

**Since the late '90s, IDF and ANIAD have steadily  
advocated against  
T1DM pilots undue discrimination**

**Felice Strollo, ANIAD's delegate**

**After my election as a member of the Executive Committee of  
ESAM (European Society of Aerospace Medicine),  
pilots on insulin became the subject of repeated discussions  
among European colleagues interested in aviation medicine and  
diabetes.**

Review

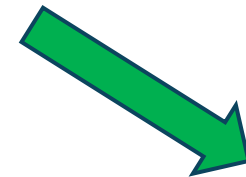
## Fighting discrimination

Wim Wientjens<sup>a,\*</sup>, Douglas Cairns<sup>b</sup>

Diab Res Clin Pract. 98: 33-37, 2012

## Would you fly with a pilot on insulin?

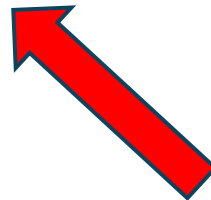
Simons R et al. Lancet Diabetes Endocrinol 2; 446-7, 2014



## Should a pilot on insulin really fly?

Manen O et al. Lancet Diabetes Endocrinol 2: 451, 2014

But if we accept this notion, in the future, will pilots with any disorder with the potential to jeopardise flight safety be able to fly because there is a specific protocol to manage in-flight complications?



ITALIAN JOURNAL OF AEROSPACE MEDICINE  RAPID COMMUNICATION

Strollo F et al. 16: 37-40, 2019

## NEW TECHNOLOGY ADVANCES CALL FOR SETTING UP A NATIONAL CIRCLE OF EXPERTS TO DEFINE SCIENTIFICALLY SOUND FLIGHT CERTIFICATION CRITERIA FOR PILOTS ON INSULIN

Review

## Technological innovation of Continuous Glucose Monitoring (CGM) as a tool for commercial aviation pilots with insulin-treated diabetes and stakeholders/regulators: A new chance to improve the directives?



F. Strollo<sup>a,\*</sup>, A. Furia<sup>b</sup>, P. Verde<sup>c</sup>, A. Bellia<sup>d</sup>, M. Grussu<sup>e</sup>, A. Mambro<sup>f</sup>, M.D. Petrelli<sup>g</sup>, S. Gentile<sup>h</sup>

Diab Res Clin Pract. <https://doi.org/10.1016/j.diabres.2020.108638>

## An Evaluation of the Safety of Pilots With Insulin-Treated Diabetes in Europe Flying Commercial and Noncommercial Aircraft

Garden GL et al. Diabetes Care 43: 2923 -9, 2020

## Blood glucose monitoring by insulin-treated pilots of commercial and private aircraft: An analysis of out-of-range values

Garden GL et al. Diabetes Obes Metab. 2021;23:2303–2310

## Medical Certification of Pilots Through the Insulin-Treated Diabetes Mellitus Protocol at the FAA

Lynn K. Stanwyck; James R. DeVoll; Joyce Pastore; Zykevisse Gamble; Anna Poe; Gabrielle V. Gui

Aersp Med Hum Perform. 2022; 93(8):627–632.

# WHY SHOULD INSULIN-TREATED PILOTS WEARING GLUCOSE SENSORS BE GRANTED FIT-FOR- FLIGHT CERTIFICATES IN EUROPE

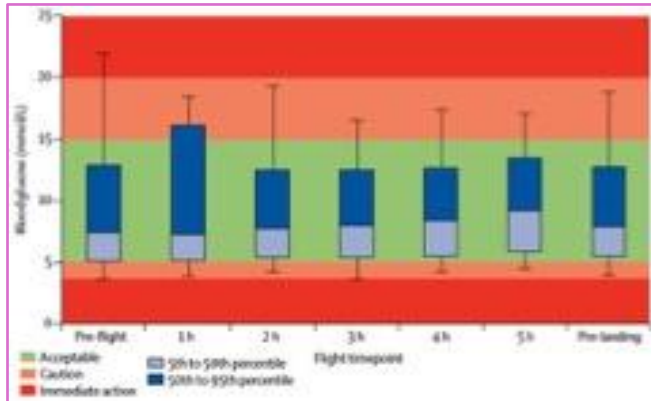
2022

F. Strollo<sup>1</sup>, A. Fresco<sup>2</sup>, M. Grussu<sup>3</sup>, A. Mambro<sup>4</sup>, S. Gentile<sup>5</sup>

- <sup>1</sup> IRCCS San Raffaele Pisana, Endocrinology and Diabetes, Rome, Italy; Secretary General of ESAM (European Society of Aerospace Medicine); <sup>2</sup> Energy Fitness ASD, Training Unit, Lanciano CH, Italy.  
<sup>3</sup> ANIAD, Presidential Office, Naples, Italy; <sup>4</sup> Sandro Pertini Hospital, Anesthesiology and Resuscitation, Rome, Italy.; <sup>5</sup> Nefrocenter Research & Nyx Start-up, Scientific and Clinical Management, Cava De' Tirreni- Salerno, Italy.

## Method of the first experimental protocol performed by the UK

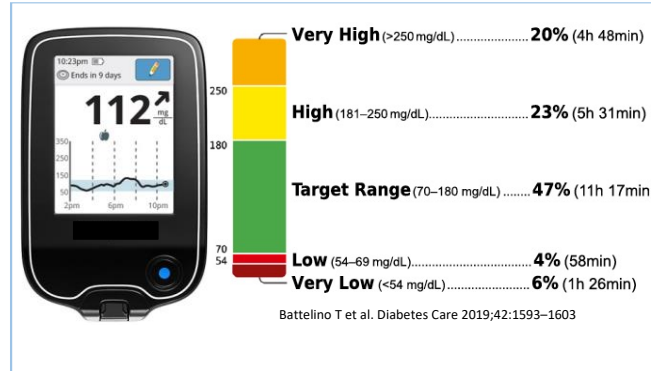
The abovementioned protocol involved insulin-treated pilots from the UK to investigate flight safety by several capillary blood tests performed before and during the most relevant flight phases to adapt carbohydrate CHO) intake and insulin doses as needed (1).



**Fig. 1.** Pre-flight and in-flight blood glucose values measured during short-haul and medium-haul flights. 7829 measured glucose values are shown and bars denote maximum and minimum of range (2).

## References

- 1) Russell-Jones DL et al. Diabetes Obes Metab. 2021; 23(7):1439-44.
- 2) Michell SJ et al. Lancet Diabetes Endocrinol. 2017; 5(9):677-9
- 3) Garden GL et al. Diabetes Obes Metab. 2021; 23(10):2303-10.
- 4) Camerlingo L et al. Diabetes Technol Ther. 2019; 21(11):644-55.



**Fig. 2.** Typical screenshot of a CGM receiver showing the spot glucose reading, an upward trend arrow, and the selected time-restricted glucose profile (left). Time in range (TIR): 70–180 mg/dL (3.9–10.0 mmol/L) (right).

## Conclusion

**Expected better quality of life will further improve trust between pilots and AMEs. The whole society will hopefully get more open-minded towards flight qualification for T1DM subjects eventually excited about a lifelong pilot career.**

## Background

T1DM represents a severe challenge for aircrew members, especially pilots, due to the risk of hypoglycemia-related incapacitation.

This consideration led the European Union Aviation Safety Agency (EASA) to classify pilots with T1DM as unfit for flight.

Such a choice causes at least :

- a heavy psychological and economic burden to several flight professionals
- severe financial consequences on commercial airlines due to:
  - individual flight crew rearrangements
  - spoilt long-term training investments

Diabetes associations have raised this issue for at least two decades on social media and found support from the IDF, known for its relentless advocacy activities in favor of people with diabetes. All the above helped bring the problem to public awareness, so the scientific aviation community decided to set up an experimental protocol to test whether or not being on insulin allows pilots to fly safely.

## Results of the experimental protocol (see Fig. 1).

The investigators defined acceptable in-flight blood glucose concentrations and ranges to prompt appropriate specified actions, designated as green (acceptable), amber (caution), and red (immediate action)

Low values required immediate 10–15 g glucose ingestion and blood recheck 30 min later.

High values required careful review of insulin dosing and CHO intake.

26 certified pilots monitored from 2012 to 2015 showed work efficiency and safety (2).

Such results motivated the Irish and Austrian authorities to join and help collect further encouraging data in the last few years (3).

## Discussion

Now, through sophisticated, efficient and reliable algorithms, subcutaneous devices allow continuous glucose monitoring (CGM) and predict/prevent sudden glucose drops (4).

Indeed, besides spot glucose readings, they can also show upward or downward trend arrows, flight/daily glucose profiles, and especially percent time-in-range (TIR) (see Fig. 2).

Such vital information can be made available also to the second pilot if interested subjects sign a privacy disclosure form as documentation for practical and legal purposes.

Together with easy access to the post-flight glucose profile by the aeromedical examiner (AME), such a possibility offers a unique chance to reassure anybody onboard the aircraft and within the national safety board concerning that pilot's fitness to fly.

As a solution to the whole problem, one of the Authors is carrying out an educational campaign in the European Schools of Aviation to help the AME understand how to exploit CGM devices in T1DM management.

This way, he hopes to maintain and possibly improve occupational levels in aviation while preventing flight personnel from developing diabetes complications over the years through an as low as possible oxidative damage granted by persistently high percent TIR.



# EASA Horizon Programme Aviation and Diabetes

by courtesy of prof David Russell-Jones



Pilots with insulin-treated diabetes using CSII are not at a greater risk of glucose variability or hypoglycaemia during flight than pilots receiving MDI therapy.



Improvements in diabetes treatments and monitoring systems have allowed insulin treated people to safely fly aircraft.



This is the first safety critical occupation that people with insulin treated diabetes have been allowed to do and represents a landmark for diabetes care



IRCCS San Raffaele  
Roma

F. Strollo

