

# PLOS Science Wednesday: Hi reddit, we're Nick, Jenna and Fumiaki, and we contributed research to the new PLOS Medicine special issue on diabetes prevention – Ask Us Anything!

PLOSScienceWednesday<sup>1</sup> and r/Science AMAs<sup>1</sup>

<sup>1</sup>Affiliation not available

April 17, 2023

## Abstract

Hi Reddit, My name is Nick Wareham and I am Director of the MRC Epidemiology Unit at the University of Cambridge. My research focuses on the genetic and environmental determinants of type 2 diabetes and the translation of epidemiological knowledge into preventive action. I also served as a guest editor on the PLOS Medicine special issue on Diabetes Prevention. I also wrote the editorial entitled “The Clinical and Public Health Challenges of Diabetes Prevention: A Search for Sustainable Solutions” in which we discuss how diabetes is driven by rapid economic development and how attempts to deal with a public health problem by clinical approaches to prevention will be unaffordable and unsustainable in many countries. We focus on the need to develop effective and sustainable public health interventions for the prevention of type 2 diabetes that can be implemented in both resource-rich and resource-poor health care systems. I am joined by Fumiaki Imamura and Jenna Panter, two scientists at the MRC Epidemiology Unit at the University of Cambridge, who also contributed research to the Diabetes Prevention issue of PLOS Medicine. Jenna is a Senior Research Associate in the MRC Epidemiology Unit. Her research focuses on examining patterns and determinants of change in physical activity and evaluating environmental and policy interventions to promote activity. Jenna recently published an article titled ‘Cycling and Diabetes Prevention: Practice-Based Evidence for Public Health Action’ in PLOS Medicine in which the authors discuss the findings from a linked paper by Rasmussen and colleagues on changes in cycling and risk of developing type 2 diabetes. In the article, the authors highlight the need to conduct rigorous evaluations of interventions to promote physical activity which will provide evidence about how researchers can create a genuinely population-based public health strategy for the prevention of diabetes and other chronic diseases. Fumiaki is a Senior Investigator Scientist at the MRC Epidemiology Unit. His research focuses on effects of dietary components and behaviours with a risk of developing type 2 diabetes. Fumiaki recently published a study titled “Effects of Saturated Fat, Polyunsaturated Fat, Monounsaturated Fat, and Carbohydrate on Glucose-Insulin Homeostasis: A Systematic Review and Meta-analysis of Randomised Controlled Feeding Trials” in PLOS Medicine. I am also a co-author of a study published by the EPIC-InterAct Study in the PLOS Medicine, “Association of Plasma Phospholipid n-3 and n-6 Polyunsaturated Fatty Acids with Type 2 Diabetes: The EPIC-InterAct Case-Cohort Study”. In the two studies based on published trials and the Europe-wide observational investigation, respectively, Fumiaki and colleagues indicate that fat commonly present in vegetable oils is good to reduce the burden of type 2 diabetes in many countries. We will be answering your questions at 1pm ET – Ask Us Anything! Don't forget to follow us on Twitter @JennaPanter, @fumimamu and @mrc\_epid.

[REDDIT](#)

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PLOSSCIENCEWEDNESDAY [R/SCIENCE](#)

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Fumiaki is a Senior Investigator Scientist at the MRC Epidemiology Unit. His research focuses on effects of dietary components and behaviours with a risk of developing type 2 diabetes. Fumiaki recently published a study titled "[Effects of Saturated Fat, Polyunsaturated Fat, Monounsaturated Fat, and Carbohydrate on Glucose-Insulin Homeostasis: A Systematic Review and Meta-analysis of Randomised Controlled Feeding Trials](#)" in PLOS Medicine. I am also a co-author of a study published by the EPIC-InterAct Study in the PLOS Medicine, "[Association of Plasma Phospholipid n-3 and n-6 Polyunsaturated Fatty Acids with Type 2 Diabetes: The EPIC-InterAct Case-Cohort Study](#)". In the two studies based on published trials and the Europe-wide observational investigation, respectively, Fumiaki and colleagues indicate that fat commonly present in vegetable oils is good to reduce the burden of type 2 diabetes in many countries.

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Don't forget to follow us on Twitter [@JennaPanter](#), [@fumimamu](#) and [@mrc\\_epid](#).

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CORRESPONDENCE:

Occasionally I hear voiced concern about the effect of calorie-free sweeteners on health, the argument being that they interact with the insulin system and cause problems similar to consuming sugar.

Is this actually borne out in data, or just a concept derived from personal biases?

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[nate](#)

Author Name: Fumiaki

Thank you for asking the question. I am also interested in it, too.

Data are available from a couple of clinical studies including famous one published in Nature (Suez et al., 2014). The study tested 5 mg/kg of saccharin in 7 men for a week. The amount is equivalent to what we can get from >40 cans of diet soda. Likewise, different clinical studies have something extreme. Also, we should keep in mind that there are many types of artificial sweeteners. Given that, there is no strong clinical evidence supporting the putative adverse effect that could happen in a life.

Aside from clinical research, many observational studies have a common problem that obese or health-conscious people have a high risk of diabetes and also show tendency of preferentially consuming non-caloric sweeteners. That causes an issue of reverse causality (spurious association that does not exist).

The hypothesis of the adverse effect of sweeteners is very interesting. But, again, there is not strong evidence for a diet in our daily life. Also, we need to acknowledge that caloric sweeteners can help reducing a caloric intake if used in replacement of sugars. I have documented it elsewhere: <http://www.ncbi.nlm.nih.gov/pubmed/26205004>.

We know that regular exercise is one of the best means of preventing diabetes. I try to take regular walks (Pokemon Go has been helping a lot lately.)

Is walking considered a good exercise for diabetes prevention, or are there other types of exercise that might be better?

[katarh](#)

Hi, It's Jenna here. Thanks for the question. In short, any exercise that you do will be better than nothing, and exercise at higher intensity is better. The World Health Organisation recommends doing some activity on most days of the week and therefore doing activities regularly that can become habitual is a great way to start.

Moderate intensity is what's recommended for health benefits: so that's any exercise where you can increase your heart rate, increase your breathing rate or sweat. So the more of these you do the better. Activities at moderate intensity include brisk walking, cycling things and can be unstructured as well as structured exercise or sports or combinations of these – including getting out and about in local area or in the neighborhood around your workplace. If it's through gaming or meeting real world people, it doesn't matter.

Aside from eating right and exercising, is there some food item you can eat to help reduce the chance of having type 2 diabetes?

[greenstatic92](#)

Hi, greenstatic92. I am Fumiaki. Thank you for asking. "eating right" may include lots of food items already, right? Apart from it, we do not have no single magic food that dramatically reduce a diabetes risk.

I fairly often see ads for "diets that will cure your existing diabetes". Is that even possible?

[Fippy-Darkpaw](#)

Hi, Nick here. Thanks for the question.

The answer to this depends upon your definition of the word "cure". If you define that as someone having diabetes been treated and then never having it again, then we have no evidence of any diets that can do this. However, if you think of response to a treatment as increasing the chance of reversing diabetes which might even more accurately be termed going into remission, then there is hope.

Roy Taylor and colleagues from Newcastle have undertaken a study in which people with type 2 diabetes were studied before and after a 2.5 MJ (600 kcal)/day diet for 8 weeks. After 1 week of restricted energy intake, fasting plasma glucose normalised in the diabetic group. This dietary weight loss programme is now being evaluated in the Direct trial.

The notion of remission of type 2 diabetes is a very positive one and should empower people in the early stages of diabetes to take personal action as there are demonstrable benefits.

Hey guys, I'm currently doing my honours year in SGLT-2 and DPP-IV inhibitors. Really like the epidemiological direction in preventing diabetes!

I was wondering, what do you guys think of the current standard of care in Type 2 diabetics? Should we be 90% of the time perscribing ACE inhibitors and metformin, or do you think lifestyle changes may be a 'better therapeutic intervention'? Or that changing your lifestyle won't be much more than adjunct therapy in the modern clinical environment?

[SugnaG](#)

This is Nick. Thanks for this question and for the points added by topasaurus.

In people with established diabetes, we know that multifactorial treatment that is aimed at control of glucose, blood pressure and lipids is effective in reducing the risk of the long term complications of diabetes.

Lifestyle modification interventions also play a role, but are not a substitute of pharmacological therapy for people with established diabetes. However, you are right that lifestyle modification interventions need to be given much more attention in clinical environments.

In response to topasaurus' point about intensive intervention in the first year after diagnosis, we conducted a trial in 3 countries in Europe called ADDITION, in which we randomised people who had screen-detected diabetes to get standard care or intensive cardiovascular risk reduction. At 5 years we saw a non-significant 16% reduction in cardiovascular outcomes. We are currently compiling the 10 year outcome data and will announce the results at a European Diabetes meeting in September.

Aside from only diet, I've heard that risk of diabetes can also be heightened by a high-stress lifestyle (and, on the other side, reduced by lowering stress). Have you found anything in your research that supports this theory?

[azclimb](#)

Hi, azclimb. Fumiaki is here. Thank you for asking. According to the recent meta-analysis, there was a positive association between long working hour and a risk of diabetes only in a sub-group with low socioeconomic status (SES), not in a group with high SES.

<http://www.thelancet.com/journals/landia/article/PIIS2213-8587%2814%2970178-0/abstract>

This is an area of active research. I would think that lifestyle, including diet, related to long working hour or stress plays a substantial role in the observed association.

Do "sin taxes" on junk food and pop have any significant effect on the consumption of these products. Do "sin taxes" on junk food and pop effect the rate of diabetes?

[vocalazy](#)

Hi, It's Jenna here. Financial incentives are one way in which governments could intervene to improve public health. In the recent study in PLoS\* Batis and colleagues found that the purchases of energy-dense foods declined in the first year, but we don't know if it also reduced consumption. We also don't know whether that follows through to impact on obesity or diabetes. This is a relatively new research field and as we and others\*\* have suggested we need more studies evaluating the impact of these policies.

This is an area that's got a lot of press coverage and evokes lots of debate. What do think of these as ways to improve health? <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002057> \* <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002077>

My understanding is that Metformin is the only medication that has been shown to improve morbidity and mortality for type two diabetes when examined through meta analysis.

We still have a host of medications being prescribed to patients that have no benefit. Do you think this mentality of illnesses need to be treated by medications gets in the way of treating diabetes?

Exercise was always attached to weight loss with the "no pain no gain" mentality. Now we understand that it won't help your weight loss, has massive other health benefits, and needs to be much less than what the public thinks. Do you foresee a change in public health messaging in the future to focus on how much a small amount of exercise could benefit a persons health? The 23 1/2 hours video dramatically changed my perspective on exercise

<http://youtu.be/aUalnS6HIGo>

[Marvelkicks](#)

Hi, Nick here. Thanks for this question !

We would certainly agree that there needs to be a change in public health messaging. In the UK, the Chief Medical Officers' advice used to focus solely on the achievement of what was considered the minimum amount of moderate activity and therefore encouraged people to accumulate 150 minutes per week of moderately vigorous activity. More recently the message has been nuanced to add that any increase in physical activity will be associated with a benefit. This is because the greatest public health benefits come from encouraging the people who do no activity to do some, even if they don't reach the 150 minutes a week threshold.

I am not sure I would entirely agree with your statement that we have medications being prescribed which are not beneficial. The evidence threshold for new glucose lowering drugs is high. The problem is that glucose is not a massively strong cardiovascular risk factor and each individual drug only has a small impact on glucose levels. Thus we often have to use combinations to achieve good control. We would certainly agree with the suggestion that the prescription of medications is not enough. Patients have to be helped to focus on lifestyle change, not as an adjunct, but as a central element of effective long term diabetes control.

Have you heard of people who don't have diabetes taking diabetes medication Metformin to extend their lives? Do you know the science behind this? I am asking because lately I keep getting hypoglycemic (it runs in my family) and when it happens, it feels very stressful on my body (weak, shaky, adrenaline pumping). Is this long term stress really bad for my body? Should I be taking Meformin and eating a low glycemic index diet even though I don't have diabetes? Thank you for your research.

[pishpasta](#)

Thanks for this question, pishpasta.

The drug Metformin lowers glucose levels and is first line therapy for people with established type 2 diabetes. It is not licenced currently for people without diabetes. However, in the US Diabetes Prevention Program, people with "pre-diabetes" who were randomised to receive metformin had a lower risk of progression to diabetes than those who received placebo.

We do not currently know whether giving metformin to people with pre-diabetes would reduce the risk of cardiovascular events like heart attacks or strokes, or whether it would reduce mortality risk. We are currently investigating this in a trial called GLINT. It has also been suggested that metformin might reduce risk of some cancers in people with pre-diabetes, so this is also an endpoint in the GLINT trial.

We would not recommend any drug that lowers glucose levels (like metformin) to someone who has glucose levels that are at the lower end of the normal range. If you have documented hypoglycaemia with symptoms and are not taking any agents that lower glucose, we would suggest you consult your physician.

Nick

I have a sweet tooth. I also have a fast metabolism, which allows me to binge eat on sweets without noticing any changes in my body as a result. Even though there is no history of diabetes in my family, I am concerned that I will one day develop diabetes if I don't change my eating habits. Is my level of concern justified? And, is there such a thing as a "fast pancreas" or "fast liver" in the sense that I have described a "fast metabolism"? (i.e. are some people's organs more efficient at processing sugars than others)

[BeTripleG](#)

Hi, BeTripleG. Fumiaki is here. Yes, about your concern. Diabetes can occur by many different pathways, so even if you have unique characteristics in metabolising sugars, they can slowly lead you to get diabetes through different pathways. So, discretionary sugars in addition to sugars you really need can damage your organs and cause diabetes, even if you cannot recognise the damage.

I'm a coach for the YMCA's Diabetes Prevention Program. Our program curriculum is based on reduced total dietary fat intake and increased physical activity. I struggle a lot with participants who want to use current high-fat, low-carb diets as they are not part of our evidence-based program. Any tips I can bring to my class on the efficacy of a reduced fat diet in preventing the onset of type 2 diabetes?

[Lolablitz](#)

Hi, Lolablitz. I am Fumiaki. Thank you for asking the question. Clinical evidence suggests that if people comply with either low-fat or low-carb diet, weight loss can be achieved. But a long-term effect of either

diet is not well established.

In recommending a low-fat diet, important to increase foods rich in fibre and plant-based protein and to keep low starchy foods and added sugars. Low-fat diet must never go with high carbohydrates of refined sugars.

With your participants, exploring a local shop or market selling a bulk of fiber-rich grain products and colourful vegetables may be good to start with.

As a team you seem to have the prevention aspect of diabetes well versed. What are some reversion tactics that maybe the public is unaware of? Are there preventive measures that can be taken that essentially halt the possibility of further damage?

[Just count victories](#)

Hi, Its Jenna here. The main focus of our work is on developing effective ways of changing two sets of behaviours. But there are two other behaviours (smoking and alcohol consumption) which could be targeted. Changing all four behaviours positively would help to prevent the majority of the preventable non-communicable diseases, including many cancers and cardiovascular disease.

What do you think about recent research into gut microbiota and type 2 diabetes? Do you think the prevalence of certain bacteria (e.g. Blautia, Serratia, and Akkermansia) is a cause or effect of type 2 diabetes? What implications should this have on treatment (high fiber diets? Fecal transplants?)?

[JediLibrarian](#)

Hi, Jedi. I am Fumiaki. Thank you for asking the question. I think the hypothesis is interesting, but there is no strong clinical evidence to support any benefits or harm. For example, the Nature paper indicated the adverse effect of sacharin by testing its bolus amount equivalent to the amount of >40 cans of diet soda. Based on a few small studies that are somewhat extreme, we cannot say anything related to our habitual diet or dietary recommendations. We wish to see more research and discussion over evidence from human studies on effects of altering gut bacterial communities and fecal transplant.

What are your thoughts on the Look AHEAD trial (2013)? I was surprised by the findings (that weight loss and exercise did not result in reduction of CVD in obese patients with T2DM.) Keep up the great work--I am looking forward to reading your answers!

[Alice McTavish](#)

Thanks for your question, Alice.

The Look AHEAD trial needs to be interpreted very carefully as there is an important distinction between a study that is inconclusive as opposed to one that results in a definite conclusion that that there is no benefit. This particular trial was inconclusive and was stopped early because there was no prospect of it getting a definitive result. As you say, the trial tried to evaluate the impact of weight loss and exercise in reducing CVD events in patients with type 2 diabetes. The event rate in the trial was low and lower than the investigators had predicted. In addition, the people who were randomised to the control arm and who didn't get the lifestyle intervention, were more likely to get risk factor modifying drugs like statins. This might have balanced out the benefit of the lifestyle intervention. The Look AHEAD trial is an example of the difficulty of assessing the benefits of lifestyle interventions on hard clinical outcomes in relatively low absolute risk populations.

Nick

My son has type I diabetes and the confusion between his condition and type II is aggravating, stigmatizing and unnecessary. Has there ever been any talk of changing the name of one of them to alleviate confusion? They're different diseases with completely unrelated causes.

[MansfieldMan](#)

Thanks for this important question. The issue of the classification of diabetes mellitus is reconsidered periodically by the World Health Organization. I was part of the most recent committee that examined this and also addressed the criteria for diagnosing the disease.

Your point about the distinctions between type 1 and 2 diabetes is well made. Type 1 diabetes is quite different in its causes and pathogenesis. As it results in absolute insulin deficiency, its treatment is different too.

However, there has never been a discussion about changing the name. Diabetes (meaning syphon) and mellitus (meaning sweet) is an ancient name that describes the symptoms of all types of diabetes when untreated i.e production of copious volumes of sweet urine. Originally the key distinction was from a totally separate condition, diabetes insipidus, which as the name suggests, results in production of very dilute urine.

The key in the future is not to change the name, but rather to help increase education about the different sub-types of diabetes. Indeed in the future, we would imagine that there will be many more subtypes discovered.

Alongside this, we have to work to make sure that no form of diabetes is stigmatizing.

Nick

I was part of a genetic study that said I had 2 out of the 3 genetic markers for Type II diabetes. Will diet and exercise *really* help prevent onset, or am I going to develop diabetes no matter what I do?

[flamingpython](#)

Thanks for this important question.

Genetic predisposition is certainly important in raising one's lifetime risk of diabetes. However, that risk is not immutable. We have shown that the relative risk reduction association with eating well, being physically active and not being overweight is similar what ever the genetic risk.

Because people who have genetic predisposition are at higher absolute risk, they actually stand to gain more (in terms of absolute risk reduction) by being more active and eating better.

So instead of seeing genetic predisposition as something that means there's no point in changing lifestyles, we should turn this completely on its head and encourage people who are higher risk to change behaviours since they have the most to gain.

Nick

What would be more important in my diet: low sugar or low fat?

[Twisterll](#)

Hi, Twisterll. I am Fumiaki. A diet with low sugar is good. Low fat is also good to reduce caloric intake, as fat is calorie-dense. But, you can achieve healthy low-sugar low-fat diet with very high fibre intake and high quality of fat. In sum, diet with a high quality of carbohydrates and fats is good.

How long would a horrible diet/lifestyle take to give someone diabetes?

[papdog](#)

The median age of onset of type 2 diabetes in people of European origin is 55 years. In South Asian populations, the condition tends to occur earlier. Carolina\_snowglobe is, however, correct that we are seeing a rise in the rates of classical type 2 diabetes in younger adults and even in children. Thus the answer to your question about duration is that it depends upon individual ethnicity, genetic predisposition and early life factors like birth weight and growth trajectory in the first year of life.

Nick

Hey! Do you think there should be more focus on the adaptation of (evidenced and proven) physical activity counseling as part of primary care, carried out by health practitioners during routine health checks? If so, do you think the way to go is through the use of brief interventions or targeted, sequenced service chains that are lengthier and usually run in joint efforts by different stakeholders. Furthermore, do you envision the need for ICT solutions growing to support in-place programmes and self-management/care?

Thank you!

[helpwhatdowritehere](#)

Hi, Jenna here. I think you're right getting everyone to do more exercise is important and primary care could have an important role to play in encouraging everyone to be active. Health practitioners already have a lot to do. Promoting physical activity and preventing diabetes shouldn't just be something that's confined to primary care - I think it's a bigger issue for public health. I think the future for physical activity promotion is about encouraging everyone to be more active by making it easier for them to do so; most people know that they should be more active but find it difficult.

Hi,

I'm nearing the end of a thesis in epidemiology / physical activity / obesity, and I've realized I've taken a huge bite. Quite more than I could handle.

What knowledge or wisdom would you impart for how to decide upon a research project? One that's do-able, achievable, etc? A fellow researcher told me that's an art upon itself. I always have a tough time deciding and narrowing my focus. Any rules of thumb / etc that you go by?

Thanks!

[swingthatwang](#)

Hi, It's Jenna here. Yes, deciding upon a research topic and an area of focus is tricky. Obviously you have to be practical. One thesis isn't going to answer all the questions that could/should be answered. Break it down into manageable chunks. Finding focus can be difficult especially if you want to show how parts are connected, but you can do that without answering every question. You will be able to decide and drive it. Think about what's important to you but make sure you have a coherent story and

that different parts of the thesis/project are clearly linked.

Best of luck! Jenna

Hey guys! Heard some stuff about cigarettes playing a role in developing diabetes. How does this happen in layman terms? Also, can other stimulants say coffee or adderall have a similar effect? Any links you can share on the topic?

Thanks for your time.

[3VANESH](#)

We have shown that people who smoke cigarettes are more at risk of developing diabetes. Whether this is causal or is due to confounding, i.e a common association with a third factor, is unknown. There are many hypotheses that might explain the association, but none are really proven.

Coffee consumption is associated with a reduction in the risk of diabetes. Again this might be causal or could be confounded. Fortunately this is slightly easier to resolve than the smoking question as it is possible to countenance a coffee intervention trial, which is tricky to say the least for smoking.

Nick

How do you feel about the view promulgated by Dr. Stephen Lustig, that added sugars are the real trigger of the whole metabolic syndrome?

[RedViperRecords](#)

Hi, Fumiaki is here. Added sugars certainly play the role. But, metabolic syndrome cannot be attributable to a single factor of a diet or lifestyle. Starchy foods and sedentary behaviour, independent of intakes of added sugars, can be the factor, for example.

Hi and many thanks to all three of you for taking the time to talk about this subject.

Do you believe that government has a role in controlling what is sold in fast food restaurants, the tax on high sugar drinks etc. and if yes what would you do if it was up to you?

[ThatIsMrDickHead2You](#)

Hi, It's Jenna here.

I think the government does have a responsibility, a public health responsibility, to ensure that as we can be healthy (or as healthy as possible). We all have a role to play - the physical activity (or lack of it) and diets we eat are a result of changes in society in the last few decades. Maybe there's a role for a range of approaches. As a physical activity and public health researcher, I'd obviously encourage an planners and policy makers to start making physical activity the easy choice for everyone, particularly those living in urban areas. Walking and cycling is one way people can integrate physical activity into everyday life.

What would you do?

What do you think of the "Banting" diet fad by Dr. Tim Noakes? It really took off here in South Africa. I've been told that it is good for people who are insulin resistant but it can cause diabetes in certain

cases. Do you have any knowledge of this?

[RaynerJ](#)

Hi, Rayner. I am Fumiaki. There is no evidence for the particular diet. So, we cannot say that is good for certain people or causes diabetes.

In general, low-carb high-fat diet can be healthy as far as fibre intake and quality of fat are kept good. So, I am not against the Banting diet.

The study I led (Imamura, PLOS Medicine, 2016) is supporting that it is good for us to replace carbohydrates with unsaturated fat, commonly present in vegetable oils. But this should not be interpreted that low-carb diet (prone to low fibre) is good to go for. Quality of carbohydrates and quality of fat are both important.

Thank you for doing this AMA. I am hyperglycemic yet exercise and diet has helped me avoid full blown diabetes so far. However whenever I eat carbs I immediately get very sleepy. I have done some research and found no correlation. Is this regular post prandial sleepiness or have you found a correlation between hyperglycemia and sleepiness?

[DaRealGeorgeBush](#)

Hi, DaRealGeorgeBush. I am Fumiaki. When you eat foods, your pancreas starts secreting insulin, a key hormone to handle blood sugars. Sleepiness depends on a biological pathway that reacts to insulin. So, when insulin is working in the blood, biology inducing sleepiness is activated and we gonna get sleepy. Hyperglycemia itself does not do the job.