Prof. Robert Lustig - Is Sugar Toxic (SF 2016)

Is sugar toxic? And if so, what should we do about it?

I am Andreas Eenfeldt from DietDoctor.com and I'm here with Prof. Robert Lustig.

-Thank you for being here.

-My pleasure, Andreas.

The number one enemy of sugar, perhaps, in the world.

I don't know about that, I think there are a few.

The bottom line is it's not really sugar per se,

it's processed food that's the problem,

but since sugar is the marker for processed food,

since 74% of the foods that are available in United States

are spiked with added sugar

and since we have the causative data for sugar and disease,

it's the obvious first target.

So to answer the question, "Is sugar toxic?"

I know you had that question many times before.

So, everybody says, "Oh come on Dr. Lusting, really... sugar?

"I mean it's been around for thousands of years, it's natural,

"comes out of the ground... part of our diet for centuries...

How in the world could it possibly be toxic?"

I get this all the time.

I am guilty of hyperbole of, you know,

escalating the argument in some ridiculous fashion.

This is not true, none of this is true.

Now, in order to understand the concept,

you have to understand what we mean by toxicity.

So the definition of toxicity comes straight out of the dictionary,

is "the degree to which a substance can damage an organism."

That's the definition of toxicity.

Now notice that that definition does not distinguish

between acute toxins and chronic toxins.

So you can have acute toxins like sarin or ricin or cyanide...

That will kill you right away.

Right, and in parts per billion, kill over and die right away.

And we have no problem calling those things toxins.

But then we have things called chronic toxins,

like for instance heavy metals, arsenic, tobacco smoke,

where you probably won't die immediately,

but if you're subjected to chronic long term exposure,

you will indeed die.

You don't die from one cigarette, but you might die from 10,000.

So the concept of toxicity is, you know, both of these

and so when we're talking about sugar, we're talking about the chronic side.

So before I get into the hard data, let me give you a framework of reference

to explain how you should think about this.

Can you name me an energy source,

something that has calories, that is not food...

It's got calories, but it's not food, it is not nutrition,

there's no biochemical reaction in any vertebrate,

for that matter any animal cell on the planet that requires it,

that when consumed in excess causes cellular,

organ system and human damage and death

and we love it anyway and it's addictive?

-That's going to be alcohol.

-Alcohol.

I knew the answer to that.

Well, alcohol has calories.

But alcohol is not dangerous because of its calories.

Alcohol is not dangerous because it causes weight gain.

Alcohol is dangerous because it's alcohol.

The molecule itself is what causes the problem.

And there are very specific thing that alcohol does

that cause you to become ill when you consume excess.

We have an innate capacity to metabolize a certain amount of alcohol,

but if we go above that amount, it becomes toxic.

And sugar... same thing?

Turns out that sugar, which is composed of two separate molecules,

glucose and fructose...

The fructose molecule is metabolized exactly the same way as alcohol.

We also have a limited capacity to metabolize fructose

in the same way as we do alcohol and when we consume it in excess.

The exact same processes that occur with alcohol,

also occur with fructose.

And that is why children today are getting the diseases of alcohol,

type 2 diabetes and fatty liver disease without alcohol,

because fructose doubles for alcohol.

So in order to prove toxicity, I have to prove that fructose,

that molecule, the sweet molecule, the molecule we seek,

is an independent risk factor for disease,

unrelated to its calories,

unrelated to its effects on weight gain,

and I have to show causation not just correlation.

So I have to have a very high bar.

And I can do all of them.

There are five studies that answer each of these questions.

In terms of perspective correlational studies

there are the studies from Frank Hu's group at the Harvard School Public Health

on the role of sugar and heart disease, that's his perspective correlational study.

There is the Epic Interact Study from Diabetologia 2013,

which shows that sugar, sweets and beverages predict diabetes incidence,

irrespective of calories and irrespective of obesity.

People that drink or eat a lot of sugar, they get more diabetes...

That's right.

Every sugar sweetened beverage consumed per day

increases your risk for diabetes by 29%.

And in America we don't consume one, we consume two and a half.

So take that up to 68%.

We have a meta-analysis that looks at all of this from Imamura from 2015,

which shows both sugar sweetened beverages and fruit juice separately

both contribute to risk for diabetes,

unrelated to calories and unrelated to weight gain

and that's controlling for industry sponsored studies as well,

which is very important, because the industry likes to publish negative studies,

so that it makes it look like there's not a problem, even when there is.

And lastly we had a paper, just came out in Public Health Nutrition,

Rodriguez said all that shows that in adolescence

metabolic syndrome is specifically predicted by added sugar consumption,

unrelated to calories and unrelated to obesity.

So we have a huge amount of perspective correlative data.

Still observational, statistic...

It's suggestive and you would tend to believe it's true, but it's not really--

It's perspective correlation and it's not causation.

But it lays the groundwork.

Then we have the econometric analysis that we did back in 2013,

where we asked, "What about the world's diet predicts diabetes change over time,

"country by country, year by year,

"adjusting for calories, adjusting for obesity,

"adjusting for poverty, urbanization, aging, physical activity

and all the other confounders?"

This was the paper that was in Plos One,

the first one was Basu.

And what we showed there is that

for every extra 150 cal available per country per day,

diabetes prevalence went up a total of 0.1%, which is not zero.

It's nothing.

But if those 150 cal happened to be a can of soda instead,

one standard can of soda,

diabetes prevalence went up 11 fold, by 1.1%.

And this study, because of the time factor analysis

and because of the ability to control for the confounders,

meets the criteria for what we call causal medical inference.

So it's a level of causation.

We showed dose - that is more sugar, more diabetes,

we showed duration - longer sugar exposure, more diabetes,

we showed directionality - countries where sugar went up, more diabetes,

there are few countries where sugar went down, less diabetes.

And lastly, most important if you're going to show causation,

you have to show precedents.

You have to show that something precedes something else to be causative,

because it can't come after.

If the diabetes comes before the sugar--

Then it can't be causative.

Three years, whenever sugar change,

diabetes change in the same direction three years later.

So the study meets the Bradford Hill criteria,

which are the same level of criteria that we have today for tobacco and lung cancer,

for football trauma and chronic traumatic encephalopathy,

for global warming.

So if you believe in any of those things, you're basing it on econometric data.

And we have the econometric data to show causation for sugar and diabetes.

And now as of four months ago,

we also have the direct interventional data,

the controlled trial data.

Because what we did is we took 43 children with metabolic syndrome out of our clinic,

who were obese and had at least one other comorbidity

and what we did was we assessed their baseline diet at home,

which of course was a very high sugar diet

and we catered their meals for 10 days.

No added sugar.

We kept the protein content of the diet the same,

we kept the fat content of their diet the same we kept the total calories the same,

we kept the carbohydrate as a whole the same,

but we didn't carbohydrate...

We took the sugar out and we put the starch in to control for calories.

So less sugar and starch instead, otherwise same thing.

-Exactly, so we took—

-For ten days.

For ten days.

So we took the sweetened yogurt out, we put the baked potato chips in,

we took the pastries out, we put the bagels in.

-So still not very good food?

-Oh, lousy food!

Processed food, but food kids would eat.

So processed, but less sugar, okay.

That's right, absolutely processed, but lower sugar.

So their dietary sugar went from 28% of calories, which is quite high

to 10% of calories.

Still not great, perhaps.

But we filled with starch, so that they would not lose weight.

Because if they lost weight, people would say,

"They lost weight, of course they got better."

What we saw after 10 days at stable caloric intake and stable weight,

every aspect of their metabolic health improved.

And I don't mean a little, I mean a boatload.

Their diastolic blood pressure went down by five points,

their triglycerides went down 46%, their LDL went down 20%,

their insulin levels went down by a third,

the glucose area under the curve went down 8%,

they had a lactate level at baseline.

You're not supposed to have a lactate level at baseline.

These kids, their lactate went down,

that means their mitochondria are working better.

Every single parameter that we looked at--

And even though you tried to make sure they didn't lose any weight.

Right, we made sure that they didn't lose weight.

So that's pretty impressive and I know you got tons of media attention for that.

We did and I think rightly so.

Obviously there are a lot of people who don't like the answer to that study,

because it goes directly to the problem.

People who don't want to take that sort of answer,

they point to the fact that there was no control group, I think.

So there was no external control, and that's very specific,

we did not include an external control,

because when you're assessing people's caloric intake,

the kinds of food they are eating, that was a lie.

So if we had set up a second external control

that was consuming the same amount of sugar,

we would've gotten it wrong.

Because we only had what they told us,

so whatever it was, we would've tried to reproduce it

and we would've actually undershot.

So we would've gotten fallacious data anyway, we knew that.

-It's hard to do this.

-It's impossible to do.

The point was it didn't matter what anybody's baseline sugar content was.

If it was 20%, we brought it down to 10%,

it was 28%, we brought it down to 10%,

if it was 45%, we brought it down to 10%.

That was good enough.

Still less sugar, and you tried to keep the weight stable as far as possible

and you got this amazing results?

Amazing results.

So less sugar, less metabolic disease, less fatty liver--

And unrelated to calories or weight.

We reversed their metabolic syndrome unrelated to calories or weight.

What that is saying categorically without doubt,

hard and fast, dagger in the heart

is a calorie is not a calorie... period.

Now I'm not saying starch calories are good,

but sugar calories are way worse.

Can you imagine how much better these kids would've been

had we not replaced the starch?

But we replaced the starch to make the scientific point.

The point is if you take sugar out of kids diets,

they're going to get better.

And you're saying that you could actually...

If you replaced it with real food instead of processed crap,

then they would get better even faster, and this is only 10 days.

Exactly and this is what we are doing in our clinic every day.

We get kids off processed food and onto real food.

-Then what happens to them?

-They all get better.

They lose weight, they feel better because now their mitochondria are working,

so they actually process energy better,

they concentrate better, they are less disruptive in class,

they're more appropriate at home and at school,

their parents say they study better,

they do better in class, the teachers noticed the difference

and they are not as hungry.

So then the question becomes, if sugar is a long-term toxin in too large doses

and especially kids, but probably everybody in the world

suffers long-term consequences from too much,

what should we do about this, what can be done?

In today's current processed food environment, not much.

This is the problem.

The change in the food environment caused the change in our biochemistry,

which therefore cause changes in our behavior.

We can't fix the behaviors until we fix the food environment,

because that's the source of the problem.

So you can't put the responsibility on people.

Well, that's the issue.

The issue is, "Is this a personal responsibility issue,

or is this a societal issue?"

I have gone on record that this is a societal issue.

In order to accept personal responsibility,

there are four caveats that have to be met

before you can ascribe personal responsibility to any given person.

Number one - knowledge.

You have to have knowledge about what you're doing.

If you don't have knowledge, how can it be personal responsibility?

Well, our public is being kept from the knowledge.

Because, number one, there are 56 names for sugar

and the food industry uses all of them.

Number two, it's not listed on the label,

so people can't know what it is they are consuming.

Number three...

... they don't know what these things are and what the problem is

and it hasn't been generally discussed.

We are doing it now.

Number two problem - access.

You have to have access to a choice.

If you don't have access to a choice,

how can you exercise personal responsibility?

If all of the food around you is tainted

and you don't live in a place where you even have access to healthy food,

because you live in a lower socioeconomic status neighborhood,

where they don't even have supermarkets, but only have convenience stores,

which only have processed foods for shelf-life.

What are you going to do? You still got to eat.

-It's not easy, huh?

-Right.

Number three - affordability.

You have to be able to afford your choice

and society has to be able to afford your choice.

And right now we can't afford that choice

and that's why Medicare is going broke by the year 2026 year in America

and why Social Security is crumbling in every country

is because you need the young people who are healthy to pay in,

so that the old people who are sick at the top to pay out.

It's a legal pyramid scheme.

But if the young people aren't paying in, because they are sick,

in fact they are taking out because they're sick,

the entire pyramid collapses.

So our societies can't afford people's choice.

And then lastly - externalities.

That is how does my bad behavior impact you?

So like for instance, if you smoke it affects me

because of tobacco smoke, asthma, pollution, etc.

If you drink alcohol, it affects me, like car accidents.

If you take drugs, it affects me because the housing prices go down

and I have to do your job for you, because you're a drug addict.

So the question is, "How does your sugar consumption affect me?"

That is clear, but...

Well, it is clear.

It affects you through your insurance premiums,

it affects you by restricting the amount of access to healthcare that you have,

because I'm chewing up all the healthcare, because I am the sick one.

And it is also bankrupting healthcare economies around the world.

This affects everybody.

Everywhere, including the UK.

That's right, and so that's one of the reasons

why the UK just a few weeks ago

said that they're going to start levying a sugar tax

starting in 2018.

I personally am not for or against a sugar tax.

I'm agnostic on the issue, I'm for reduction in consumption.

Now taxation is a way to get reduction in consumption.

It is a cheap, easy way that any government can institute.

It distorts the market, it reduces effective availability,

thereby reducing consumption.

I'm for reducing consumption,

so you might say, "Then you should be for the tax."

Not necessarily.

Here's the problem with a tax.

It's really three taxes, it's not one tax.

The first tax is the subsidy.

Because when you subsidize one thing,

means you're taxing everything else to make up the difference.

So there's already an inherent tax in everything we eat,

because there is a subsidy on sugar and a subsidy on corn, wheat and soy.

Leaving libertarians to be able to live with the idea

that you could remove a subsidy, right?

Right, libertarians love the idea of removing subsidies.

Second... the fee.

Which we call a fee for increased healthcare costs.

And that fee is levied across all strata.

You are paying more for healthcare insurance,

because of the diseases that are being generated,

because of metabolic syndrome, because of sugar consumption.

Now we don't call it a tax, but we might as well.

It's a fee, it's a tax.

They're the same.

And then finally you're adding the third one on top, the tax itself.

So you're actually having three taxes for one

when you could fix the entire problem

by getting rid of the first tax which is the subsidy.

So I am actually more for reducing subsidies than I am for taxing products.

In addition there are other ways

you could make reduction in consumption work better.

You could do something called differential subsidization.

You could actually subsidize the healthy alternatives, like water,

and you could tax say soda.

The food industry makes the water, they bottle the water.

It's the same companies.

So why couldn't you take the tax from the soda and subsidize the water?

The food industry would make the same money, because we all have to drink.

And we would be reducing our consumption

and people wouldn't necessarily even mind that they were taxing the soda,

because they were subsidizing the water.

So no extra money coming out of their pocket.

So shouldn't we encourage people to drink like tap water?

That would be even better.

There would be a terrific way.

Now the problem is that in some places like Flint Michigan,

you can't drink the tap water.

You shouldn't do that, huh?

So we have to improve potable water

and have better water purification schemes worldwide,

especially in low socioeconomic countries.

Moving away from government, you say that the environment is so bad

that it's totally hard for people to do this by themselves,

but this is the situation we are in at the moment,

so people watching don't want to wait for government to do something.

What can they do? Can they do anything?

Well, number one, they have to get educated on the issue,

because if you're not educated, you can't help solve your problem.

The issue though is that education has never solved any substance of abuse.

It didn't solve tobacco and it didn't solve alcohol

and it didn't solve illicit drug use.

But some people managed to stop, you know, alcohol or tobacco,

so, it can be done.

Well, it can be done, but it's very difficult and a lot of people can't,

there's still plenty of people who continue to smoke.

The point is that when...

...when you have a substance of abuse,

no amount of education can solve the substance of abuse,

that's why it's a substance of abuse.

Addiction means you can know that whatever it is you're addicted to,

it's ruining your life, it's ruining your health,

it's ruining your family, it's ruining your economic potential

and you still can't do anything about it, that's why it's addictive.

So, for every substance of abuse we have two paradigms in place.

We have personal intervention, which we can call rehab

and societal intervention, which we call laws.

Rehab and laws, all substances of abuse follow rehab and laws.

So we have alcohol rehab and we have all sorts of laws to discourage its use.

-Should we have sugar rehab?

-I think so.

What would that look like?

Well, number one, you and I do it, at least at a personal level,

that's what we do as clinicians.

The point is, we get paid for taking care of obese people.

Could you potentially subsidize clinicians to deliver this message,

so that they can spend more time with the patients,

doing the kind of education that you and I do, with our patients,

so that they could actually deliver that message

in an effective way, within their offices?

Right now they can't, because they're being paid on volume,

but what if you subsidized them to be able to deliver that message

and had some measures of efficacy for doing that?

You could do that, that would be personal rehab.

And then you have societal.

Should there be, for instance, money for, you know,

reducing the amount of sugar that's within the food in schools?

Should there be closure of convenience stores to children

on the way to and from school, so that they couldn't buy it?

Now there's blue laws for sugar beverages

in the same way we have blue laws for alcohol.

Okay, there are all sorts of things we could do

to try to limit effective availability

that we have chosen not to do, because people don't see sugar as a problem,

they don't see processed food as a problem.

They only see this as, "Something we want, something we like,

even if we don't need it."

And therefore, we're affecting their liberty by talking about reduction in consumption.

The point is, those people are affecting my liberty by continuing to consume

and causing Medicare to go broke, social security to go broke,

without access to physicians and basically, eating at the heart of our society.

That's quite a big problem,

you've been struggling with this for a long time.

Do see any positive movement, where you think it's heading?

Just to wrap this up.

I do see some positive movements.

For instance, in the UK, sugar tax based on the Mexico soda tax,

which was put in place in 2014.

The data from the Mexico soda tax demonstrates reduced consumption,

across-the-board it says 6% reduction in consumption,

a little less than they had hoped,

but certainly, greater than if they had done nothing,

and if you look at the socioeconomic strata,

the poor have reduced their consumption by 12%.

That's very important.

People say "Well, wait, the poor can't afford, you know, the tax."

Well, you know what? They can afford diabetes even less.

People say that a tax is aggressive against the poor,

well, diabetes is even more aggressive against the poor

and we know that the sugar in the soda has caused the diabetes.

So, that is not, that's a specious argument,

that's not a winner for the opposition.

We have seen some movement by other countries as well,

in terms of societal intervention.

India is now thinking about this, various other places in Europe,

obviously Denmark had instituted both high-fat and a sugar tax,

they have repealed the fat tax, appropriately so,

because that wasn't the problem in the first place.

And I'm hearing all the time about other countries

that are interested in finding out more,

so, I think this is where things will be going over the next 4 to 5 years.

Do you see the fight against sugar,

being something similar to the fight against tobacco,

going back 50 years?

Is it going to take 50 years?

It's 50 years, yeah.

What I see... and I will lay out the reason for this,

what I see is that sugar is like alcohol,

it's like alcohol metabolically,

it's like alcohol societally

and it's like alcohol economically.

The sugar companies, the food companies, are like the tobacco companies,

in terms of the denial, in terms of the corporate malfeasance,

in terms of fraud, in terms of the public relations,

in terms of the blocking at governmental levels.

So, we have to understand the biochemistry, which is like alcohol,

and we have to understand the politics, which is like tobacco.

And once we do, we can move forward

and finally, perhaps, win this fight against obesity, diabetes and all that.

It's going to be a long fight, Andreas and I have to be honest with you,

it took 40 years for tobacco to finally be brought to heel,

it's taken a very long time, even though we've known about trans fats,

to finally get them not generally recognized they are safe,

that took 25 years.

These are slow processes.

I just read in a paper in The Guardian, an article in The Guardian,

which you know about, called "The Sugar Conspiracy".

There was one particular comment that I loved.

That there was a paper that came out last year,

called "The science advanced one funeral at a time"

Meaning that the old guard has to die out,

in order for bad ideas to finally go away.

This is going to take a long time.

What we are seeing is the old guard, the dinosaurs, if you will, of our field,

continuing to expose "This is about calories, this is about overeating,

this is purely a personal responsibility issue."

And we're starting to see young people like ourselves

and, you know, some of our disciples,

started to recognize, "No, this is a societal public health problem."

and I expect the balance to shift over the course of the next 10 years.

And, at least in some small parts it's your work, I guess,

because you've been one of the leaders in this movement for a long time.

Let's put this way - I didn't come here to come here.

I came here because of the science,

the science brought me, if you will.

I was a pediatric endocrinologist, I took care of short kids

and then, the short kids got fat on me,

and it happened on my watch.

And then I started doing a research in it and realized, you know,

what I thought was the problem, wasn't the problem.

That's what research is, research is debunking dogma.

We've held a dogma for the last 40 years,

that the low-fat diet was the right diet

and that was a dogma, because there was no data to support it,

even back in the 1960s and 70s,

but we accepted it as dogma.

And as far as I'm concerned, there's only one dogma...

There is no dogma, that's the only dogma.

Because whatever we believed 10 years ago, was already wrong,

whatever we believe today, will be wrong 10 years from now.

I'm very prepared for me to the wrong 10 years from now,

but today I'm right.

And at least, less wrong than what people used to believe--

Yeah, because research is not a direct line, it's a bunch of zigzags,

you get closer and closer and closer to the truth.

But the question is, if you never do anything,

because you're never absolutely sure,

then, you'll never solve any problems.

This actually has a name, this philosophy of doing nothing.

It's called the pessimistic meta-induction theory.

And there are nutritionists who call themselves advocates,

who expose this, whose names I won't mention,

but who are actually doing more harm than good.

The question is, how do you know when you have enough science to act?

And what I'm saying is we now have causation

and it's hard and fast. It's time to do something.

And get closer to the truth.

-Thank you so much.

-My pleasure, Andreas, always.