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ORIGINAL RESEARCH

Normal glucose tolerance with elevated one-hour post-load plasma glycemia shows reduced β-cell function similar to impaired glucose tolerance - Evidence review

Dott. A. Colonnese[1]

1 Nutritional Biologist, Italy

1. ABSTRACT

The original study compared Korean adults with normal glucose tolerance, distinguishing those with a one-hour plasma glucose level after an oral glucose tolerance test of 155 mg/dL or higher from those with lower values, and including a group with impaired glucose tolerance. The results indicate that the first group had lower pancreatic β-cell function indices adjusted for insulin sensitivity compared to normoglycemic individuals with lower one-hour glycemia, and similar to those observed in the group with impaired glucose tolerance.In the section "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi, the study contributes to the narrative that a marked postprandial glycemic excursion can reveal an early loss of the pancreatic capacity to adapt insulin secretion. Independent studies, conducted in overweight youth, high-risk adults, and prospective cohorts, support the association between elevated one-hour glycemia, poorer β-cell function, and higher future incidence of type 2 diabetes. However, the cross-sectional nature of the original study does not prove that the glycemic value causes diabetes; furthermore, the optimal threshold may differ among populations.

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2. ANALYZED STUDY

The research question was whether, among individuals who are still considered normal according to conventional oral glucose tolerance test criteria, elevated glycemia one hour after glucose intake already identifies an unfavorable metabolic profile. The hypothesis was that the subgroup with one-hour glycemia equal to or greater than 155 mg/dL had a reduced capacity of pancreatic beta cells to produce insulin in proportion to the body's needs.This question is relevant to the section "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi because it concerns the passage stating that some apparently normoglycemic people may already have pancreatic function similar to that observed in impaired glucose tolerance. The analyzed study documents this specific link in the chain: elevated one-hour glycemia during the test lower beta-cell function relative to insulin sensitivity. However, it cannot establish whether this alteration directly causes future diabetes, as it did not follow the participants over time.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

This is a cross-sectional study, meaning it is a comparison performed at a single point in time rather than a follow-up. Researchers recruited individuals aged between 30 and 80 years through local advertisements. Subjects undergoing treatment for diabetes, hypertension, hyperlipidemia, or obesity, as well as pregnant women, were excluded.Of the 280 people who underwent a 75 g oral glucose tolerance test, 192 with normal glucose tolerance and 52 with impaired glucose tolerance were included in the analysis. The 192 normoglycemic participants were divided into 149 with a one-hour glycemia below 155 mg/dL and 43 with a one-hour glycemia equal to or greater than 155 mg/dL.During the test, fasting glucose and insulin levels were measured, as well as levels at 30, 60, 90, and 120 minutes. Indirect indices of insulin resistance and insulin sensitivity—the body's ability to respond to insulin—were calculated. The oral disposition index and ISSI-2 were also estimated; the latter is an index that combines insulin secretion and insulin sensitivity, where lower values indicate that beta cells are less adequately compensating for insulin demand. The analyses were adjusted for sex and body mass index, as these factors differed between the groups.

4. RESULTS

Participants with normal glucose tolerance but elevated one-hour glycemia had a mean fasting glycemia of 89.1 mg/dL, compared to 85.6 mg/dL in the group with lower one-hour glycemia. One-hour glycemia was 182.6 mg/dL and 115.3 mg/dL, respectively; both comparisons between the three groups were statistically significant, with $P<0.001$. The group with impaired glucose tolerance had even higher mean values at fasting, 93.7 mg/dL, and at one hour, 195.2 mg/dL.The most relevant result for the book section concerns pancreatic function adjusted for insulin sensitivity. The oral disposition index and ISSI-2 were significantly different between the three groups; after pairwise comparisons between groups, both indices were lower in the normoglycemic group with elevated one-hour glycemia compared to the normoglycemic group with lower glycemia. The authors also report that these indices in the group with elevated one-hour glycemia were similar to those of the group with impaired glucose tolerance.In practical terms, the data indicate a reduced ability to effectively increase insulin secretion when glucose levels rise. The isolated insulin secretion indices at 30 or 60 minutes, HOMA-b, and HOMA-IR did not differ significantly between the groups. This is important: the difference emerged primarily when the β-cell response was interpreted in conjunction with insulin sensitivity. The complete numerical values of the indices present in the tables are not reported in the provided material.

5. INTERPRETATION

After a glucose load, beta cells should rapidly increase insulin secretion in a manner appropriate to tissue sensitivity. If muscles and the liver respond less effectively to insulin, the pancreas must compensate by producing more; if it fails to compensate, blood glucose levels rise significantly. The disposition index and ISSI-2 are specifically used to describe this relationship, rather than just the absolute amount of insulin produced.The analyzed study suggests that, in the examined population, a one-hour blood glucose level equal to or greater than 155 mg/dL may help

identify an early reduction in pancreatic functional reserve, even when fasting blood glucose and two-hour blood glucose levels still meet normal criteria. This is the specific reason why the publication was cited in the section "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi.However, the interpretation must remain cautious. The cross-sectional design shows a difference between groups but does not establish which alteration appeared first, nor does it prove that elevated one-hour blood glucose causally leads to diabetes. The sample was relatively small, recruited locally, and had an uneven gender distribution; furthermore, the indices used are derived from the oral glucose tolerance test and are not a direct measurement of pancreatic function.

6. INDEPENDENT SUPPORTING EVIDENCE

Initial confirmation comes from a study of 113 young people without diabetes, who were overweight or obese and aged between 10 and 20. Researchers used glucose clamps, experimental procedures considered particularly accurate for measuring insulin sensitivity and insulin secretion. The 44 young people with one-hour glycemia equal to or greater than 155 mg/dL had a lower disposition index compared to the 69 with values below the threshold: 295.1 versus 498.6 mg/kg/min, P<0.001. The difference was independent of glucose tolerance classification. This directly confirms the premise that an early glycemic peak may reflect lower beta-cell function relative to insulin sensitivity, even though it concerns a pediatric population with overweight rather than the Korean adults from the original study [1].A second study evaluated 305 non-diabetic children of people with type 2 diabetes. Among those with normal glucose tolerance, the group with one-hour glycemia equal to or greater than 155 mg/dL showed lower insulin sensitivity and a reduced acute insulin response, measured via intravenous test, after correction for age, sex, and body mass index. The disposition index was also reduced. The effect of incretins, intestinal hormones that promote insulin secretion after glucose intake, was not reduced. The result reinforces the hypothesis that the phenomenon stems primarily from an intrinsic defect in beta-cell compensation, but the study remains observational and was conducted in people with a family history of diabetes [2].In the multicenter GENFIEV project, 926 adults at risk for diabetes underwent an oral test with beta-cell function modeling based on glucose and C-peptide. Among the 474 participants with normal glucose tolerance, those with one-hour glycemia higher than 155 mg/dL had lower insulin sensitivity and worse beta-cell function compared to those with values equal to or lower than 155 mg/dL. They also had higher blood pressure, glycated hemoglobin, LDL cholesterol, and triglycerides, and lower HDL cholesterol. Compared to those with impaired glucose tolerance, their cardiovascular risk profile and insulin resistance were comparable, while their beta-cell function was slightly better. This evidence confirms the direction of the book's narrative in a broader adult population, but cannot prove the causal sequence of events [3].Finally, a Korean community cohort of 5,703 people initially with normal glucose tolerance provided the necessary prognostic link. Over 12 years, 593 participants, or 10.3%, developed diabetes. One-hour glycemia equal to or greater than 8.0 mmol/L, equivalent to approximately 144 mg/dL, was associated with lower beta-cell function and a 2.84 times higher risk of incident diabetes after correction for major risk factors. The study therefore supports the idea that one-hour glycemia identifies higher future risk, but it proposes an optimal threshold lower than 155 mg/dL in the population examined [4].

7. CONFLICTING EVIDENCE

No directly conflicting evidence of sufficient relevance has been identified; this does not prove the absence of contrary results. However, there is one factor that limits the generalizability of the 155 mg/dL threshold. In the Korean cohort followed for 12 years, the value that offered the best compromise between sensitivity and specificity for predicting incident diabetes was 8.0 mmol/L, approximately 144 mg/dL, rather than 155 mg/dL [4].This difference does not contradict the central biological concept, namely that elevated blood glucose at one hour signals reduced β-cell function and a more unfavorable metabolic risk. It does, however, indicate that the most useful threshold value may depend on age, geographic origin, body composition, baseline risk, and clinical objective. Furthermore, the available studies use different

indices to estimate insulin secretion and insulin sensitivity, making quantitative comparisons between populations less straightforward.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the analyzed study from the independent publications used to confirm or contextualize the specific narrative of the book's paragraph.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Cross-sectional	244 Korean adults: 192 with normal glucose tolerance and 52 with impaired tolerance	In the normoglycemic group with one-hour glycemia ≥155 mg/dL, the oral disposition index and ISSI-2 were reduced and similar to the group with impaired tolerance	direct confirmation	moderate
[1]	Physiological observational	113 overweight or obese young people without diabetes	One-hour glycemia ≥155 mg/dL associated with lower disposition index, measured via clamp	direct confirmation	moderate
[2]	Physiological observational	305 non-diabetic offspring of people with type 2 diabetes	In normoglycemic individuals with high one-hour glycemia, insulin sensitivity, acute insulin response, and disposition index were reduced	direct confirmation	moderate
[3]	Multicenter cross-sectional	926 high-risk adults; 474 with normal glucose tolerance	One-hour glycemia >155 mg/dL associated with worse beta-cell function and lower insulin sensitivity	direct confirmation	moderate
[4]	Prospective cohort	5,703 Korean adults with normal glucose tolerance, followed for 12 years	One-hour glycemia ≥8.0 mmol/L associated with lower beta-cell function and a 2.84 times higher risk of type 2 diabetes	biologically consistent evidence	high

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The analyzed study shows that, in Korean adults with normal glucose tolerance, a one-hour blood glucose level of 155 mg/dL or higher is associated with a reduced capacity of beta cells to compensate for insulin requirements. This result is consistent with the book's narrative and is confirmed by independent evidence in both young people and adults.The relationship between elevated one-hour blood glucose and early impairment of beta-cell function is well-supported. The link to a higher future probability of diabetes is also supported by prospective studies. However, it has not been proven that a single threshold value is optimal for all populations, nor that the one-hour data point alone is sufficient to make individual diagnoses or therapeutic decisions.

Aggiornato al 17/11/2026. Questo contenuto riflette una sintesi divulgativa delle evidenze scientifiche al momento della pubblicazione e non sostituisce il parere medico.

10. TRANSPARENCY AND SCIENTIFIC RESPONSIBILITY

Artificial Intelligence was used solely as a tool for editorial and documentary support. All content, interpretations, bibliographic citations and conclusions have been verified, reviewed and approved by the author, who assumes full scientific responsibility for them.

The manuscript was also subjected to independent peer review prior to publication.

To ensure the greatest transparency, the complete history of the article, including the dates of submission, revision, acceptance and publication, as well as information on the peer review process, is available on the dedicated Article History page.

11. RIFERIMENTI BIBLIOGRAFICI

[1] **One-hour plasma glucose concentration during the OGTT: what does it tell about b-cell function relative to insulin sensitivity in overweight/obese children?**
Tfayli et al., 2011
Pediatric Diabetes
DOI: https://doi.org/10.1111/j.1399-5448.2011.00745.x

[2] **Insulin Sensitivity, b-Cell Function, and Incretin Effect in Individuals With Elevated 1-Hour Postload Plasma Glucose Levels**
Marini et al., 2012
Diabetes Care
DOI: https://doi.org/10.2337/dc11-2181

[3] **Elevated 1-Hour Postload Plasma Glucose Levels Identify Subjects With Normal Glucose Tolerance but Impaired b-Cell Function, Insulin Resistance, and Worse Cardiovascular Risk Profile: The GENFIEV Study**
Bianchi et al., 2013
The Journal of Clinical Endocrinology & Metabolism
DOI: https://doi.org/10.1210/jc.2012-3971

[4] **One hour postload plasma glucose concentration in people with normal glucose homeostasis predicts future diabetes mellitus: a 12 year community based cohort study**
Oh et al., 2017
Clinical Endocrinology
DOI: https://doi.org/10.1111/cen.13280