantibody Positivity Among Children Diagnosed in 2025

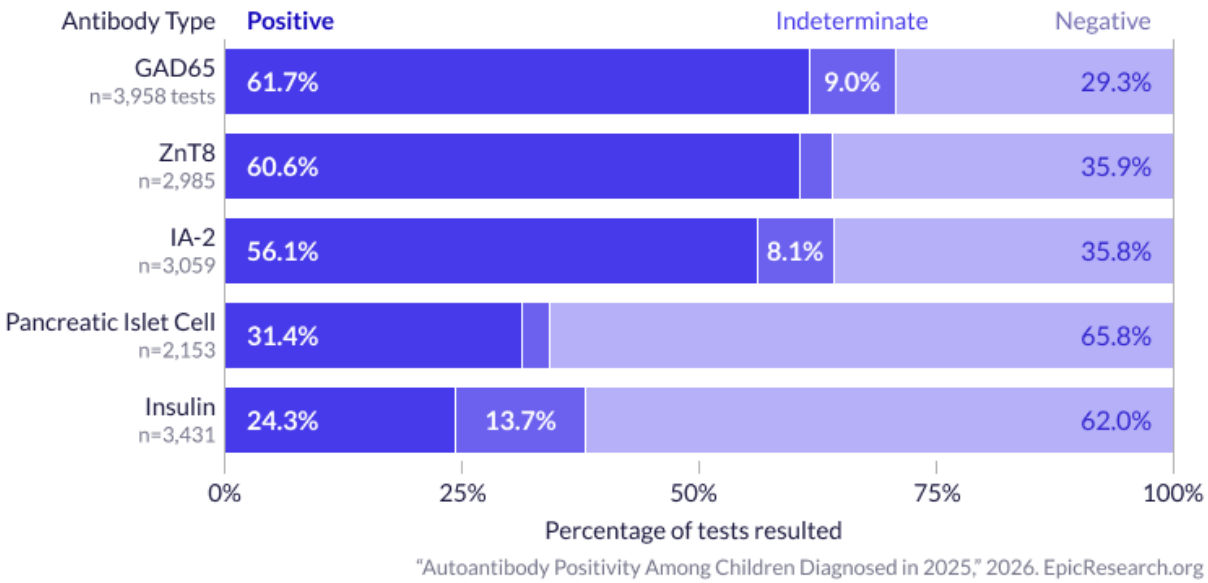

Figure 2. Positivity rates for each autoantibody test performed for children with new-onset type 1 diabetes diagnosed in 2025.

Autoantibody testing has risen over time, both before and after diagnosis. Before diagnosis, testing remains uncommon but is trending upward across all five autoantibodies. In 2017, 2.4% of children were tested for GAD65 before their type 1 diabetes diagnosis; by 2025, that share had nearly doubled to 4.2%. Insulin autoantibody testing before diagnosis grew from 1.9% to 3.6%, IA-2 from 1.2% to 3.1%, ZnT8 from 0.4% to 3.3%, and pancreatic islet cell antibodies from 0.8% to 1.9% over the same period. These rising pre-diagnosis testing rates may reflect growing awareness of type 1 diabetes risk screening programs and the availability of therapies for individuals identified in early disease stages.[5]

Autoantibody Testing Before Type 1 Diabetes Diagnosis

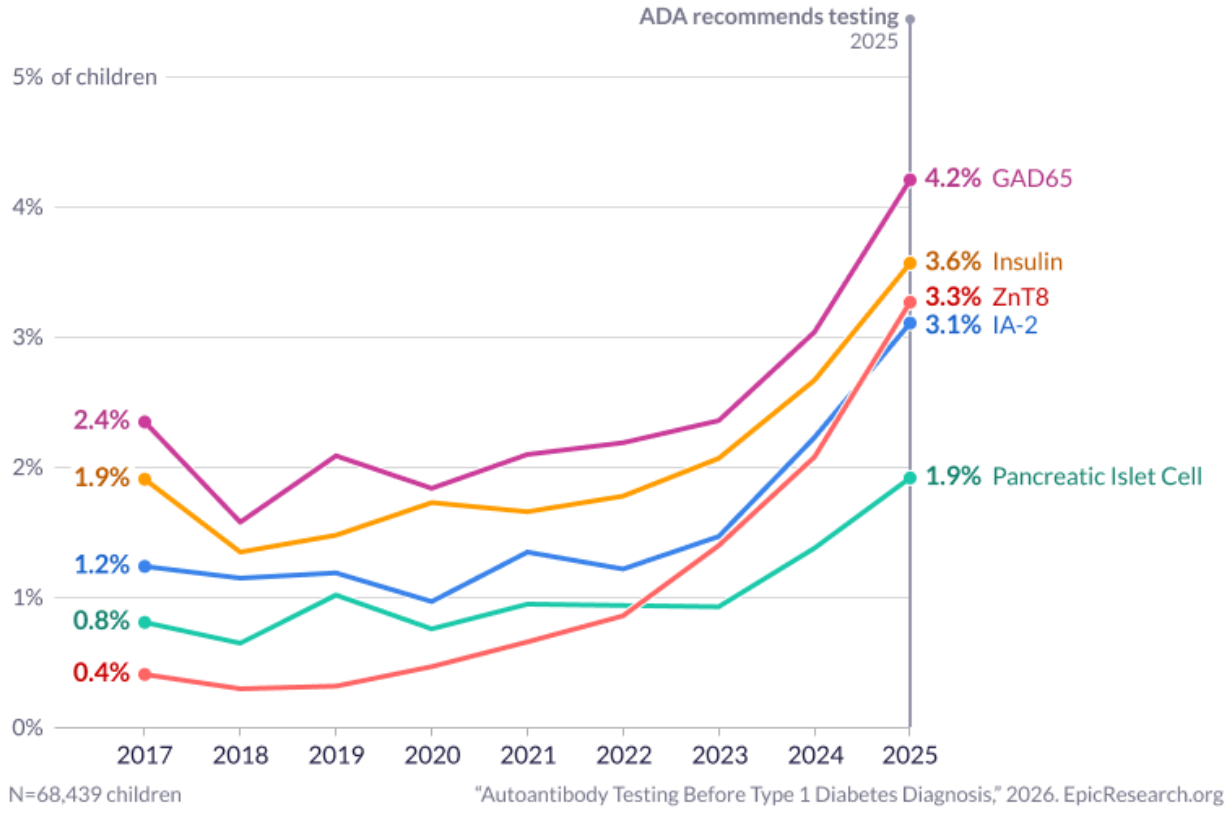

Figure 3. Percentage of children tested for each autoantibody in the six months preceding their type 1 diabetes diagnosis date, by year of diagnosis (2017–2025).

Testing after diagnosis is far more common and has also increased. GAD65 remained the most frequently ordered autoantibody, yet even among children diagnosed in 2025, fewer than half (46.6%) were tested for it after diagnosis, up from 31.2% in 2017. Insulin autoantibody testing rose from 24.9% to 40.4%, IA-2 rose from 22.4% to 36.3%, and islet cell antibodies from 7.6% to 23.3%. ZnT8 testing showed the most dramatic growth, climbing from 3.3% in 2017 to 35.1% by 2025.

Autoantibody Testing After Type 1 Diabetes Diagnosis

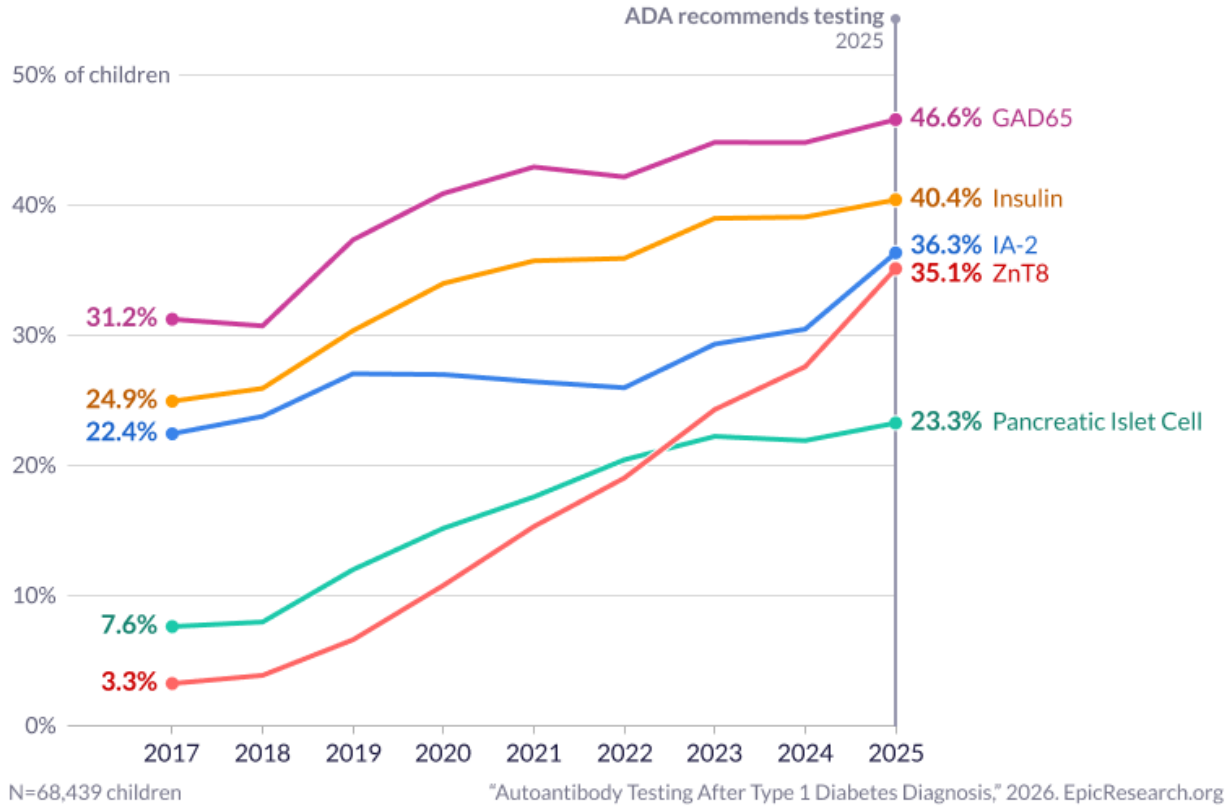

Figure 4. Percentage of children tested for each autoantibody in the six months following their type 1 diabetes diagnosis date, by year of diagnosis (2017–2025).

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 310 million patient records from 2,200 hospitals and more than 50,000 clinics from all 50 U.S. states, Canada, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientist. The two teams came to similar conclusions. Graphics by Brian Olson.

References

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Data Definitions

Term	Definition
Study period	1/1/2017 to 12/31/2025 with follow up through 6/1/2026
Study population: inclusion	Patients with: • The first diagnosis of **type 1 diabetes** before age 18, which is not from the problem list unless a non-problem list diagnosis exists within six months • An **outpatient face-to-face encounter** at least six months prior to **index date** • An **outpatient face-to-face** encounter between six months after **index date** and end of the **study period** • For testing rate outcome, the department which added the index **type 1 diabetes** diagnoses must have had a prior submission of one of the **diabetes autoantibody lab tests**
Study population: exclusion	Patients who have two diagnoses of **type 2 diabetes** prior to their first diagnosis of **type 1 diabetes**
Index date	Date of first **type 1 diabetes** diagnosis
Outcomes	The rate of **diabetes autoantibody lab testing** six months prior to **index date** The rate of **diabetes autoantibody lab testing** six months after the **index date** **Lab positivity** rates
Type 1 diabetes	A diagnosis with ICD-10-CM code E10* or SNOMED CT code 46635009
Outpatient face-to-face encounter	An encounter with a type of Office Visit, Well Child, Follow-up, or Telemedicine
Type 2 diabetes	A diagnosis with ICD-10-CM code E11* or SNOMED CT code 44054006
Diabetes autoantibody lab test	GAD65: LOINC 94345-6, 72523-4, 83004-2, 94699-6, 101233-5, 56540-8, 81725-4, 30347-9, 58451-6, 13926-1, 111335-6 (excluding those with a source from cerebral spinal fluid) Insulin Ab: LOINC codes 8072-1, 2481-0 2482-8, 60463-7, 11087-4, 56546-5, 5232-4, 8074-7 IA-2: LOINC codes 31209-0, 81155-4, 56718-0, 70252-2, 70253-0, 32636-3 ZnT8: LOINC code 76651-9 Pancreatic islet cell Ab: labs with LOINC code 8086-1, 31547-3, 34652-8, 13927-9, 33563-8, 45225-0, 45171-6, 5265-4, 56687-7
Test positivity	Positivity is assessed by cascading the following conditions and using the first that applies: • Abnormality o If the lab's abnormal value is set (1 or 0) we used that • Value

	○ If the lab has a string result that reflects a positive or negative result, we used that • Numeric value meeting defined threshold ○ An IA-2 numeric value: > 10 was positive ○ A ZnT8 numeric value: < 10 was negative, >= 15 was positive. • Lab with a numeric value that was greater than its upper reference value was positive
Model specifications	Descriptive statistics
Limitations	Autoantibody tests performed outside the health systems contributing to the Cosmos dataset might not be captured or are returned in a way that we could not use (in a PDF, not mapped to LOINC, free text, etc.), potentially underestimating true testing rates; however, nearly all children in the study had some form of lab result after diagnosis, suggesting the gap in autoantibody testing reflects ordering patterns rather than a loss to follow-up. Excluding departments that don't have any results helps mitigate this missingness but also excludes departments that legitimately did not test patients, which could potentially overestimate the overall testing rate. The study relied on available lab data to determine positivity, and variations in assay methodology across institutions may affect comparability.

Table 1. Baseline Characteristics of the Study Population

Characteristic	Category	Count (Overall N=68,439)	%
Sex	Male	35,824	52.3
	Female	31,613	46.2
	Other	1,002	1.5
Age at diagnosis	<4	5,250	7.7
	4–10	26,419	38.6
	11–15	30,189	44.1
	16+	6,581	9.6
Race	Black	12,433	18.2
	Non-Black	56,006	81.8
Ethnicity	Hispanic	9,450	13.8
	Non-Hispanic	58,989	86.2
Rurality (RUCA)	Metropolitan	56,495	82.6
	Micropolitan	5,982	8.7
	Small Town	3,026	4.4
	Rural	1,870	2.7
	Other	1,066	1.6
Social Vulnerability Index	<0.2	9,745	14.2
	0.2–<0.4	12,007	17.5
	0.4–<0.6	11,702	17.1
	0.6–<0.8	14,151	20.7

	≥0.8	19,897	29.1
	Other	937	1.4
Subsequent T2D diagnosis	Yes	19,445	28.4
	No	48,994	71.6

Table 2. Autoantibody Testing and Positivity Rate Among Children with Type 1 Diabetes

Category	Patients (N)	% of Lab Population
Not tested for any autoantibody	28,205	45.5
Tested, no positive results	9,924	16.0
1 positive autoantibody	8,764	14.2
At least 2 positive autoantibodies	15,030	24.3%

Table 3. Autoantibody Positivity Among Children Diagnosed in 2025

Autoantibody	Tested (N)	Positive (n)	% Positive	Indeterminate (n)	% Indeterminate	Negative (n)	% Negative
GAD65	3,958	2,441	61.7	358	9.0	1,159	29.3
IA-2	3,059	1,717	56.1	248	8.1	1,094	35.8
Insulin	3,431	835	24.3	470	13.7	2,126	62.0
ZnT8	2,985	1,810	60.6	103	3.5	1,072	35.9
Pancreatic islet cell	2,153	676	31.4	61	2.8	1,416	65.8

Table 4. Autoantibody Testing Before Type 1 Diabetes Diagnosis

Autoantibody	Year	Patients (N)	Tested (n)	% Tested
GAD65	2017	4,671	110	2.4
	2018	6,000	95	1.6
	2019	6,160	129	2.1
	2020	7,514	138	1.8
	2021	9,534	200	2.1
	2022	8,499	186	2.2
	2023	8,690	205	2.4
	2024	9,872	300	3.0
	2025	7,499	316	4.2
IA-2	2017	4,671	58	1.2
	2018	6,000	69	1.2
	2019	6,160	73	1.2
	2020	7,514	73	1.0
	2021	9,534	129	1.4
	2022	8,499	104	1.2

	2023	8,690	128	1.5
	2024	9,872	220	2.2
	2025	7,499	233	3.1
Insulin	2017	4,671	89	1.9
	2018	6,000	81	1.4
	2019	6,160	91	1.5
	2020	7,514	130	1.7
	2021	9,534	158	1.7
	2022	8,499	151	1.8
	2023	8,690	180	2.1
	2024	9,872	264	2.7
	2025	7,499	268	3.6
ZnT8	2017	4,671	19	0.4
	2018	6,000	18	0.3
	2019	6,160	20	0.3
	2020	7,514	35	0.5
	2021	9,534	63	0.7
	2022	8,499	73	0.9
	2023	8,690	122	1.4
	2024	9,872	205	2.1
	2025	7,499	245	3.3
Pancreatic islet cell	2017	4,671	38	0.8
	2018	6,000	39	0.7
	2019	6,160	63	1.0
	2020	7,514	57	0.8
	2021	9,534	91	1.0
	2022	8,499	80	0.9
	2023	8,690	81	0.9
	2024	9,872	136	1.4
	2025	7,499	144	1.9

Table 5. Autoantibody Testing After Type 1 Diabetes Diagnosis

Autoantibody	Year	Patients (N)	Tested (n)	% Tested
GAD65	2017	4,671	1,459	31.2
	2018	6,000	1,843	30.7
	2019	6,160	2,300	37.3
	2020	7,514	3,073	40.9
	2021	9,534	4,094	42.9
	2022	8,499	3,585	42.2
	2023	8,690	3,895	44.8
	2024	9,872	4,424	44.8
	2025	7,499	3,493	46.6
IA-2	2017	4,671	1,048	22.4
	2018	6,000	1,427	23.8
	2019	6,160	1,666	27.0

	2020	7,514	2,028	27.0
	2021	9,534	2,521	26.4
	2022	8,499	2,207	26.0
	2023	8,690	2,549	29.3
	2024	9,872	3,009	30.5
	2025	7,499	2,725	36.3
Insulin	2017	4,671	1,165	24.9
	2018	6,000	1,556	25.9
	2019	6,160	1,870	30.4
	2020	7,514	2,554	34.0
	2021	9,534	3,406	35.7
	2022	8,499	3,052	35.9
	2023	8,690	3,388	39.0
	2024	9,872	3,859	39.1
	2025	7,499	3,030	40.4
ZnT8	2017	4,671	152	3.3
	2018	6,000	232	3.9
	2019	6,160	407	6.6
	2020	7,514	811	10.8
	2021	9,534	1,460	15.3
	2022	8,499	1,618	19.0
	2023	8,690	2,112	24.3
	2024	9,872	2,724	27.6
	2025	7,499	2,634	35.1
Pancreatic islet cell	2017	4,671	356	7.6
	2018	6,000	479	8.0
	2019	6,160	739	12.0
	2020	7,514	1,141	15.2
	2021	9,534	1,677	17.6
	2022	8,499	1,737	20.4
	2023	8,690	1,933	22.2
	2024	9,872	2,163	21.9
	2025	7,499	1,744	23.3