

21.02.13 Taking The Shot Hour.wav

SM Sarah McConnell
TB Taison Bell
CD Carrie Dolan
FG Frank Gupton
CM Christopher Morris

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SM Dr. Taison Bell has been treating COVID patients in the UVA health intensive care unit for nearly a year.

TB We print off a list of our patients every morning, just to keep track of when we're going through rounds.

SM And one day last summer, he was working in the ICU and he got that list of names.

TB And I realized that one half of the list was almost all Latino patients and the other half of the list was almost all Black patients.

SM He started going through his rounds trying to figure out, okay, what needs to get done.

TB You know, what are the things I need to do for the day and the normal sort of workflow that I go through while, you know, at the same time this heavy weight is on my shoulders. I couldn't focus without addressing it because it was like the elephant in the room.

SM So, he stopped the team.

TB And I just told my team, you know, I'm having a tough time seeing this and I don't know what the answer is, but we have to do our job. But I just have to acknowledge I'm having a tough time.

SM From Virginia Humanities, this is With Good Reason, I'm Sarah McConnell. Today on the show, treating and preventing COVID-19 for everyone, but especially the communities who need it the most. Taison Bell is a critical care physician at UVA Health and a professor of medicine at the University of Virginia Medical School. He was also named a 2021 outstanding faculty member by the State Council of Higher Education for Virginia. Taison, you are the second person at your hospital to get the vaccine. How much relief did you feel after you got the shot? Was it palpable for you?

TB It was interesting because I - I really didn't know how to feel. I knew that it was going to provide me an amount of protection. And that was certainly great news and made me feel really good. It was also really clear that it was going to be a long road before many in my community, but also gained our protection. So, in a sense, it was kind of bittersweet.

SM Even you, was there even a smidge of fear? A moment?

TB Well, I don't like needles and that, you know - and this is hard to admit because I'm a physician and, you know, I'm a critical care physician and I deal with needles all the time, but I don't actually like receiving needles for anything. And so in the back of my mind, I'm like, got to keep it together. And in all these complex mix of emotions kind of came to a

head when the needle went in my arm. But in the end, I felt this sense of relief. And it's kind of like sometimes you don't understand the burdens that you bear until you start to see that weight come off a little bit. You know, the weight that I - I guess I realized after the fact that I was carrying was the concern that I was going to bring infection home to my family, my mother-in-law, who comes to watch our kids during the middle of the week during virtual school. Talk about risk, like I'm literally going into the patient's rooms for COVID-19 and doing procedures and putting breathing tubes down and things like that. It doesn't really get more high risk than that. And, you know, if I'm doing what I'm supposed to do, things should be fine. But you still have that measure of uncertainty and - and fear, frankly, that something that you're doing might cause those that love you and depend on you to get sick.

SM As you know so well, Black and brown communities have been hardest hit by COVID. Have you seen that among your own patients and at your own hospital?

TB Of course. And this echoes what we've seen across the country. We see a higher percentage of Black and Latino patients being admitted and going to the ICU. So, it's - it's shocking to see sometimes because, you know, at the end of the day, I'm a Black male physician and I come from a community just an hour south of where I work. And that means that some of these families and people I know, either from their family name or we know someone who knows someone. I'm connected to this community and it's painful to see. There was one day I was working in ICU and, you know, we print off a list of our patients every morning just to keep track of when we're going through rounds. And I realized that one half of the list was almost all Latino patients and the other half of the list was almost all Black patients. And I'm going through rounds and trying to figure out, you know, what are the things I need to do for the day and the normal sort of workflow that I go through while, you know, at the same time this heavy weight is on my shoulders. And I just stopped the team because I - I couldn't focus without addressing it because it was like the elephant in the room. And I just told my team, you know, I'm having a tough time seeing this and I don't know what the answer is, but we have to do our job. But I just have to acknowledge I'm having a tough time. And that was a day I'll never forget because it made me feel that no matter how hard I was working, I couldn't turn the tide and ultimately get the community better. You know, maybe I can make a better outcome for this patient, but there are so many more who were coming in and the same issues that go into why Black and Latino patients are more likely to have more severe outcomes with COVID-19, you know, just replay themselves over again. And that was a dark day because I would - I would say I didn't see the light at the end of the tunnel at that point, I think. We were in the summer and we had kind of a second surge happening in Virginia and it was just really devastating to see.

SM That's a powerful story and it brings home what we know to be true. So, what's the answer to that? What's the answer to trying to reduce the incidence among Black and brown people? Is it the vaccine? Is it allowing people to stay home, to be more isolated?

TB I think the immediate fix is the vaccine. You know, that's really the key to bringing down the cases in our communities. You know, Black and Latinos have a higher chance of working in essential jobs, which means that they can't shelter at home. We have a higher likelihood of living in dense, multigenerational housing, which you can't fix overnight. So, many of these structural barriers are really just ingrained so deep in society, it plays out in the way that we live our daily lives, and that's hard to change so quickly. So, I would really say the vaccine is the immediate, urgent need that we have right now. And then some of

these other factors that have led to why these communities are more high risk is what needs to ultimately be fixed.

SM Just about everybody in my family hopes to get a vaccine and is patiently waiting. What about yours?

TB My family is a little bit different, you know, and it became clear once I became a physician, actually, that I had crossed over. I was still, you know, a member of the family and loved and people are proud of me. But all of a sudden, I became one of 'them'. And, you know, when I recommended medicines and therapies and sort of, you know, things to do, it was taken with a grain of salt from that point where, "well, you know, you've had their education and - and now you're one of the medical establishments". That was kind of the implication, which was surprising to me because, you know, I had stayed - I was still Taison Bell, you know, and my mom and dad changed my diapers when I was - when I was young and - and nothing else had changed aside from I had gotten this education. But it was almost as if. In the process of gaining medical skills and medical knowledge, I had a miseducation in a sense that I was now more disconnected from my family in my community. So, that it was interesting to deal with because there's kind of this assumption that, well, if you're a Black doctor and you talk with the Black patient or your family member, then they'll trust you, right? That's not the case necessarily. And that really lets you know how deeply ingrained the mistrust and distrust in the medical system has been. And what I try to tell people that I work with when we talk about these issues is that it's an earned mistrust. Medicine has actually worked pretty hard to get on the bad side of Black people. We talked about this Tuskegee experiments at length and I think, you know, many people understand that. But there are so many other examples, even at my local institution that was a proponent of eugenics in the last century to sterilize Black bodies, to prevent them from - from populating. You know, these are stories that the community holds really tight to the chest and pass on. And, you know, many remember acts of discrimination. And it's not as if this is a completely new day. You know - you know, things like Tuskegee don't happen anymore, but we do see many examples of Black people being mistreated by the medical system, even physicians with the example of Susan Moore, who was literally screaming, "I'm dying of COVID-19" and was ignored by her - her treatment team. So, we remember these stories and when you - you need to have an understanding of that before you approach our community. But you also have to have an open mind, because what I've also seen is this false dichotomy or a false equivalency that where you say, well, Black people don't want the vaccine. So, you know, we'll just have to move on and try to vaccinate other communities. I would say that the Black community is not monolithic. There are many different opinions within the Black community. So, you - you don't want to assume that a Black person who is not receiving the vaccine is hung up on Tuskegee. It might just be a simple information gap. There is a Kaiser poll I looked at recently that showed that among Black participants in the poll who said that they were not going to get the vaccine for - against COVID-19, they thought the vaccine actually gave them COVID-19. And that was just a simple information gap. And so we have to come, you know, multipronged approach, as my public health colleagues would say. That we need to address the historical distrust, we have to address the information gap. But then after that, we have to fundamentally address access and that you're much more likely to make a decision for your health if it's an easy decision to make. So, imagine if someone shows up in your community with information on the vaccine, with trusted messengers about the vaccine and a simple sign up process for the vaccine. If you're on the fence and you see people in your community, you know, signing up in this process and getting vaccinated, you're more likely to say, OK, I'll go ahead and do it today. But you take that same person and you say, OK, you want the vaccine, go to this public health website, do step one, step

two, step three, sign up for this, get this email, oh - it might go to your spam box, if the website crashes call this line and you spend three hours on the line. Now, are you going to be likely to go through that process, especially if you have an essential work job and you can't sit on your computer all day? And if you don't have access to the Internet or you don't have a smartphone? I think access has to be a large part of the conversation as well, in addition to addressing the concerns of the community.

SM What do you think about the idea of sending vaccine mobiles into rural and urban neighborhoods, into senior center homes and elsewhere, to send a team of vaccinators to communities to address all of those issues?

TB I think that should be one of our primary models to reach hard to reach communities. You know, the last mile is the concept that it's that last step that takes the longest and is the hardest and is the slowest. And I think that these mass vaccination sites, I love them, and I think that definitely has to be a part of the solution because we have to have high throughput ability to vaccinate so many people. But there's a segment that that can miss in people that are low access, rural communities, don't have access to public transportation. You know, we can easily miss out on that population by focusing just on these sort of big box solutions. So, I think that mobile teams with educators, translation services and easy sign-up process are absolutely an essential part of the vaccination effort.

SM I thought it sounded like a great idea to distribute vaccines also through the popular pharmacy chains like CVS and Walgreens. It seems like there's one of these stores everywhere, but you've expressed concerns about that. Why?

TB Well, I just take it to my experience growing up. I grew up in Lynchburg, Virginia, and Lynchburg is a town of about 65 or 70 thousand people, about 20 - 20 to 25 thousand of those are Black individuals and - and the majority of them live in a specific neighborhood or collection of neighborhoods. And I grew up in one of those neighborhoods. And you could - you could walk every street of that neighborhood and not encounter a CVS. In fact, there are two community pharmacies in that neighborhood that have limited hours and don't have the purchasing power of a CVS or Walgreens because they're just standalone pharmacies. And so we need to make sure that places like that get access to the vaccine. But when we say we're going to make CVS and Walgreens the solution, maybe to someone who sees those on a regular basis, that makes a lot of sense. But they were not in my community, not at all. And - and to think that that's going to be the, you know, that the initial solution, you realize that there are pharmacy deserts in addition to food deserts. And, you know, this was one of my communities growing up. And to get to one of these pharmacies, you either had to have a car or you had to embark on a 30-minute bus ride, which meant that it was an hour to get to there and back if you needed something. And some - for some people, for a lot of people, that's not an easy way to get access to something.

SM States that have prioritized prisons and jails, which have been incubators for this disease, have often received pushback from people who said, why are you giving this to felons or to people who've, you know, violated the law when we haven't vaccinated all the elderly yet? How do you feel about that?

TB We have to start with, why are people in prison? We have four percent of the world's population and 22 percent of the prison population in the world, so we have to start there. We have to ask questions about the justice system and the fact that Black individuals are more likely to be convicted and charged - charged, convicted and served longer sentences

for the same crime. When I was growing up, I didn't even realize that white people smoked marijuana. Which is fascinating because all of the messages that I received in my community was this was a problem of Black youth, problems with education, education and morals, and not having fathers in the household. And that's why this was ravaging my community. And I just needed to say no. And then I get to college and realized that people have been doing this in these other communities with no punishment whatsoever. It was really eye-opening for me because it made me realize that it wasn't just my community that engaged in some of these activities every now and then, but we were definitely being punished for it at much higher rates and in a much more punitive fashion. So, I think we have to take a step back and think about our criminal justice system as a whole, how it disproportionately impacts the community, and then think about the rest of that community. At the end of the day, people in prison are people. We've seen lots of clusters of cases related to COVID-19 in the prison population. And, you know, it's a virus that jumps from person to person. So, it goes to prison workers as well, too - the correctional officers, who are just as afraid about COVID-19 as the people that are incarcerated. So, of course, of course, we should prioritize vaccination for incarcerated individuals, how else will we call ourselves humane.

SM Taison Bell, thank you for talking with me on With Good Reason.

TB Thank you so much for having me.

SM Taison Bell is a critical care physician and medical director of the medical intensive care unit at UVA Health and a professor of medicine at the University of Virginia Medical School. He was named 2021 outstanding faculty member by the State Council of Higher Education for Virginia.

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SM Navigating social lives in the time of COVID can be awkward. How do you tell your friends, "No, I won't be joining you at that restaurant. But yes, we can take a walk in the park together", without having to explain or excuse. Carrie Dolan is a professor of health sciences at William and Mary and also director of "Ignite", a global health research lab based there. Dolan says we need to get better at communicating our personal risk levels during the pandemic or we won't be able to stop it. Carrie, you have studied public health for years. How does your work on HIV and malaria influence how you teach people about COVID?

CD So, I think the work that I have done for the last several years has to do with targeting limited public health resources where they're needed the most. And one thing that I have learned is that in order to get people to use interventions that help save lives, you have to have a piece about motivation. So, for example, with the case of HIV, one of the best interventions we had are condoms. With the case of malaria, one of the best interventions we had are malaria bed nets. And so with COVID, one of the best interventions we have are masks. But people don't always use the masks. And, you know, the masks are great. They're when - they're cheap, they're very effective, but we have to be able to have people use them if we're going to get a protective effect across the community.

SM And what is your tool when it comes to helping people want to wear masks?

CD One of the major tools that I have is this know your number scale. And so it's a scale from one to five, where people can self-identify where they are in terms of how they're

feeling about their COVID risk. And so you can use the know your number scale to be able to communicate to other people how you're feeling. And so, for example, in our house, we're a three. We have a lot of ability to control our use of PPE and to social distance, we can work from home, and so I feel really comfortable being able to interact with a small group of people. But that's not the case for everyone. And so this number scale really helps people have a dialog about where they are and be able to move forward together instead of apart.

SM Do you know any people who are, let's say, a five?

CD Yeah. So, I have friends across this whole scale. So, I have friends that are ones and then I have friends who are five who are off skiing and they're very comfortable doing that. And what I think the scale does is it - it eliminates the judgment factor that's associated. We all have different risk factors associated with our likelihood of getting COVID. And so the scale allows us to know where other people are and then make decisions for our own selves and keep the focus on ourself, what our own next best steps are.

SM So, I guess that's not hard and fast, but just quickly go through one to five and tell me what risk factors might be involved in those various numbers.

CD Yeah, so if you're five, you're probably young and very healthy. You probably have a lot of ability to control your external environment. So, these fives are mostly working from home all the time, they don't have any comorbid conditions, they exercise regularly, they eat really well, and they aren't in the demographics that we think are most at risk. So, typically, when I think of the fives, I think of fives or my friends that are willing to get on an airplane and fly different places to have different experiences, whereas a four might be a little bit more conservative, still doing a lot of different kinds of experiences and things out in the world, but maybe not quite ready to hop on the plane just yet. A three - we are threes and so we interact with a small group of people, we wear our masks when we're outside of that group of people, we practice social distancing, but we still interact with other people. And we can do that because we're also healthy and we don't have any comorbid conditions. And we have young children who at this point, we've gone on with the pandemic for a long time and we've got to find ways to interact with people we love. And so for us, a three is a comfortable place to be. And then twos are people - I would say that my parents are twos, they're in their 70s and they have some comorbid conditions, very conservative about the people that we - they see. When we interact with my parents, we only do it with masks and socially distanced. So, our ones are people, my friends, that really haven't left the house. So, these are people that have serious health concerns, that are still ordering all of their food in and they are still not interacting with other people, masked or not masked. And so that's the most conservative.

SM So, how useful really is having a one to five COVID number? Is it just about personal decision making or does it really help sort of keep us safe?

CD I think it helps keep us safe because it helps us foster a dialog about how we're going to interact with other people. So, instead of assuming that you know where somebody is or applying what characteristics that you're using to define what is safe to other people, we're able to actually articulate for ourselves where we are and then tell other people. And so what that looks like for me is that we've had to make some difficult decisions. We've had to say to people, no, we are a three, and so we're not comfortable interacting in a certain way. And it takes a lot of the judgment out of it. So, one thing I want to say about this number scale is it's important to use it to continue to have a dialog. It's not meant to put

people in a box where you then stay, people move along the scale. So, I would say throughout this pandemic, I've been anywhere from a two up to a four. And I use where I am on this scale to talk about how we're interacting with our son's friends, but then also to talk about how I'm interacting with my work environment.

SM But it seems like the problem is, what if everybody around you decides they're five and they can go mask-less, or take risks, or hover around your personal space, leaving it up to everybody to decide their own number is a little risk, right?

CD Well, at the end of the day, we all we can do is keep our side of the street clean. Right. And we can only focus on ourselves. I mean, we can only dictate our own next best steps. So, what I've looked at is an opportunity to meet other people and inform other kinds of activities with people who are more in my number group. But I will say that once I've communicated where I am on my scale, so if I tell my five friends that I'm a three, when they interact with me, we do three-like activities. I think it's just a sign, like, of communication and respect so that we can find ways to interact with people that we love.

SM Is the system - is the numbering system, the COVID number dependent on certain baselines, community norms, like even if you're a five, you are going to wear a mask and protect other people?

CD Yes. So, the policy guidelines of masking, distancing, washing your hands are extremely important that we all adhere to when we're moving outside of the area that we can dictate our own next steps. So, when we go to the grocery store, it's important that we still follow the recommended public health guidelines to keep people safe.

SM I've never thought about my own COVID no before, but are people in your community using the system? Do they have COVID numbers?

CD Yeah, so I've used this in a number of ways. I use this on a personal level, like we've already talked about, with how we integrate with our friends in our family. But then also on campus, I'm part of the COVID Mitigation and Response team. And so we use the number to help talk about how the college students are integrating when they come back to campus.

SM This is William and Mary?

CD Yes, this is William and Mary. So, William and Mary is about a three, and that's kind of how we can operate. So, if you're a four or you're a five, it's the expectation that when you come back to campus that you norm your behavior down around to be around to three. If you're a one or two, you need to understand that we can't put all of the structures in place that would then norm down to those numbers. And so people need to be aware that when they come back to campus, the expectation is that you adhere to that structure.

SM What about in school? So, if you go from college system to a school campus for K-12, how might they use a number system?

CD So, one thing that I recommended to our public school system is that they consider using this as a dialog to - to talk about people within their teams. So, for example, you could have a team of teachers all teaching fourth grade and one teacher be a five and another teacher be a one. And it's important to know where people are coming from before you try to start working together again. What I have found is that when people learn that

somebody is more conservative than they are, then they try and do what they can in order to try and help that other person create a safe environment. So, people are motivated by three things. They're motivated by how they think, how they feel, and what they can do. And so this number system is really a way to be able to quantify how people are feeling about their COVID risk. What people think, this is the data, so this is what we know about percent positivity. It's what we know about the infection rates within the school system. It's what we know about the burden of disease, the prevalence in our community. And then what we can do or the interventions. So, it's the masking, it's the distancing, it's the handwashing. But you need all three of these pieces to come together. And so what was lacking from the national dialog was this discussion about how people feel. So, we knew a lot about the numbers in the data. We also knew a lot about what we could do. But we weren't integrating this piece about how people feel in a way that was meaningful. And so it was like we - you know, we had one leg off of our stool. So, once we get all three of these things together, we can really coalesce around a healthy next step. So, in the case of the schools, it's how we could reopen safely.

SM Carrie Dolan is a professor of health sciences and director of "Ignite", a global health research lab based at William and Mary. This is With Good Reason, we'll be right back.

[00:28:00]

SM Welcome back, this is With Good Reason from Virginia Humanities, the COVID-19 pandemic has thrown our pharmaceutical supply chain into the spotlight. It's highlighting a problem that was already acute. Every day all over the world, people die because they don't have access to existing lifesaving medications. Enter Frank Gupton. He's a professor at Virginia Commonwealth University and CEO of the Medicines for All Institute at the VCU College of Engineering. Gupton and his institute are using innovative production techniques that aim to cut costs and democratize pharmaceuticals. Frank, I'm sure it's very complicated, but why are so many lifesaving drugs either non-existent - there's a shortage of them - or too expensive?

FG Part of it is kind of the race to the bottom. It's about, you know, trying to provide access to health care by driving down the costs at the expense of availability, and once you get down to a point where there's no margin to be able to achieve in the product, people stop making it. What ends up happening is that they find other drugs that they can make in the same equipment and get a reasonable margin on. And on the other end of the spectrum is, once you start paring down the number of manufacturers and you get down to eventually to a single supplier, then they control the market, and the price can spike because they have a monopoly. There's currently somewhere between 200 and 400 drugs in short supply right now. And in addition to that, we have a huge shortage in the children's hospitals in the United States. And the problem there is that the volumes are so low that it makes it difficult for the pharmaceutical companies to justify making these pediatric formulated drugs for - for those applications. And there's a bigger shortage in that environment than there is currently in the general, generic market.

SM What kind of drugs are you talking about here?

FG I'll give you - I'll give you one. There's a drug to treat a thing called urea cycle disorder, and that's a very nasty disease. At first it causes brain damage and then ultimately death if it's not treated. And there are two simple molecules that they use to treat that disease. In fact, they're used as preservatives and a lot of sodas. And the volumes are so low that the pharmacies and the hospitals can't keep them in stock because urea cycle disorder occurs

so infrequently and the shelf life of the drugs is so short, and the volumes are so low that even though the active ingredient is inexpensive, one vial of the stuff costs about ten thousand dollars. And so, they end up having to throw it away rather than use it on a patient because it doesn't happen very often. And this is happening every day in the United States. There's - I didn't know this - a good friend of mine who's head of the Neglected Disease Division of a Children's National Hospital has kind of educated me on this, but every newborn in the United States now gets tested for genetic deficiencies. The problem is that the drugs aren't available to treat them and ultimately the children die from it.

SM So, we clearly have this need. But I learned recently 80 percent of active ingredients for the drugs we use are made overseas. 40 percent of the finished drugs are made overseas. With all these big pharmaceutical companies in the U.S., why can't we fill our own needs here?

FG There's a simple reason. It's because the processes that we're using are very labor intensive. And - and the fact that they're labor intensive puts the disadvantage in the US versus places like India and China. So, these are the things that are the main drivers, why most of these pharma companies have gone overseas. And if they can figure out how to reduce the labor costs, then they can reduce the cost of them and make them more cost effective overseas. And that's - that helps them be more competitive in this race to the bottom on the cost of the drugs. So, it's just kind of a downward spiral that we've gotten into that - that's moved us offshore. And so this leads me to the kind of decision that we got on looking at an alternative way of producing drugs. And here's the interesting thing about this. This is not new technology. This is old technology. I'll use the analogy about making spaghetti. If you look at the process to make spaghetti sauce, it's a batch process. You take all the ingredients, you put them in a pot, you heat them up, you cool them down, you dump them out. That's a batch process. A continuous process is like how you make pasta, where you're continuously feeding the starting materials in and continuously taking the product out. The advantage of a batch process, for instance, with the spaghetti sauce, is you can make a bunch of different sauces in that same piece of equipment, whereas the pasta has a single function and that's to make pasta. The real advantage is that from the FDA perspective, each batch of spaghetti sauce tastes a little bit different, but all the pasta tastes the same. And that's OK when you're making spaghetti, but not when you're making pharmaceuticals.

SM Does the continuous process also lower the cost of production?

FG Well, these things are highly automated, so the labor costs on them are dramatically lower and therefore you're creating a more competitive environment to produce them anywhere in the world rather than where the labor costs are very low.

SM And your goal is to make more of these drugs more cheaply in America, primarily?

FG I wouldn't say more cheaply, I would say more cost effectively. And - and I think that, yes, the idea is to create a competitive platform that will allow us to be able to - to produce these drugs, these essential drugs that are currently in short supply. And, you know, this whole supply chain issue is much bigger than I ever thought. One of the reasons why we - we started this was a collaboration with this organization, Civica Rx. And Civica is a nonprofit pharmaceutical company, and I know that might sound like a misnomer, but it's a consortium of all the major hospitals in the United States that have banded together to try and address this drug shortage because they're losing operating room capacity because

they can't get the drugs to support their procedures in the operating rooms. And Civica was concerned about the supply chain in China. And when COVID hit, we kind of saw it in spades that they didn't export anything for a period of time because they were using those drugs to treat their patients with - in country. You know, I think that if we don't use this current crisis as an opportunity to kind of look at things differently and address these root causes, it's going to happen again.

SM You mentioned COVID and the impact that had on the supply chain from China, on pharmaceuticals we needed here. There minute COVID hit, it was clear to everyone that we needed a robust domestic supply of pharmaceuticals and tons of other manufacturing. How is Medicines for All involved in responding to the COVID crisis?

FG Well, on a couple of fronts. So, I mentioned earlier that, you know, we're - we've been working with the Gates Foundation now for just about seven or eight years on developing new, low cost-effective processes to make HIV drugs and now malaria and tuberculosis drugs. So, I guess it was like February or March, so the Gates Foundation called me and said, "we've got two drugs we want you to work on". They gave us the first round, it was Remdesivir, and they were having problems sourcing a key raw material. And, you know, I'm very proud of the group for what they did. In four weeks, they figured out how to make this starting material at about a third of the price of commodity based starting materials that would allow them to produce the material anywhere. This is one of those enabling capabilities for Remdesivir.

SM That's amazing.

FG And - and then the other drug, and this is the one I think that everybody's kind of banking on right now. The problem with Remdesivir is it has to be given by IV. This other drug Mercas, is oral. We figured out a way to make that drug really, really cost effectively with a minimal number of steps and high yield.

SM Another thing I understand that Medicines for All is doing is trying to help local production happen in South Africa. Are you helping the labs and technicians there create this continuous production of medicine process?

FG Yeah, we started getting these inquiries from countries in Africa asking about would we be willing to work with them to be able to do in-country manufacturing of HIV drugs over there. And I explained to them that everything that we were doing with the Gates Foundation was open access and if we could help them, we would. So, initially I got invited over to the Ivory Coast to talk to their leadership about what can be done. We've developed a memorandum of understanding with them. To help take bright young scientists and engineers over there and bring them over into our labs and train them on what we're doing, and then they can go back and become the leadership on facilities that they're looking at building. About a year and a half ago, a company approached us in Pretoria, South Africa, who has the capability to do this. And it's been working with us side by side on taking some of our processes for HIV drugs and producing them over there. And one of the processes we've developed over here is in the process of getting commercialized. And so we're really excited about that. And the really interesting and exciting part about this is they're willing to become an alpha site for us so that they can use their knowledge and experience to create other regional manufacturing facilities for these other countries to produce their own drugs. One of the things I've heard anecdotally is that a major percentage of the HIV drugs that go into that market are either adulterated or counterfeit. And the challenge that you have with HIV drugs is when you underdose an

HIV patient, they can build up resistance to the drug and then they can't take it anymore. So, this is a real problem over there. And - and so we've been looking at it from the perspective of how can we help to provide a more robust supply chain that allows them to produce our own products. And when you think about it, 70 percent of all HIV infections are over in Africa. The majority of malaria and tuberculosis cases are over there. They basically got this unmet need that if we can figure out how to enable them to be able to address their issues and meet their internal demands, they could become a low cost producer globally because they've got low labor costs, too. And if we use the best technology and pharmaceutical manufacturing over there with the best chemistry, then they should be able to be globally competitive with the rest of the world. And that ends up resulting in job creation and economic development.

SM On top of all this you're also training the next generation of medical researchers to work on these topics. Are you finding they are motivated?

FG I have to say that these are - these are some of the most motivated students I've ever worked with in my entire life. Everyone knows two things: first of all, that there's an unmet need and if we can solve this problem, it's going to fix a health care issue. And secondly, they know that if they develop something, it's going to get commercialized very quickly. And that's kind of unusual for academia. We have all these willing partners on the outside that are - this is basically a market pull where once you've developed a process, it's out there and people are using it. And I think that's one of the things that everybody sees is really motivating that they're learning in the process, but they're also helping mankind.

SM Well, Frank Gupton, thank you for talking with me today.

FG Oh, you're quite welcome. And thank you for the opportunity to talk to you about the great work that the students are doing. I'm very proud of them and I feel like that that they're going to make the difference in the 21st century in fixing a lot of these problems.

SM Frank Gupton is a professor at Virginia Commonwealth University. He's co-founder of Flow and CEO of the Medicines for All Institute at the VCU College of Engineering.

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SM Bioprospectors are companies or people that go looking for materials to become new medications. Sometimes they strike gold, but what if that discovered medication has been known and used by indigenous people for years? Who gets to profit off of selling it? The bioprospectors or the indigenous people who found it first? My next guest studies how these complex questions are asked and answered in the South African pharmaceutical industry. Christopher Morris is a professor of anthropology at George Mason University. Chris, tell me about the Geranium plant that you've been studying in South Africa that was used for many generations there by native people for respiratory illnesses. What's the story of how knowledge of this plant got to Europeans?

CM Right. So, this plant is now one that you can purchase - at least a medicine derived from the plant is one that you can purchase in many parts of the world and in fact, you can purchase it in your local grocery store, I'm guessing - as Umcka, U-M-C-K-A. Although there are some versions of it in the United States that are also called Umckaloabo. And the story of that commercialization, the recorded history of that begins with an Englishman in the late 1800s who came down with tuberculosis. He ended up in what's now Lesotho and he ended up consulting with a local healer who it's believed was ethnically Zulu. And this

local healer prescribed him a formula that contained this plant, this geranium, and he slowly started to recuperate. He thought, "this is incredible, I think I should try to sell this". And he decided to return to England, and that's where he actually found quite a bit of success. Decades later, the formula for the therapy ended up in a German pharmaceutical company's files and this is how the plant came to be commercialized as not as a tuberculosis therapy, but later on for its treatment for the common cold and reducing respiratory problems with respiratory tract infections.

SM And so how does the German pharmaceutical use of this plant play out when it comes to compensating native people for their knowledge of it and possession of it?

CM Well, the German company used a - a method or procedure for making the plant - making the medicine from the plant that they felt was unique, and they decided therefore to try to patent this method of producing the medicine from the plant. But they didn't just stop there. They thought, listen, this could be actually something that would be good for people's immune systems in - for other diseases. So, we would like to explore this further. And we would ultimately like to take out a patent on the use of this plant for treating diseases like tuberculosis and like HIV. And so, they successfully did that, they took out those patents, they were granted those patents in Europe. And as a result of this, there was a lot of public concern about that because it was privatizing the use of this plant. And what - where were the original knowledge holders? Where were the plants coming from? And could the people who are involved in providing the company with samples to these plants, could those people and shouldn't they be compensated for that? So, what resulted from that was a really widely reported scandal. The company was accused of bio-piracy and some activist organizations ended up challenging those patents at the European Patent Office in Munich. And this unfolded between 2007 and 2010. And lo and behold, the company lost one of its patents, the production method patent, which was not the result of the bio-piracy accusation, not that they had, for example, stolen the knowledge. It was that some competing companies in Europe were also using the same procedure to make the medicine. And therefore, well, the procedure was not novel, it wasn't unique, so the company should no longer be able to - to patent it. But the bigger story here is that the company was so shocked and unsettled by the accusations of bio-piracy, they had been so publicly shamed, I guess you could say, that they elected to voluntarily withdraw the other patents. And therefore, other European companies started descending on South Africa in order to gain access to the plant and to start manufacturing their own versions of - of the medicine. They're actually extracting large volumes, the plant in mass, bulk quantities and using that material to produce a very simple medicine that's then sold on international markets.

SM And the story that you've been pursuing with this plant also extends to how do you identify native groups? How do you identify groups within the groups? Who are the people that you want to partner with if you are trying to ethically coproduced and profit share?

CM Yes, I think the entry point for this is the Convention on Biological Diversity. What the Convention on Biological Diversity did was it took those resources and that knowledge out of the global commons and it placed it under the authority of nation states. And so on its face, this seems to give governments like South Africa a lot more control over the exploitation of these resources and knowledge. But on the other hand, it creates an incredible dilemma for them, because now the South African government, after it ratified the Convention of Biological Diversity, it was tasked with creating its own laws that would involve government in lots of different and very thorny cultural issues. The Convention on Biological Diversity also has some troubling assumptions. For one thing, it assumes that

plants and people and knowledge are all going to be found together in the same geographic location, in a simple bundle, and that therefore it's going to be relatively straightforward once the knowledge holders are identified and once samples, a small sample is taken, that sharing of benefits would be relatively straightforward. But in South Africa, this assumption doesn't prove true. The case of Pelargonium illustrates this most of the Pelargonium that is being removed from the country, it's happening in a region that is located hundreds of miles away from the nearest lands occupied by the undisputed indigenous groups like the Saan. So, the government faces a real problem then, a real - let's say, like the South African government today when it's trying to regulate this whole industry that we've been we've been discussing, they have, on the one hand, the undisputed knowledge holders that are living elsewhere in the country. But then they have these other groups that are actually providing the physical access of the resource to the drug companies.

SM Help me understand the big picture of where we are now with bioprospecting. How do you think this relates to our efforts to protect the world while also extracting resources from it?

CM So, I would say that the Convention on Biological Diversity is both a symptom and a cause of this of this trend. What the Convention On Biological Diversity embodies was an effort to reconceptualize or reimagine capitalism not as something that is going to inherently degrade or harm the environment and to reinvent – re-envision it as something that is going to save it. The hope, of course, here was that we would sell nature in order to save it. But a recent U.N. report, a report from the United Nations, actually tells us that this approach may not have yielded the kinds of results that we want. In fact, this report that came out, I think last year or the year - the year prior, suggests that the world faces now environmental degradation on a level that's unprecedented in human history. And that we face extinction rates that are not being reduced through these market-based approaches that we've that - we've taken on, but instead are - are being accelerated. So, how do we try to, I guess, work within this model while at the same time keeping our eye on these broader structural issues that are plaguing these communities? And that's where I think bioprospecting and the market-based approach to commercializing these medicines is only going to be one part of a broader initiative at addressing issues of inequality and actually developing economies that are beneficial to the worse off in countries like South Africa.

SM Christopher Morris, thank you for talking with me about this today on With Good Reason.

CM It's been my pleasure. Thank you.

SM Christopher Morris is a professor of anthropology at George Mason University. With Good Reason is produced by Virginia Humanities, which acknowledges the Monacan Nation, the original people of the land and waters of her home in Charlottesville, Virginia. Our production team is Allison Quantz, Matt Darroch, Lauren Francis and Jamal Millner. Maya Nir and Cassie Deering are our interns. Some of the music from today's show is from Blue Dot Sessions. For the podcast, go to withgoodreasonradio.org. I'm Sarah McConnell, thanks for listening.