DarkHorse Podcast with Geert Vanden Bossche & Bret Weinstein...

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**SPEAKERS**

Geert Vanden Bossche, Bret

**Bret** 00:04

Hey folks, welcome to the Dark Horse podcast. I have the great pleasure of sitting today with Garrett Vanden bush. Garrett Vanden bush is a doctor of Veterinary Medicine who has specialist expertise in viral ology. And vaccinology. He has worked in industry in the construction of vaccines, he has also worked in the nonprofit sector in bringing immunity to larger numbers of people. Welcome, Garrett.

**Geert Vanden Bossche** 00:39

Thanks for having me.

**Bret** 00:41

So you have become well known in certain circles, and controversial of late because you have deployed an argument that suggests that the current campaign to vaccinate large numbers of people in the midst of the covid 19 pandemic may be ill advised, and I have seen, you have been accused widely of being an anti vaxxer, which is completely preposterous in light of the career that you have you have participated in? Do you want to say any words upfront about where you're coming from, in deploying your warning, and then we can get into some of the biology that will be relevant to the argument that you're making? Well,

**Geert Vanden Bossche** 01:27

but what I could say is that, for me, the alarming points game was when I realized or we realized as a community that all of a sudden, this was back in November last year, a number of highly infectious variants were popping it almost simultaneously. That was one thing. And the second thing was when vaccination started that there were some reports that were reporting indeed about, you know, people being vaccinated and still shedding virus. So the combination of these things, the presence, even before mass vaccination started, of highly infectious strains that were already present. And then this combined with the fact that the vaccines as most vaccines do not prevent against infection, and enable people who are vaccinated, to shed the virus and basically to spread it. So this was the fourth video alarming point.

**Bret** 02:28

Interesting. So from my perspective, one of these things, it seems to me is obvious that we would see it is essentially no matter where this virus came from, we would expect in light of the fact of effectively a point source, we would expect a large number of variants to emerge on the basis that this virus is new to people. And it is now experiencing a effectively a very large canvas on which to learn new tricks. So I find nothing surprising about the idea that new variants are popping up, we should have expected that. The other point that you make is not so obvious, from my perspective, that people who are vaccinated may still be shedding virus. In other words, they do not have immunity sufficient to ward off the infection and prevent them from infecting others. Is that is that what you're saying?

**Geert Vanden Bossche** 03:26

Yeah, but this is this is pretty normal for conventional vaccines. There is there are only a few, very few vaccines and you would rather need to look into life vaccines live attenuated vaccines, most of our modern vaccines prevent against disease. And to some extent, they diminish, of course, the the spread of the infection, they diminish the viral load to some extent, really substantially, but they do not completely prevent infection.

**Bret** 03:55

Yeah, so this then sets up a hazard in the form of a trade off that the vaccines are very good at preventing people from becoming sick. But by being narrowly focused and not preventing the shedding of virus, they open an evolutionary pathway for the virus to learn new tricks, because that is to say somebody who has substantial immunity, but not complete immunity to the virus will will tend to shed new variants that have making made use of that higher bar or that have cleared the higher bar.

**Geert Vanden Bossche** 04:37

Well, if the variants are present already, which was the case before the mass vaccination really got got rolled out the mass vaccination campaigns. And, of course the we are talking about the spike Ruby, I think everybody by node knows more or less about the spike protein. As we know the version of the spike protein in the vaccines is not the same As on the variance, so they are the result heterologous situation. And therefore, it's also logical that when you are vaccinated, but you are exposed to a variant that has a different version of the protein, that the S protein may not be completely recognized by the vaccinal antibodies, and therefore not completely, completely neutralized, for example, so that is pretty logical, it only becomes a problem, I guess, if you do this at a very large scale, and that is my argument, the mass vaccination in the midst of a massive infectious pressure, which is the case during a pandemic, of course.

**Bret** 05:41

Alright, so here's my suggestion, in order for people to understand what is I think a fairly subtle distinction, deploying a vaccine, like one of the ones that we currently have narrowly targeted at the spike protein in advance of a pandemic might work very well. And in the midst of a pandemic might have exactly the opposite impact. The The reason for that is clear enough to me, but I think it will be obscure to almost everyone. So let's talk a little bit about the immune system, how it functions so that people can understand the context of your argument. So I should say, my background, I did not, I have no degree in either virology or vaccine science. But I did study this many years ago, in the context of basically I took a course in the medical school that I was interested in, in immuno biology, which is basically the biology of the immune system that underlies both the natural immunity that we have, and the immunity that we create with with vaccines. So we essentially how we can dichotomize the systems that create immunity in a number of different ways. One of them is that we have something called innate immunity, these are the ability to recognize pathogens or other disease causing patterns without needing to have any exposure. And then we have what's called acquired immunity. Acquired immunity is, for example, people all will have had the experience of getting sick with something a cold or a flu. And then a couple of weeks later, they will find themselves recovered. And what has happened is that the immune system has learned the electromagnetic signature on the surface of the the, either the viruses or the cells that have been infected. These are called antigens. And having learned that specific pattern is then very good at finding cells that have been infected, and destroying them or triggering them to self destruct. And once you have that, then set of memory cells are created so that if you ever encounter the same pathogen, again, creating the same antigens, the immune system is so quick to recognize that that we very frequently don't even realize that we've been invaded, right. So you don't tend to get the same cold twice or chickenpox, for example. Alright, so what I want you to do, I'm going to sort of stand halfway between what you understand and what my audience is likely to understand and just try to paint with a broad brush, some detail about the systems here so that people can follow. So the acquired immunity is carried in two kinds of cells. Broadly speaking, we've got B cells, which make antibodies, people will have heard the term antibodies antibody is basically a y shaped protein. And that y shaped protein floats freely, and it sticks to things based on the electromagnetic, the pattern of electromagnetic magnetic charge on the the pads on the tips. And so those antibodies float around and they attach themselves to bacteria or to virally infected cells. And that has a number of consequences. And then the T cells function very much like B cells, except that instead of creating fleeth, free floating antibody, the what look like antibodies remain on the surface of the T cells and they function as receptors so the T cells move around. And when they encounter something that their receptors stick to an antigen for which they're well matched, those T cells become triggered to do something. How am I doing so far?

**Geert Vanden Bossche** 09:38

Yeah, that's, that's okay. So there is just the T cells that then then can immediately destroy the infected cell because as you were pointing out that recognize an antigen of the pathogen on the surface of that cell. But there are also the T cells that will provide the help to the B cells in order to build that memory. If there is no t help, there will no be no B cell memory. So there is two types of T cells that are important to help ourselves to enhance the B cell response and decide to toxic T cells that have the capability to immediately destroy a cell, an infected cell, provided they recognize the antigen on the surface of that cell.

**Bret** 10:21

Great. Alright, so help me remember that we want to come back to that so people understand what it means. What I want to do is talk about the way in which acquired immunity is acquired in the first place, so that we can then understand what these memory cells are. So acquired immunity, I must say is one of the most fascinating evolutionary processes I've ever heard of the first time I learned of this, my jaw was on the floor, it was so interesting that such a system had evolved and existed and functioned, without our awareness 24 hours a day, every day of your life. So the system functions more or less in this way, you have a an array of cells that produce antibodies, which have an ability, sort of a general ability to react to any large organic molecule, any configuration of charges that an antigen might have is contained in the system, there are multiple cells in the system that will react to it somewhat. So you have billions, billions Is that the right order of magnitude, maybe it's 10s of billions

**Geert Vanden Bossche** 11:33

of well, it's a huge amounts. Anyway, it's a

**Bret** 11:36

very large number of these cells existing in your body that have a very wide range of patterns of antigen that they can react to, and you have these things before you're born. Now the system will react really in principle to any sizable organic molecule. But it's very important that it not react to molecules that you yourself make. And so what happens is the system during a critical period of development, eliminates all of those cells that are triggered by your own molecules. And the fact of being a mammal plays into this very interestingly, because there's a period before you've been exposed to the world where the only molecules you're encountering are your own. So the system wakes up to all of the members of the this class of cells that react in utero, and it eliminates them. Now what that does is it creates a system that once you've been born and you're out in the world, and you encounter molecules that aren't yours, the system reacts. But when it encounters molecules that you're making, it doesn't. So it creates a self non self recognition system

**Geert Vanden Bossche** 12:46

called tolerance. So the self antigens,

**Bret** 12:49

right, we become taller. And if you weren't tolerant, you'd have an autoimmune disorder, your immune system would be attacking your own cells. And maybe we'll talk a little bit about what that might represent later on. But the what I want to get people to understand is that the system in its initial state just simply reacts to anything that isn't you, right? And what isn't, you might be a pathogen, or it might not right, you could breathe in some pollen pollen isn't actually utilizing yourselves to do anything. It's just an organic molecule that you've inhaled, and your system might react to it as if it was a dangerous, that would be an allergy. But when you are invaded by let's say, a bacterium or a virus, you are suddenly creating molecules that your system has never seen, and your system begins to react. But at first it reacts very weakly, because it doesn't have a very good program for recognizing this specific new invader. It has a very general program that just recognizes anything it does, it hasn't seen before, right. But this is the really amazing part, the cells that react a little bit to this new pathogenic pattern, those cells create a bunch of offspring cells that are not identical to each other. And those cells among the offspring, cells that react even more strongly to the pathogen are then triggered to produce more offspring cells. And so what this does is it uses quite literally evolution to generate a recognition of this new pathogen that your body has never seen. But it learns over the course of hours, days and weeks to recognize this new pattern and it becomes very, very good at right at the point it has become very good at it so it can recognize any place in the body that's making these new antigens, then it is capable of fending off the pathogen. as you point out the natural killer cells actually know the natural killer T cells will come in and kill cells that have been infected by virus and the body will in many ways clear The the infection

**Geert Vanden Bossche** 15:02

or the cytolytic T cells, or cytotoxic T cells,

**Bret** 15:06

cytotoxic T cells, okay, so having done that, so imagine you got sick, you breathed in a virus, maybe it was a cold, it invaded some cells, those cells started to make viral particles, those particles got recognized by the adaptive immune system, the immune system got very good at becoming specific and targeting those antigens, the affinity for the antigens went up. And then you eventually clear the infection because your system is good at recognizing it. And then your system goes in, it produces memory cells, these memory cells remember the formula so that if they are triggered again, they can immediately create a large army of cells that are very specifically targeted at that pathogen. Still, right? Well, yeah, okay, good. And then you point out that the helper T cells are actually involved in helping to trigger B cell immunity in the adaptive immune system, having discovered the formula for for the particular pathogen.

**Geert Vanden Bossche** 16:14

Yeah, well, this process that you were describing maturation and acquisition of memory, is t helper cell dependent, it depends on the support the assistance of T helper cells.

**Bret** 16:28

Great. And so in the context of COVID, people will have heard a discussion about whether or not the infection with the virus or the vaccination triggers a robust B cell response, they will we will be able to detect an antibody titer that is the degree of antibodies that we find. A deeper question is how, how well how much affinity do the antibodies have for the antigen and question which will vary based on whether or not we're talking about the variant of the virus that the vaccine was built to recognize or a new variant, right, so the affinity could drop, but wouldn't drop to zero? And then there's a question about whether or not the system that creates the antibodies, which would create a short term immunity, has converted over into a system of memory that would allow long term immunity to exist. So we talked about the cellular immunity having been acquired, and that is much harder to test for, it's very easy to test for antibodies in the system. So you get the vaccine, your antibody titer goes up, we can measure that with a simple blood test testing whether or not you have long term immunity based in cells that have a correct memory is tougher, but still possible, am I right?

**Geert Vanden Bossche** 17:52

Yeah, but the B cells also do have memory, right. And in order to, to get that memory, you have to boost you have to you need to boost an injection for the most of the vaccines. So it's not just, it's not just the T cells that have memory, it's also the B cells and you need that memory also of the B cells in order to to recall your antibodies after the re exposure of course to the virus or to the antigen. So what you have as well, B cell memory as T cell memory, great,

**Bret** 18:23

okay, and the So, people can also now understand, in some sense why some of these vaccines require two doses, right? So the vaccine is entering your cells. Let's take one of the mRNA vaccines as an example the mRNA, which encodes the spike protein is introduced, it is taken up by cells, and actually I'm a little unclear on why the lipid nanoparticles cause it to be taken up into cells given this is effectively like a synthetic virus that we introduce an mRNA surrounded by lipid nanoparticles. Can you explain why it is taken up by the host cells in the lipid nanoparticle

**Geert Vanden Bossche** 19:11

is liquid nano particles will simply enhance the uptake of the because you could say if you would have the mRNA as such, it would be very soluble and you know it could go anywhere. Whereas the lipid nanoparticle has a higher affinity I would say for the cell, the cell membrane, because of all kinds of interactions, you could say hydrophobic interactions between the lipids and and the organic phase of the of the cell membrane. So that will enhance the uptake of the of the mRNA because of the particular structure one and second, because of the physical chemical nature of this particle, which is now a lipid nanoparticle and also the size. nano sized particles are readily taken up into what we call you know, Well, as well as presenting cells as normal cells, for example, it will it will, it will promote and it will enhance the entry of the mRNA in the in the target cell.

**Bret** 20:11

Okay, beautiful. So I think what I've just heard you say is that you have an aqueous environment, that is to say, a wet environment of the blood and the lymph, they're primarily made of water, the cells are surrounded by fat, which is obviously not water soluble. And by putting the mRNA inside effectively, a globule of fat nanoparticles, the affinity for the cell, these basically drives these mrnas into the cells, which then transcribe them because one of the things that goes on inside of cells is that mRNA is transcribed just to do the normal business of the cell itself. Okay, great. So what we've done so far as we've talked about, the adaptive immunity system, which through a process called clonal, selection actually evolves to be able to target and eliminate or control an infection once acquired, but this is not the full basis of our immunity to pathogens in the world, we also have innate immunity, that is to say immunity that does not require exposure in order to develop. So can you describe the basis of innate immunity?

**Geert Vanden Bossche** 21:28

Well, I'm going to limit myself to the equivalent the human role, so the antibody part and the cellular part of the innate immunity, because that is really what is most important for this discussion. So, as you were pointing out, you have the antibodies as you describe being part of the innate immunity are sort of a big part of the acquired immunity specifically or First of all, they specifically recognize an antigen and they can also induce memory, these B cells can have memory and therefore produce antibodies, that will readily recognize the antigen upon re exposure. So, the equivalent in the innate immune innate immunity or what we call natural antibodies, those natural antibodies are produced by what we call an innate like B cell, right Is this a B cell that is already pre programmed is already present at birth, right. So these natural antibodies, in contrast to the antibodies produced by the B cells of the acquired immune system, have no antigen specific specificity, they can recognize multiple antigens, and they are not recalled upon re exposure. So that is the humoral part of the innate immune system, then the cellular part, the cellular part is in contrast to the T cells, we were talking about, not able to recognize a specific antigen that is presented, for example, or on an infected cell. But the cells that have the innate immune cell of the innate immune system, we call them natural, natural killer cells, like you have the natural antibodies of the innate immune system, you have the natural killer cells of the innate immune system, they recognize in a nonspecific way, a kind of array of motifs on the surface of an infected or pathologically altered cell, like a cancer cell, for example, they will recognize motifs, a pattern of motifs, so this is not very specific for an antigen. But if, for example, a virus invades that cell, and there are some proteins that are presented on the surface or some glycans, then this lichens for example, Bill built a pattern and these patterns will be recognized by the NK cells. NK cells, again, have no memory, but they can act very, very fast, like the natural antibodies, they are already there, they are pre armed, they are pre pre programmed, so they act immediately. This is really the first line of immune defense when a pathogen gets in.

**Bret** 24:19

Fascinating, okay, so you have a system that reacts more or less to the symptoms at the cellular level of pathology, the cells are behaving molecularly in an unusual way that triggers these natural killer cells, and they don't need to learn any new tricks. But they also are limited in their capacity, because they are not specific so they can recognize the pathology and react, but to specifically recognize the pathogen and its molecular consequences, requires this acquired immunity. Alright, now, I hope we haven't antagonize people by leading them through that biology. But I know for experience that listening to conversations about COVID? If you don't have this basic level, you can't understand what's being said and why it might be true. You have no, it doesn't. It doesn't add up, the complexity of the system is inherent to understanding how it works, and what is reasonable to do in response. So all right, let us get into your argument about the hazard of our current vaccine regime. And let me say, you have made some very strong claims, you have argued that, in fact, the vaccine campaign that we are currently engaged in is so dangerous, that it should be halted. And I will say, I don't know if you're right, I cannot, I cannot determine based on what I understand if you're right, but what I can say is that you are making sense, right? This is frightening in and of itself, that your argument is completely coherent, whether or not it is true, this is at least a question that should be engaged by those who are making policy around this because the possibility of making our viral situation with respect to COVID worse is present. And, you know, we, we are creating the hazard of the future that we will be confronting a year or two down the road, by our actions now. And so where are we to have reacted differently at the beginning of COVID, we might not be in the situation we're in now, where we to act differently now, we will be in a different situation years down the road. And so we are always sort of setting the stage of our next battle. And it is in that context that we have to engage your arguments and take it quite seriously. So what in a nutshell, is your argument for the hazard that we may be creating.

**Geert Vanden Bossche** 26:59

So my argument is, first of all, as I was always saying, these vaccines, or wood would be perfect to be used outside of a pandemic. why I'm saying this, because if you use them, if you use vaccines before you get exposed to the virus, well, in this case, it's a virus, you can build a full fledged immunity, as you were pointing out great, this takes time. Most of the of the current vaccines even require two doses, you have be pointing out about this, this clonal expansion. In the meantime, you acquire memory, you acquire higher affinity etc. This is a process before you acquire the full fledged immunity. So if you have this full fledged immunity, and then you get exposed to the pathogen, you literally have everything you need to fight off this pathogen, right? And and there is absolutely no problem. And that's what I'm always what I have always been saying, I'm not talking about maybe secondary effects or adverse events, etc. This is not my field of specialty, other people can discuss this. So I'm not talking about really the quality of the vaccines or adverse events. But in principle, this is a correct vaccine to be used outside of a pandemic. So let

**Bret** 28:27

me just pause you there. Let's say just hypothetically speaking, let's say that the virus had emerged in Wuhan. And the world had limited it spread, let's say that it was kept to Eurasia, and the rest of the world had not faced the virus, then if we took one of these mRNA vaccines, for example, and vaccinated the population so that at 90% of the population was vaccinated before encountering the virus before the virus crossed any ocean, for example, then we would expect this to work very well. Sure. And the hazard of it would be low. Even if it was true that it only produced let's say, 80%. immunity. And even if it was true that people shed some people who were vaccinated, but then became infected, did shed some virus and occasionally infected other people. Is that fair to say that this still be a reasonable? Yes, a reasonable campaign?

**Geert Vanden Bossche** 29:42

Yeah. The only thing I would like to add read just to be clear for the audience, is that here we are talking about the original virus about the wildfires, the original boom fires, right? We are not yet talking about variants. Right? Under that assumption, what you're saying is perfectly Correct and fine, because even if you don't prevent infection completely, and you diminish only the viral load, as long as the virus will have not, they'll not have enough opportunity because the infectious pressure is so low to propagate, it will, it will die out. So that is perfectly fine. And so you can control it.

**Bret** 30:26

So this is the thing that I think is too subtle for most people to to get, and hopefully we can help them see the difference. The vaccine, from the point of view of the patient, the patient goes, they get they, you know, go through whatever anxiety they have about needles and unknown hazards of vaccines, and they get their shot, that looks the same to people, whether they're being vaccinated in the midst of a pandemic, or in advance of a pandemic. But from the point of view of the evolutionary landscape, these two things are completely unrelated, right? Introducing the vaccine when the, the virus has already gotten a foothold, and has started to diversify. Getting a vaccine is actually, you know, it's like, showing up. Imagine that your nation was being invaded, right. And there's a question about how useful your rifle is, when the ship, you know, some little boat with 12 people on it shows up on the shore, your rifle might be very useful, right? If you show up with that same rifle against an army of 10,000, you're gonna get shot and you know, you may actually be in a worse position, because you'll give away, you know, you're shaking your finger,

**Geert Vanden Bossche** 31:45

especially if this happens, before you can completely charge your rifle. Your arm is not fully charged, and you're already under attack.

**Bret** 31:55

Right already under attack. So this is I mean, in some sense, this is, this is very straightforward to me, because I'm used to thinking in evolutionary terms, right. And so the idea of, to me, the virus looks very different, even though the particles may be very similar to each other. The virus looks very different, when it has a huge number of individuals in which to engage in evolutionary experimentation, versus a tiny number of individuals, where the chances of it happening on anything useful are very small, right? Once you've got the huge Canvas, the chances that the virus is going to learn new tricks are 100%. And in fact, it's doing it and you know, as I said, at the top, no surprise at all, that us having botched the initial reaction to the virus, which frankly, in my opinion, could have been much stronger, right, we could have had a much more intensive campaign to, to control the spread of the virus early on, and we might not be dealing with this, you know, half assed long term, you know, set of measures that are increasingly draconian, and having all sorts of other effects a short, intense control effort would have been more effective. In part, the reason that I say that is because it's just much easier to address, you know, if this was an invasive species, and there are 10 individuals, right, finding them is very effective, you can find them, you can eliminate them, you're done. Once the thing has covered the landscape, it's a whole different puzzle, even if the the individual critters aren't aren't very different. So all right, we've got a difference between these vaccines and their utility in advance of a pandemic versus in the pandemic. We are in the pandemic. And now what do you see the hazard being of a mass vaccine campaign?

**Geert Vanden Bossche** 33:52

Well, right. So these vaccines will definitely induce an immune response. That's what we have been explaining. So what we know is that it takes time to develop an immune response. So during that time, your immune response is not optimal. Right, it's not fully mature. That is one thing. The other thing is we are already dealing before we started the mass vaccination campaign before they got rolled out properly, we had already variants. So, again, the immune response that you are mounting when you have been vaccinated is suboptimal towards a variant that has a spike protein which is different from the spike protein in the vaccine. So the vaccinal antibodies against the spike protein are suboptimal because the is protein of the variant is not the same. So we are when we when we are vaccinating people as I was saying, your your going to war that your arm isn't charged yet, you're already fully under attack, and you still need to mount this antibody response. And you are attacked by things that you have not learned to properly recognize. So the immune response is suboptimal. So now, so this creates what we call an immune pressure, a pressure is suppressed, it's definitely a pressure on the virus that the virus isn't happy with, with with with with his immune response, but it is going to be able to adapt to that immune pressure. Why am I saying this? I'm saying this because

**Geert Vanden Bossche** 35:37

when you have whenever you have to adapt a virus or a microorganism, but I'm talking about viruses to unfavorable conditions, let's let's let's say you you would like to do this in the lab, you have a virus, and you would like to adapt the virus to an unfavorable condition, that unfavorable condition could be cultivating, for example, an influenza virus on eggs, instead of on a cell culture, or incubating your virus on a temperature that is not ideal for the cells to grow and for the virus to produce. But it could also be doing favorable condition could also be an immune pressure antibodies, for example, that are present. So if you would like to do this in the lab, you would like to adapt a virus to unfavorable conditions, what you would do is you would take that virus, and you would put it on a cell line in the presence of those in favorable conditions. So it is in this case, it would be a sub optimal antibody dose, let's say. But then that is not sufficient, because of course, you have always, and that is the argument of many people. Yeah, you have all the time variants and mutations, etc, of course, but now, you will select certain mutations that are capable of dealing with this unfavorable condition. Right, so you will select those variants. But that is not sufficient. Because it's not because we have done the selection one single time that this variant is now going to become dominant in the population, it will still have a very low, we call this a viral titer, a very low concentration. But now if you take that virus, or, you know, the oldest viruses, and you're now going to inoculate this on another cell culture under the very same conditions of immune pressure, and then you do it again and again and again, then ultimately, this mutant will adapt to these unfavorable conditions, and it will have a competitive advantage compared to the original viruses. And that is how, you know in the course of time, this population of this Newton set originally will only present a very low concentration will now become predominant. So now you translate your extrapolate this to people, what you're going to do, in order to be able to adapt to adapt a viral mutant, you would need to passage a virus from one person to the others. But in order for a virus to be able to adapt, it would be important that these people are under the same immune pressure, also experiencing a situation of sub optimal immune response. And what I'm saying is that if you are already having variance before you start your vaccination campaign, and then you're immunizing in the heat of the pandemic, where while the immune response is build up, you're already under attack. Many many people of course, in such situation are going to be to be experiencing a suboptimal immune response. And hence, this will enable utens that occasionally emerge, of course, to adapt and to gain a competitive advantage and to become dominant in that population. And then of course, we have a problem because this is what we call selective, selective, immune escape. You select it and you enable the virus to adapt to that situation. So it becomes predominant. And that is what we are seeing right now as soon as you have any fixes Varian popping up. Guess what I mean, it takes like a few weeks or it becomes pretty dominant in the population.

**Bret** 39:29

Okay, so let us build on the analogy of, of war. To see your argument more clearly. When we send soldiers to war, we send them to boot camp first. Okay, boot camp is like the vaccine, right? We expose them to something that is war like, without there being an actual enemy so that the soldiers can learn to fight that enemy in a comparatively safe context before they fail. The actual enemy. If you send your soldiers to the front before you send them to boot camp, not only will they be vulnerable, but they will end up training the enemy on how to exploit their weaknesses, right, you want to eliminate the weaknesses first. And so in effect, what you are saying is that by deploying this vaccine in the context of an epidemic already underway, we are effectively sending soldiers to the front. And we are, yes, it is true that the soldiers will learn to fight on the front to the extent that they can survive, but they will also teach the enemy to fight even better. So you are entering an arms race at a disadvantage rather than an advantage. Now, if we extend the metaphor a little bit, let's imagine so the whole system functions based on the ability to recognize the enemy and see it very clearly, right? You could imagine on the battlefield, this would make sense to the extent that some enemies are very good at camouflage themselves, those enemies tend to persist. To the extent that some enemies are obvious, they tend not to persist because they get shot. So imagine that we did some trick with the camouflage that the soldiers on the front wore, were those that persisted the longest, their camouflage spread itself and those that died early their camouflage went extinct, right. So over time, the camouflage would get better and better. By exerting this pressure, you are arguing and I think there's no question that this is accurate, we are effectively running what would in the laboratory be called a serial passage experiment, we are creating those exact conditions in a context where there's a huge landscape of virus already adapting to the inability of the immune system to see certain things. And I would add one thing to your description so far, which is that the nature of these vaccines, part of the magic of them, the ability to generate them so quickly, has to do with how utterly narrowly focused they are, instead of doing something traditional, like taking a virus and inactivating it and introducing the whole virus into the body. So the body sees the whole thing, right, we've narrowed the focus down to the spike protein itself. And not only that, we've narrowed it down to the spike protein of the original virus. And this has created a very concentrated pressure, which means that we're trying to inform the immune system of exactly what the enemy looks like. And we've honed in on one characteristic, and that means that if the virus can change that one characteristic, then suddenly it becomes invisible. And so we are effectively setting ourselves up for an evolutionary failure by concentrating our response and introducing it on the front rather than in advance of the encounter. And you know, again, I don't know that your argument is right, but I can say it's very clearly plausible, and the hazard is potentially immense.

**Geert Vanden Bossche** 43:14

So the thing I would like to to add to this, Brett, which is a very objective arguments, we absolutely needs because otherwise, we're not not the boat of it, but the community is going to turn around in circles. And of course, I can understand that the resistance is enormous, that we absolutely need criteria that we agree upon. that would that would enable us to distinguish whether human intervention, whether this is mass vaccination, or the mass prevention if infection prevention measures are both combined, in use in unescape. So what would be the criteria that would be generally acknowledged and accepted? What is B, for example, dramatic increase of more infectious variants, for example, what is B, really resistance to the vaccine? So ultimately, what is B that we have more and more younger age groups that become infected? So there is a number of criteria that could be defined, and that according to my humble opinion, clearly illustrates that there is a huge impact of human intervention on the way the virus evolves and on the collective the collective immune response of the population in the dynamic set off. But as long as we don't agree on upon this criteria. My fear is that mass vaccination will continue no matter what till everybody gets vaccinated. It's no longer a question of immune defense. Building an immune defense, it becomes a question of vaccinating everybody, which is not the same, certainly not within the context of this complex phenomenon, the pandemic, combined with human intervention.

**Bret** 45:14

Yes, so I, I like what you're saying very much about the criteria, I have a concern or two, some of the criteria are likely to occur either way. So for example, let's just take one, you talk about the potential for the increasing vulnerability of the young, and we have not yet described why it is that the young might be anomalously immune to COVID, which they seem to be we'll come back to that. But one thing that is certainly true is that the young to the extent that they do not seem to come down with COVID, and when they get it don't seem to have very severe disease, in general, represent an opportunity for any variant that can figure out how to bypass effectively what must be their innate immunity, that is preventing the disease. So that opportunity exists, whether we vaccinate or, or we don't. And it is, in fact, one of the reasons, you know, the argument that I would make for a very intensive campaign of behavior modification to control the virus, which, you know, this, the ship has sailed, but we should very early on, have treated this much more carefully. Because now that it is out in the world in such large numbers, there is nothing to stop it from discovering a pathway to infect the young, right, it is always hovering at the door, and it may eventually figure out how to how to accomplish that, just as it may eventually figure out how to spread outdoors, something that it does not seem to do well yet, but is an opportunity, you know, to the extent that some of us are using the outdoor environment, effectively to engage in social behavior, because the environment itself protects us, that's an opportunity if a virus can figure out how to endure UV lighter, or whatever else it's doing. So how many of your criteria will separate the natural evolution of the virus just by virtue of the fact that we have an uncontrolled pandemic from the evolution of the virus driven by a targeted at broad scale vaccine campaign?

**Geert Vanden Bossche** 47:27

Well, that is exactly what the criteria should be based upon. And I guess the only competitor we have unfortunately, is almost like the flu pandemic. 1980 why I'm saying this because this was clearly a pandemic of a respiratory virus, where there was no human intervention, infection prevention measures were very, very, very limited, it was war on top. So you had crowding you had very bad hygiene, hygiene, hygiene conditions, etc, and it was no vaccine. So, there first of all, what we have seen, we have seen no variants, the whole thing happens within one year. And and people have been sampling or analyzing autopsy samples to see whether there was any variation in the in the strains that you know, during this pandemic appeared in several different parts of the world. And it was very homologous. So that is one thing. Now. So that is that is very important because it is a high infectious pressure and natural pandemic, no human intervention. So if you imagine now that we have, like, every second or third week, we have a new infectious variant appearing. And not only is this a more infectious variant, it's very often also much more infectious, like the Brazilian compared to the UK, etc. And it all appears very rapidly. It's not like during evolution, of course, you know, these things appear. And if they have a competitive advantage, they will replace the original status right. Now, all this is happening multiple variants within a short period of time, with dramatically increased infectivity. And this is in parallel with with with the mass vaccination campaign. I mean, as I was saying, you have the same pandemic. Well, it was flu, of course, nothing happens in 10. In terms of variants, there were a few mutations. But here the mutations are very clearly targeted, they are selected at domains that enhance the infectivity bars. So they are not like random, random they are really selected towards parts of the of the spike protein that are responsible for infectivity. So I mean, there is something there, right? Oh, yes. We need to agree upon this. Same, same for example, if you look, if you imagine now, the city In Chile, for example. Okay, so you are vaccinating, you're vaccinating on a background of a variant that had just appeared, right? I mean, the Brazilian, Brazilian ferien. So this Brazilian variant is, of course, pretty much different the S protein from the s protein of the vaccine. If you know start vaccinating people, of course, this variant that just emerged is going to have a competitive advantage because it's more infectious. And what you'll want to do with your antibodies is to prevent infectivity. So now all of a sudden, you see how this variant is exploding. And you see the infectious rates that are dramatically increasing. So all of a sudden, you have a much higher infectivity rate, right. And so there is other criteria as well that we could. The limitations are, of course studies and we see more and more that they are also now converging towards domains that are targeted by the factional antibodies. This. So if you take all these things together, we should be able compared, as you pointed out correctly, to a natural pandemic, to observations that are really hot, a very, very strange, and that according to my humble opinion, could be correlated with at least I would say, human intervention, right in this pandemic.

**Bret** 51:24

So if I can make that a little bit simpler, what you're saying is a something that surprised me the first time I heard you say it, which is that in the 1918 pandemic, there was apparently there were no widespread variants. And we know this, from the comparison of samples taken during autopsy. So that shocks me, I think what it suggests is that the evolutionary experimentation took place before the pandemic, that effectively the virus got very effective at transmitting in some small population that wasn't captured in the autopsy samples, maybe it wasn't even recognized as a unique disease. And that by the time it circulated around the globe, it was already highly effective. And that in this case, we have Well, a I would say, the anomalous fact, of this virus, apparently, having emerged in the human population already highly effective, we have no evidence for that experimental evolutionary period at the beginning, which is one of the reason that many of us believe the laboratory origins hypothesis is probably correct. But in the context of this vaccine campaign, what you're arguing is that we are seeing exactly the pattern of change that you would predict, if we were creating this inadvertent serial passage experiment in the human population, we are putting pressure on the spike protein in this narrow way, we are seeing change in the spike protein and in exactly the domains that would cause immune escape, and that, you know, the let's put it this way, I think the presumption would have to be that we are driving that change, or at least accelerating that change by virtue of the very intense and very narrow evolutionary pressure that we are applying to the virus.

**Geert Vanden Bossche** 53:23

Well, frankly speaking, but if you would ask me set up an experiment where you adapt a variance to immune pressure we do it in humans, or do you deal with the the mammalian population? What would you do? You would of course, first of all, make sure you have a high viral load, you would make sure that as many people as possible or in the same situation have a suboptimal immune, immune response. And, I mean, if you have already, if you can already start with variants where the match is already suboptimal, then it's even better right? So that is exactly what you will do. That is exactly what you will do to adapt very, and what what what is very song rate is the kinetics of all this, this is all going very, very fast, right? I mean, the appearance, the emergence of all these variants, and I mean, as I was saying, there is probably a whole series of variants that that have not been identified yet and, but it's not like any variants. Many of these variants are selected to words for example, a higher higher infectivity, and when we come now more and more modality, bodies etc. We see already that some of these mutations or abolishing the effect of certain antibodies within within the polyclonal serum of the vaccine Allah antibodies, so it is very well directed, it is fast, it is pretty huge. Because I mean, as I was saying, if there is As a mutation just by an antigenic drift, for example, and that mutation happens to be a little bit more infectious than the original three, then in the course of time, it will take over, but this will be pretty slow, right? evolutionarily speaking, here, these things are, like accelerated enhance. And it's difficult to deny that this is not really in parallel with, with with with the best vaccination campaigns or with with human intervention, because as we were saying, during the the flu pandemic, nothing was seen. And you could argue as well, people must have mounted antibody responses, right? During the flu pandemic. I mean, it was not like, there's no immune response.

**Bret** 55:43

So you have said, if you were going to set up an experiment to induce the effectively gain of function here, it would look more or less like this campaign, I would say evolutionarily, we can describe this very simply that effectively we have given the virus a gentle evolutionary evolutionary slope for which it can discover high infectivity and escape from immune surveillance. So that's all that's all quite frightening, that not only does the pattern in the wild seem to match the fears of somebody who is well positioned to say, here's what you would expect to see if my hypothesis is correct. about, about immune escape. So that that raises a number of different questions. I mean, it raises the question about what should we be doing vaccine wise?

**Geert Vanden Bossche** 56:51

well read, I'm a little bit irritating. If for a second, we should come back to the innate immune response,

**Bret** 57:01

oh, and connection to the young. Because,

**Geert Vanden Bossche** 57:05

because, I mean, you could say, well, if there is immune escape, worst case scenario is that the vaccine won't work anymore. And that is the then the other argument, we will produce new vaccines, right. But my main argument, really, that is my key argument is that even though the antibodies may no longer neutralize the virus, they will still be able to bind to the spike protein. And all this is science, because people have been showing that for example, antibodies against the common cold virus, right? They do not neutralize or cross neutralize COVID-19 for example, or SAR scurvy to which they do binds, they do bind to this protein, but they do not neutralize it. So if antibodies are no longer completely functional in the sense that they can neutralize the virus, they can still bind bind to the protein. And there comes my big argument. And therefore, we need to come back to these natural antibodies. by binding to the s protein, this antigen specific antibodies are capable of out competing natural antibodies. And that is that is the disaster because as we were saying at the beginning, the natural antibodies, they are not antigen specific, they have the capacity to broadly neutralize not only all kinds of COVID variants, but even all types of Corona viruses. And maybe you want to jump in at this point to make it a little bit clear to

**Bret** 58:49

Sure. Yeah, this is such a fascinating point. But what we have is the possibility of antibodies that are ineffective at preventing the spike protein from binding the receptor and therefore ineffective at preventing infection, that would nonetheless, attach themselves electromagnetically, they would just simply stick to the spike protein and they would block the innate immunity that we all have some degree of and that young people appear to have a great deal of and therefore take the immunity that works best and neutralize it without creating a new immunity that would take its place that you know, again, that's a wild argument, but I see nothing wrong with it. Logically, logically speaking, this makes a great deal of sense.

**Geert Vanden Bossche** 59:40

Well, you know, Brett, I'm going to be very open with you. The fields of natural antibodies is not well recognized or known in the field of vaccinology. It is well known by immunologist, frankly speaking there are there is dozens of papers on this natural antibodies And how fascinating they are, as I was saying they are a little bit, you know, a parallel to the NK cells, they recognize patterns, they recognize patterns of antigens. But this field is so neglected so underestimated, I am sure that many vaccine ologists don't even really understand what natural antibodies are about and what they can do. Because there is a lot of documentation of this and receiving documentation, I will tell you, I will tell you the nicest documentation is you know about the blood groups right at all, etc. So these blood groups, these are glycosylated structures, right? glycans, sugars, for people who don't understand what glycans are. And so for example, if you have, if your blood group group is all for example, you will have antibodies, natural antibodies, all documented all in papers in publications, you will have natural antibodies against, for example, the blue blood group, a blood group A is a sugar, and acid, acid, tile, galactose, I mean, right. And so now, interestingly enough, if the virus is now grown in a cell in a mammalian cell in a target cell, that belongs to somebody who has blood group A, right, then as the virus is burning, when the virus is leaving, it's released from the cell membrane, it has an envelope, of course, that envelope because it's partly, you know, part of the membrane of the target cell, it will also have this blog Group A antigen. And when such a virus is encountered by somebody who has blood group, oh, and who has natural antibodies against blood group A, this will the virus will be destroyed. And this has been proven, not for SARS, COVID. Two, but for SARS COVID. One, that this natural antibodies will prevent the virus and the S antigen from interacting with the AC two receptor. Right? I mean, it's not like there is no evidence there is no points, also the binding forces between the multimeric natural antibodies, and the specific, specific antibodies are completely different, you know, that type of chemical bonds, the one is the multivalent interaction, which is much weaker than the specific binding, for example, I mean, there is many, many things documented, there is also very well documented that natural antibodies can prevent influenza infection against a whole range of areas, all this is in the literature. So it's not like I'm the crazy guy, just inventing some stuff and making putting pieces of a puzzle that doesn't exist in reality together to make a fancy story, right? It is, it is really, it is really highly likely that if you have a specific antibodies binding, but of neutralizing your virus that they can prevent the natural antibodies from, from acting on advice. And that is, as you pointed out, your specific antibodies are no longer functional, and you have no substitute for it, because you put your natural antibodies out of business.

**Bret** 1:03:37

So this potentially puts the young at risk who are largely protected, because it is presumably their innate immunity that is functioning to keep them safe. So I want to clarify a little bit in here. A, it is a very familiar pattern, that medicine and medical science will ignore the parts of the system that work well without intervention. In other words, the idea that we are much more familiar with adaptive acquired immunity, and just so happens that there are lots of interventions that we deploy that depend on it, and that we are largely ignorant of this alternative kind of immunity because effectively it just simply functions without largely our awareness of it. is it's a classic pattern. And the the fact I mean, so members of my audience will remember when Heather and I started doing our live streams about COVID. We were struck many times that the accumulating evidence not unlike for other pathogens, but there's a piece of evidence that suggests that whether or not you get sick, is heavily dosage dependent that effectively even if you are in a room with an infected person, and you are they're very brittle Flee, that you don't tend to pick up the virus. But if you've talked, if you were there for five minutes, you effectively feel some kind of bucket. And that once that bucket overflows, you're likely to get the virus. So on the one hand, this creates a whole landscape of advice that we can give about how to behave to reduce your risk, like opening windows and being in large volume environments, etc. but effectively, that piece of evidence implies the innate immunity system, that basically you have a system that is capable of recognizing in a not very specific way, a wide range of particles, and it can deal with them until it is overwhelmed. That is to say, when you have just simply too many viral particles so that your entire innate immunity that is capable of dealing with this virus is occupied, then that leaves some of these viral particles on the outside, right. Sorry, go ahead. Go ahead. No, that's all I'm saying is that it's interesting, we have seen patterns here that are suggestive of the importance of innate immunity in the COVID-19 story in a way that, you know, is under appreciated. And the idea that now we're talking about rendering that immune system, the innate immune system ineffective. At the same time, we are failing to create proper immunity in the adaptive immune system that is, you know, it's a perfect storm at some level, right? We're taking the thing that works, and appending it without creating the thing that would replace it, and it does seem a very frightening prospect.

**Geert Vanden Bossche** 1:06:38

So the the, the errors, the error comes from the fact that, as I was saying, normally, adaptive immunity is a fantastic thing is a fantastic thing, because it's very quick, it's very, very specific, it's really up to target. But, for example, if you have, let's say you would have adaptive immunity, let's say against influenza, right? And all of a sudden breath, all of a sudden, you have a dramatic change in the antigen, we call this an antigenic shift, right? Then the adaptive immunity will not work anymore, right. But the innate immunity will still work and many, many people have never been vaccinated, you know, they will simply deal with influenza, no problem. So this adaptive parts that has no been subverted, so to say by the virus by the antigenic shift, you will have an outbreak of course, right. And what is happening here with the immune Escape is that we are also creating an antigenic shift. But it's not static, it's dynamic, the more we vaccinate, the more it's going to change. So, we can never solve this normally, if you have an antigen, you will have an outbreak. And then again the the collective immunity of the population can can can deal with this, but here we are always changing the antigen. So the adaptive immunity cannot cope. We cannot deal with this. And that is why here in a kind of exceptional situation, the innate immunity becomes so important. When people talk about herd immunity. I'm always saying the real herd immunity that we have here is innate immunity. Cause if you have this infection 80% of the population in some populations, depending on age and the demographics, even 85% of the population eliminates the virus and doesn't have any symptoms. Isn't that Isn't that fantastic? herd immunity. This is due to innate immunity. We know in the elderly, the innate immunity is weakened due to aging. And these are the guys who first get get severe disease. So to herd immunity is here you to innate immunity, right? And that is the complete misunderstanding.

**Bret** 1:09:06

Yep. Now this tracks perfectly with what I understand of the system. And it does raise the specter that our intervention is actually not only going to become ineffective, but render things far worse than they are that in fact, we you know, we take the immunity of the young to COVID-19 as somehow God given and permanent, and it is anything but it is dependent on a system we know not enough about and that system is capable of being disrupted by a ham fisted intervention in the adaptive immunity system that strikes me as all too plausible. And I would actually point out, it occurred to me when you were speaking earlier that there are lots of familiar examples where the same kind of overly simplistic logic has failed us for exactly the same reason. So people who have been prescribed an antibiotic by a doctor for an infection know full well this counterintuitive advice that even after you've gotten better, you should finish the course of antibiotics. And most people know why you were advised this and that's because you will surely feel better before you've completely eliminated the pathogen. And if you withdraw the antibiotic before you are done with the course, what you have then done is trained the remaining members of this population to you know, you have selected for those members of the population of the bacterium or the fungus that were most resistant to the bacteria, you have selected for those. And then if you withdraw the the antibiotic, then that population regenerates. And what you've done is you've induced resistance. And so we now know that we have a population level problem with induced resistance. And we've seen the same thing with pesticides where we think, Oh, this pesticide is going to eliminate malaria, or it's going to eliminate this pest from the crop. But effectively, we've entered an arms race, we're incapable of winning, and made things worse in many cases.

**Geert Vanden Bossche** 1:11:12

So people say, Yeah, I know that many people think what I'm saying is, is crazy, because it has never happened before. But never, ever, the whole history of mankind. Have we been doing a thing like this, we massively intervene in this pandemic, you know, infection prevention measures worldwide, and pretty stringent. And then on top of this mass vaccination, in the midst of the pandemic, we haven't never ever been doing a thing like this, and then saying, what you're saying doesn't make sense, because it has never happened before. Right? I'm saying, well, the situation we have never generated, we have never created a situation like this.

**Bret** 1:11:52

Right? It's it's novel either way. Alright, so I would like to talk a little bit more about if you are correct about the hazard here. My guess I think, as you have already said, is that there's no stopping this campaign that is, in some sense, politically inconceivable that people would change course, even if it made perfect sense for them to do so. And so the criteria you suggest might tell us that your model is correct. Standard hypothetical deductive science, you've put out a hypothesis here that characteristics that you would expect to indicate that it's right, if it turns out it's right. What do we do next? Do you have a sense?

**Geert Vanden Bossche** 1:12:38

Well, do you mean in terms of to remedy the situation? I mean, my point is, you know, the best thing that can happen to somebody is to be seronegative. Right? Because if you're seronegative certainly, certainly, if you are in good health, and you're set or negative, you have good natural antibodies, again, this is no fantasy, there are studies, scientific studies where even natural antibodies are defined, or or use as a benchmark for good health, right. So if you're still negative, you don't suffer from any antibodies that could block your natural antibodies. And you can be fully exposed, I mean, of course, the problem is going to be the more you vaccinate people, the more people are going to going to be sitting on long lifts on long lift antibodies right. And even if those antibodies decline and they get re exposed to the virus, I mean these antibodies will be immediately recalled you were pointing out you were educating people on what is memory and how antibodies gets recalled or re exposure right. So then you have of course, well being seronegative is not going to be easy and I tell you why because if we if we continue to breed is highly infectious variants, the likelihood for somebody who is seronegative to become infected is going to become higher and higher Of course so at the end of the day, you can turn it the way you want for me there is only one solution at this point in time maybe not at the beginning where there was the wild just the wild say that at this point in time there is no other solution but but to intervene and for me the the the only intervention that makes sense is really to eradicate those those various strains because nobody is telling us how we are ever gonna get rid of those right. herd immunity Well, I mean that's not gonna happen obviously because you know, We have

**Bret** 1:15:00

not gonna happen because people will have been exposed to different variants. And therefore it's, you know, it's a family of viruses. Yeah, you know, not, not a single.

**Geert Vanden Bossche** 1:15:12

But remember, this was the final target. This was the end game of the vaccine A of the mass vaccination, it's to have heard immunity, right? So you could you could of course, also, and I'm not the expert, but let's assume an antiviral would work. And this antiviral could even be things like ivermectin, you don't hear me advocating for ivermectin. But let's assume some kind of anti viral direct would work. You could you could imagine to treat also people with with with this antiviral, but doing this in a prophylactic way, you're gonna have the same problem as with antibiotics that some people you know, will have low concentration be confronted with the virus, and it will induce resistance, I think, at the end, so you can use this for early treatment that I think is very, very useful. But to get rid really of all these variants, and to reduce the infectivity and control the whole thing, I really see no other way but to have a vaccine that induces you can maybe explain this to the audience sterilizing immunity, which is really to completely kill the virus, no matter No, no, no matter what the antigenic constellation is of the virus, but it is a very,

**Bret** 1:16:27

so maybe I don't know well enough to explain it to the audience, I'd like to understand better, I certainly see that there is a hazard. A vaccine is not a vaccine, right? a vaccine is a very general technology. And in this case, the narrow targeting of the vaccine seems to me, it was a blessing in the sense that it allowed the vaccine to be generated very quickly. But it's a curse in the sense that it informs the immune system only about the one characteristic and that if we were to use something like a in an activated virus, that the immune system could discover various antigens, and therefore the evolution of a single antigen would not create the kind of escape that we're seeing. But you tell me whether that adds up?

**Geert Vanden Bossche** 1:17:21

No, no, it does. I think it's a very logical reasoning, but unfortunately, it does not apply. The reason is if you target the ACE protein, what most of these vaccines do, you prevents you can prevent the virus from entering into the cell. So that is basically that is that is sufficient. If you know. The problem is, if you Well, let me put it the other way around instead of an inactivated virus. I think that might make sense, because by the way, that is the way we eradicated like smallpox, that's also the well, the biggest strides in the eradication of polio, polio is not fully eradicated, but almost the biggest strides we have made with the oral polio vaccine, which was also a live attenuated vaccine. And they are, of course you in US innate immune responses, as well as of course, adaptive immunity, etc. And that would be, I think, in my opinion, much more efficient. But of course, it would not be a solution for people who have already been vaccinated, because as I was saying, if you re vaccinate them with the oral polio vaccine with, let's say, an attenuated Coronavirus, you're going to recall their original antibodies first because they those have memory and there is something like we call this antigenic sin, if you are rechallenged, with an antigen that is similar to the one to which you got originally primed, then your original antibodies are going to be recalled and those are not going to match with with the variants. So you you are going to even promote, again, immune escape if you re vaccinate people who have previously vaccinated been vaccinated with with with the current vaccines, so they help for those who are seronegative. So anyways,

**Bret** 1:19:21

you're arguing? So the attenuated virus is one that functions to transmit between cells

**Geert Vanden Bossche** 1:19:34

that function to transmit Well, it's live attenuated, so it's going to be secreted to excrete it right to something right. Yeah, some people will say it was also the problem with with oral polio is that in at the end of the day, you put these in the environment it gets again in people it can recombine, etc. But still, as we have seen with oral polio, it has dramatically dramatically reduced the viral load. But my understanding is because of this antigenic sin that you could not use it in people who have already been pre grind with with the current vaccine. So

**Bret** 1:20:10

this is this is yet another argument against the current regime is that the current vaccine regime actually eliminates what might be our best weapon going forward because it will induce a kind of immunity that will react to this alternative type of vaccine,

**Geert Vanden Bossche** 1:20:29

this breath is something people need to understand in contrast to a direct, you will have a direct when that gets eliminated from your blocks, or you know, you will have the halftime of the unit the minimum concentration for the drug to be active. If you're below that concentration just work anymore, it's eliminated and you're fine. It's done, you know, there is no, there is no consequences. So to say a vaccine is something that educates your immune system for God's sake for the rest of your life. Right? So that is not a simple thing. That is something which has serious consequences. I mean, we were talking about the memory what what is memory? Well, memory means that if you see this antigen again or something alike, your antibodies, your original immune response will be recalled, right? So that is a serious thing.

**Bret** 1:21:25

I've been trying to, to call my audience's attention to this, that we are inherently intervening it not just in a complex system, right? complex systems are tough enough. But you're, you're intervening in a complex system within a complex system within a complex system, right? the narrowest one being the immune system, which you are educating the immune system existing inside the body, which is itself an adaptive system. And then it exists inside a population. And so all of these things interact. And what they do is they mean that any action that you take because it sounds like the right thing to do risks, creating a cascade of consequences, you did not anticipate this being one such consequence that there is a tool that would take longer to develop, that you will take off the table, to the extent that you have educated people's immune systems such that effectively, you've warned them about a pathogen, your next vaccine might be attenuated. And effectively, the immune system would have the equivalent of post traumatic stress disorder where it would react to the attenuated vaccine, which is potentially life saving. It would react to it as if it were a pathogen, and it would prevent the effectiveness is that what you're saying?

**Geert Vanden Bossche** 1:22:43

Well, it will recall your original antibodies, and these are the ES antibodies of the current vaccines, right, which, which we know you know, they don't do the job, essentially, let's assume that you, you make this vaccine and you start vaccinating with it in half a half a year from now, in the meantime, you will have further evolution, of course of your variants. So they will even be more different there is protein from the one that was originally the vaccine. So now when you recall the original antibodies in one in half a year from now, yeah, for sure, they will match much less with with with the S protein of the variants that will be circulating in half a year from now. Right? So it's so it's further driving in unescape, that basically, so for me, and I start bred to you know, to hate to say this, because people think that I'm selling my business or whatever. But asymptomatic people, asymptomatic people, they cleared the virus, thanks to natural antibodies in combination with NK cells. Again, this is science, there's publications are very compelling, very, very compelling show that the combination of the natural antibodies and natural antibodies, so to say, as you were saying they evacuated part of the virus so that you know, the concentration, so to say diminishes, and so that the chances that you're going to get severe disease or, or diminished, so they evacuated part of the virus, and they bring it they into the nk cell pathway so that the virus can be destroyed by the NK cells. And the NK cells normally, that's how we started the discussion have no memory. So now there are tricks and we know that to some extent, nk cell scan acquired memory, it has not been proven for Corona, but I think this is really a pathway to work on. Because if we know the motifs that the NK cells recognize, we can use them in a vaccine. And of course, we need to do something about the memory but I'm always giving the example maybe you have heard about the streptococcus vaccines, the polysaccharide vaccines against that pneumonia, for example. IPS media etc that you get, you know, during childhood. Normally these antigens, polysaccharide sugars, they induce antibodies, but without memory. So that's not good. So what we have been doing, we have been making a conjugate vaccine, and we have taken the polysaccharides. And we have conjugated them to a T helper protein, a T helper protein. And now with these synthetic constructs, this is not a natural construct, is it something manmade, I think the biggest invention ever in vaccinology, we have no managed to induce an immune response that not only recognizes the polysaccharides, but also has memory thanks to this conjugate. So, in other words, even though natural immune responses do not have memory, we can educate the immune system in a way that it can get, you know, acquire memory against this particular pattern. So I would say, so that's fascinating. Yeah, because this is known antigen specific. So that means the cannot be immune escape, right? escape against what selection of what? It's known antigens? It's no. Yeah, General specific. That's the right way to say,

**Bret** 1:26:17

all right, that's very interesting, I did not know about that construct. But the idea of creating, basically hacking the system to trigger memory, in a case where memory would not ordinarily be developed, that's fascinating. So I had a thought here, likely wrong. But when triple drug cocktails emerged against HIV, I had this moment where I had the sense that it was obvious that we should have done something like this from the beginning, because, effectively, by taking three different drugs and challenging the virus simultaneously with them, we eliminate the pathway by which we would train it against whatever our best drug was, because you've sort of pushed it in three directions at once. And it can't, it can't adapt. So evolutionarily speaking, I thought this was straightforward that something like this would work, it doesn't have to be three, but pushing it in more directions than it can go. Make sense. So by analogy, if you were to set up conditions where you know, some sort of competition, where somebody had to, you know, increase their capacity to hide Trump, at the same time, they increase the amount of weight, they could lift, and conserved the maximum number of calories, all those things push in different directions. So the point is, there's no way to game any of these systems, you have to just sort of compromise which makes you low quality at all of them. So I'm wondering if there's not a vaccine style solution here, that involves, instead of pushing the virus in one direction and creating the immune escape pathway that you describe, is there not some way of formulating a challenge that pushes it in simultaneous mutually exclusive directions, so that it cannot move?

**Geert Vanden Bossche** 1:28:25

Well, of course, I've been torturing my brain, you know, for like many years, though, because of this Corona thing. As you can imagine, we could have other pandemics as well, to which we are not prepared at all. So in other sense, what has been the focus, in fact of my attention of my rich research in the last eight years has been universal vaccines. And universal doesn't mean one vaccine for all kinds of diseases. No, it means one vaccine for a number of light. For example, natural antibodies, as I was saying, or NK cells recognize a pattern of motifs that may be shared by several different pathogens, when the infect cells, right? This like a cancer cell at the very beginning, the first alteration of the cancer cell no matter what cancer it is, it's an alteration of self. That's the kind of common denominator. So it's a pattern that is shared amongst several different pathogens or pathogenic agents. And so how can you How can you make such vaccines This is very challenging, but frankly speaking to cut a very long story short, that is why I started to concentrate on nk cell based vaccines, because the innate as we were saying, the innate immune cells, but we need to provide them with memory, of course, or in fact, the only cells that have this capacity To recognize, you know, a wide array of several different changes on the surface of the cell. And another important thing is at a very, very early stage of infection, that's a very important thing. Because we were talking about the T cells and the cytolytic. T cells, we know when people get the disease, for example, severe disease, and then they cure it out, it's to a large extent, thanks to cytotoxic T cells, but they can wait too late, what we need is the cell that the virus gets into the cell, there is an alteration on the membrane before even you have the progeny of the virus, right before you have, you know, replication and production of new virus particles. So at the very beginning, you have an alteration of the cell of the cell membrane at a very early stage, that's where you need to kill the cell. And I not aware and, and I don't think it exists that you could use multiple, multiple immune interventions at the same time, combine them to cut let's say, several different pathways for the virus to to generate the progeny and to propagate. Because as soon as soon as you come with several different immunogenic agents, you will have competition as well, right? You will have competition what will be more dominant than the older and will will take advantage of the immune system and use its full capacity? and other immunogens? You know, they, they will barely generate any new response because they are not dominant, right? So there is one thing that I've learned in immunology that does not apply, which is the more the better. That doesn't apply to women, right? The more debate that does apply to drugs, very often, it does not apply to immunology, people always think, Oh, well, this vaccine doesn't work, we give double those, or we give another dose after three weeks, and then one month and etc. So the more the more the better. That's not that's, that doesn't work in immunology, that doesn't work vaccinology It's a message that you convey to the immune system.

**Bret** 1:32:14

Yes, for for multiple reasons, it doesn't work. So to the extent that you have informed your immune system about a particular challenge, it's informed, right, informing it, if you're sending it, you know, 1000 emails that share the same piece of information doesn't inform it better, then there's also the problem of autoimmunity and leukemia. Right. So the point is, it's not just a question of the information, which the value of which a single email will do, or a single vaccine that is effective at creating memory will do. But there's also the problem that this system is very tightly managed for health, and that, at some level, I'm pretty sure we don't know what the result of continuing to trigger it in various ways is and you know, unregulated production of B cells, for example, would be a known type of tumor, it's would be leukemia, right? And autoimmunity would be the reaction of the immune system, to things that you yourself, make. And so the point is, messing with this system, when you don't know what you're doing carries all kinds of potential hazards. And we have to be very careful with it. And unfortunately, I think the political environment in which we find ourselves makes it very hard to behave rationally that there is a demand on people who are in a position to govern that they do something. And the problem is very few appreciate just how delicate the system is, and how marvelously, it's working on their behalf already. I mean, yes, COVID is frightening, but the degree to which most of us have not gotten it is owing to the effectiveness of the system. before you make any intervention at all. Yeah,

**Geert Vanden Bossche** 1:34:14

yeah, the immune system is extremely sophisticated. And, for example, I posted on my website a number of maybe 15, maybe 2015, let's say questions that are really fundamental questions, things we don't understand, you know, in the pathobiology, of COVID-19, and a number of questions surrounding Of course, the the the immunology and the immune defense. And I think if you cannot answer to this fundamental questions, I mean, it becomes very, very tricky to intervene in the new system. And certainly, certainly if you intervene at a very, very large scale, knowing that the message we were talking about will stay with you for the rest of your life, right? So that is something really i i think there we should have done much, much better homework. Because massive intervention is something which is so well tuned. So, so sophisticated. Either you have a fantastic effect or, you know, if you do this on a massive scale or it's, it's all good, good. And that is that is really my fear right now with what is happening and rain, which seemingly we will not be able to stop anymore.

**Bret** 1:35:40

Yes. I think in some sense to continue with the military analogy. This is a live fire exercise in which we're all in. Unfortunately, it's an expense. It's an experiment and a very poorly, a very poorly controlled one. Yeah. Which is frightening. Yeah. All right. Where can people find you?

**Geert Vanden Bossche** 1:36:04

Well, people can find me, based on my website, because unfortunately, although I try to distribute, you know, scientific information and only scientific information, it gets increasingly blocked on all kinds of channels and media. So my, my website is geared vandenbosch and then.org. O RG.

**Bret** 1:36:37

Okay, gear to vandenbosch.org. I know that you're also on Twitter, and that your website can be found through your Twitter bio, I will say to the extent that people that platforms are taking down the material that you're putting up, This is madness. Right? This is madness, you are a domain expert, you are clearly motivated by concern. What you're saying is whether or not it is correct, it is perfectly rational, it is highly logical, and can be interpreted by anyone who has the scientific training enough to follow such an argument, that the idea that you are somehow a hazard by virtue of engaging in very serious questions on which a great deal of human well being rests is preposterous, these, these platforms are in no position to evaluate what you're saying. And that means we have to be able to discuss it in public.

**Geert Vanden Bossche** 1:37:51

Well, that is why what I'm calling for since many, many weeks, because the the way the discussion is conducted right now is that, well, some fact checkers reach out to some experts, and then you have some one liners in their report, some one liners that sort of, say contradict what I'm saying. And then the fact checker confirms me with this kind of, you know, contradictory statements. So to say, that is not a discussion, and that is and I'm asking all the time, you know, for these experts to to start a debate right, like we are like we are discussing, then things can be clarified and, you know, arguments can and and we could I would love to see a consensus on what are the what is going to be the criteria that we all agree upon to say whether or not human intervention is driving this, this is driving immune escape, right? Because if there is really an immune escape driven by human intervention in the way we have been discussing, then I think everyone will agree that this is not a good thing. This is really very problem problematic. But if we don't have criteria, and if we don't agree upon, I mean, the only thing will be vaccinated everybody, right? Not everybody is unless everybody's vaccinated. It's not over. Right? And that cannot be according to my interpretation.

**Bret** 1:39:21

No, and the pressure to vaccinate everybody is incredible. The number of young people that I hear are being vaccinated preposterous in light of the fact that there's really almost no reason to do it. Even even if the vaccine is as safe and good as it's being portrayed it. The fact is, young people are already immune and there's no reason to intervene. And the

**Geert Vanden Bossche** 1:39:47

only the only caveat Brett is this was certainly the case when the winds rain came in and I told my kids, you know, okay, if you have if you're obliged to because, you know, you have to wear a mask in the store, for example, you have to do this, but don't do it when you are with friends, etc. They are not they were not participating in mass gatherings, gatherings anyway. But now the problem now is with this highly infectious variants, the likelihoods is increasing that. Well, this is something we didn't discuss. But it's important to understand when you are an asymptomatic asymptomatically infected, so you got infected with a virus without developing symptoms, during a short period in time, you will be developing antibodies, right? These are antibodies that are not very mature in I'm not saying in all asymptomatically infected people, but in a fair extent, a fair number of asymptomatically infected people, they will develop antibodies that are not fully mature and utter shortlist. So as we as we discussed, these antibodies will be able to bind to this protein, not neutralize it but outcompete your innate immune response. So now with the highly infectious variant, circulating the likelihood that as a young guy or lady you get hit by the virus, during the time where you are sitting on your immature antibodies becomes increasingly higher, right? And that is how we now also see how your age groups without underlying diseases, people in perfect health and get severe COVID. Right. So you see, these are criteria for me that are really important to analyze, and to further discuss and to agree upon, if that is not done. And the only criterion is we go on till everybody gets vaccinated, young or old, no matter what, no matter what, you know, whether they are in good health or or whatever, whether your surplus deficit or negative. I mean, then it's it's Yeah, it's really a war situation.

**Bret** 1:42:02

Yeah. Well, that's, that's very frightening. All right. Well, this has been a fascinating discussion. I look forward to hearing how this develops. And I do hope that people I know people are taking your argument seriously, privately, I think there's a lack of courage in, especially in and around academia, where people won't necessarily say what they understand because they're afraid of consequences. And in this case, the consequences for humanity are so immense that I think it is incumbent on people to, to at least point out that this is an argument that needs to be taken very seriously.

**Geert Vanden Bossche** 1:42:41

Well, there are top experts, much more famous than I am. Who I know when who write me that, you know, I'm right. But if you're really a top expert, of course, you are working in some of these communities that are no, or, you know, deeply involved in driving these vaccination campaigns. So unfortunately, these people cannot speak up. And I think it's, it's really given what is at stake? It is, yeah, I, for me, it's a moral obligation. You know, I could be employed, I could be whatever, you know, I mean, this is so frightening to me, I have spent weeks and weeks and nights to understand what is going on. And so, you know, having done my homework, the moral obligation to react is such that, you know, this is for me the absolute priority, no matter no matter what,

**Bret** 1:43:45

well, I agree with you about the moral obligation of it. It's, of course, not entirely safe for me to put you on my channel, either. I feel that same moral obligation. And I would just point out that I think we've lost track of how much risk people have taken through history when something was important. And to the extent that people may have fears about what happens, career wise to them, if they speak an important truth, they need to recognize that lives are on the line. This is an argument that must be engaged, and it's time for them to step up. And I would say, to the extent that there are people who privately acknowledge that what you're saying is sensible people who believe you are right, and are in a position to change public opinion, I open this channel to them if they'd like to come on and and tell us what you've got, right, what you've got wrong, what they think we ought to understand. I'm more than happy to host that discussion.

**Geert Vanden Bossche** 1:44:47

Well, I much appreciate that. Brett, I really do. And, yeah, I'm also very much hoping for people ultimately because it's really it's really more than time. To do so, because as you as you will realize, right now, things start to be very fast to evolve very, very fast. If you see in some countries because that is the only the other thing every country is looking at its own situation. When I hear the news, for example, in Belgium, it's like the only country where, where we have a COVID from them, right? And, and the world is closing in on us. And it's like, I mean, if there is a double mutant thing in India that is resistant, for example, that is also my problem. That is your problem. That is everyone's problem. And it's like, oh, let's let's, let's put the figures down. Let's try to put the figures down in Belgium or in Germany or in UK, right?

**Bret** 1:45:45

If If there was ever a situation in which we should put politics aside, put national boundaries inside and team up to address a problem, this is it.

**Geert Vanden Bossche** 1:45:55

Yeah. pandemic is the definition of global thing. And our strategy is not global at all right? Yeah, well, you know, we could go on forever this, but I much appreciate you doing this, and at least giving me an opportunity to talk about this. And frankly, speaking, I think, Brett, we have been very scientific about this, right? I mean, yep. So yeah,

**Bret** 1:46:21

I think we have we have to continue to have this discussion. And I must say, I greatly appreciate your courage and your insight. I think you're a force for good and I I am so glad that you chose to come on dark horse.

**Geert Vanden Bossche** 1:46:38

Yeah. Thank you so much for having me. All right. Thank you. Okay.

**Bret** 1:46:42

Well, everyone Yeah.