Judith Vaitukaitis Interview
August 18, 2003

It's August 18, 2003. We're at Building 31 on the NIH campus.

Sarah Leavitt: Well, thank you so much for agreeing to do this, first of all.

Judith Vaitukaitis: It might be something unusual, to put it mildly.

Leavitt: Well, I hope so. I guess I'm, of course, going to focus most of my questions on your work on the pregnancy test and the hormone research that you did, but let's start out by just letting you talk a little bit about your educational background and why you became a physician.

Vaitukaitis: I don't know why I became a physician. It was something I always wanted to do before I was 10 years old. I was never sick, I never knew a physician, and for some reason. First, I liked science and I liked working with people, and so as I got a bit older, like 11, 12 years old, maybe 15, I thought through it and I said, well, first, if I could, I would love to be able to do research -- I didn't know anybody that did research -- because I loved science. And if I was a physician, I'd interface with patients. I'd like that and then I would like to teach, never did that. And so, to make a long story short, that's exactly what I turned out doing. It never dawned on me that I couldn't do it. I grew up in an era where women were not very welcome into these professional areas. There were some people, some physician faculty, that were aware that I was interested in pursuing a research career,

and so one of them was chief of medicine at the time at Memorial Sloan Kettering and suggested that I pursue reproductive endocrinology. This was a new field and nobody knew much about anything.

Leavitt: What years were those?

Vaitukaitis: This was the mid-‘60s, mid- to late ‘60s. And so I looked into it and I liked endocrinology because it was logical, and it was one of the few disciplines for which you can measure something objectively to confirm your hypothesis, if you will, whereas most other disciplines had very few objective tools available and were more of an art than a science. The other thing I observed was that the principles of endocrinology transcended most other disciplines, so I ended up pursuing reproductive endocrinology here at NIH with Mort Lipsett.

Leavitt: That’s right away when you came here in 1970?

Vaitukaitis: Yeah. I came to stay for six weeks or six months, and I stayed almost six years. It was five and a half years. It was probably the most fun time of my life. It was the kind of scenario that, if I were independently wealthy, I would have done it for nothing.

Leavitt: Really?

Vaitukaitis: But I wasn’t in that position, so I did it for a salary.

Leavitt: Did you come as like a postdoc or as . . .

Vaitukaitis: I came as a visiting fellow from Boston University School of Medicine, and it was one of the few places in the country where one could do

reproductive endocrinology. It was a new field. And the irony was that, no matter what we did, it was brand new, so everything was publishable. And so I worked principally with Griff Ross, and we also collaborated with Bob Canfield, who was a scientist in Columbia University, College of Physicians and Surgeons. And his laboratory was isolating the human chorionic gonadotropin from the pregnancy hormone, and he had isolated it and he had broken it down to two subunits. We know much about what the sequence, not the chromosome that is responsible, but the gene that is responsible for making HCG, but the amino acid makeup. And that was back in the days things were, you had to do things by hand, and so the throughput was very slow and tedious. And a couple of years later, that whole process was becoming more standardized with higher throughput, but not the lightning-fast throughput that one sees with unzipping the genome code.

Leavitt: Right.

Vaitukaitis: So that's . . . Thank God, or else we would be up a creek.

Leavitt: So when you got here, it was in NICHD that . . .

Vaitukaitis: Initially it was in NCI. We were all in NCI. Then we were moved over six months later to Child Health.

Leavitt: How come?

Vaitukaitis: There was a change in administrative structure because they didn't think that the grants, the production of research grants, was doing much work

cancer research. But the irony was, a couple of years before I went to, I arrived here in Bethesda, Griff Ross was working with the then-chief of the branch, Roy . . . I forget his last name.

Leavitt: We can look it up.

Vaitukaitis: I'll think of it in a second. Anyway, they had developed a way of treating choriocarcinoma, gestational choriocarcinoma, with chemotherapy, and in order to monitor whether they had cured the patient, thought they cured the patient, they had to use bioassays, and the bioassays are not very sensitive. They're about a thousandfold less sensitive than radio immunoassays. But those weren't developed at that, available at that time yet either. It was just at the time that that kind of technology was being developed. So my primary research was -- I was aware of these other things going on, and we had talked about, you know, it would be nice if you had a better way of measuring HCG, have a more sensitive endpoint for monitoring these patients, but it was not our force. So we were looking at structure function studies of human chorionic gonadotropin. Was there biologic activity in the isolated subunit? What was it about the molecule that was responsible for the unique immunologic and biologic activity? Why were these hormones glycosylated? We still don't know, but we have some pretty good ideas. And what, if you modify the glycocylation, what happens to the hormone's immunologic effects? About a year before I came down here, I was working on steroid hormones in Boston, and so I'd

made some observations there and I got down here and I said, "Gee, you know, why can't we modify the sialic acid like we do with the steroid ring?" And so I asked Gil Ashwell who was in PDK, I guess it was, on the next floor down, about doing some modifications of it and calculating out some things metrically to see if it would work. It worked. And you sort of do one thing and it has a spinoff to other things. And so it turned out that by modifying the inner ring -- there's a little nubbin on the sialic acid molecule that modifies the inner ring -- you can introduce radioactivity into that inner ring and follow it biologically or the tag and making sure you're measuring what you think you're measuring. And so it turned out to be the way we labeled another glycoprotein when we were at the stage to study its biologic effects *in vivo* in a rodent model. It was the first time that was ever done. Then it was used to -- I had no idea it could be used this way at the time -- they used it for _____fication of hormone through some biochemical processes, and that was a sort of a bonus.

_____ we realized that the biologic effect of the hormone resided in the beta _____ of HCG comprising two subunits _____ family of hormones, reproductive hormones. There's one in the brain, in the pituitary, leutinizing hormone, that has the same biologic effect as human chorionic gonadotropin, but its half-life is much shorter. And physiologically, it only _____ level at peak. For instance, if the ovaries

are removed or the testes are removed, and so the hormone level goes up to high levels, maybe not _____ 200 to 300 milli international units _____ standard. But with HCG, the levels could go skyrocketing into hundreds of thousands of milli international units. It would be a different standard. And so you could take advantage of relative specificity. And so in doing this structure-function studies to understand where the immunologic and biologic specificity resided, it became obvious that you could really take advantage of the relative specificity of the end serum.

But in order to do that, we had very small amounts of hormones to deal with of the purified alpha-beta subunits. And so we needed a technique to make antibody. John Robins [sp.], who's in Child Health, with him, we got this technique for intradermal injection of small amounts of immunogen and became a reference technique for several different disciplines. Interestingly, that became widely used, too. It was, again, a spinoff of something that was important. It was key for us to have developed so that we could develop specific antisera or relatively specific antisera for measuring hormone levels in humans, in the human circulation. So we got that far.

And so, just at that time also, hormone was being purified from postmenopausal urine, called Perginal, which had a follicle-stimulating hormone activity. So that combined with HCG, one could induce ovulation in infertile women. And so I learned to do that on my own.

And so I used to have these patients -- I used to draw blood from them throughout the whole menstrual cycle in return for treating them.

Leavitt: These were patients at the Clinical Center?

Vaitukaitis: These were patients that came -- they would come from anywhere.

Leavitt: Oh, okay.

Vaitukaitis: There were patients who traveled -- there's one particular patient I can remember who traveled every day from Manassas, Virginia, and then I arranged for them to get blood drawn elsewhere so it was convenient. But I also had to examine them, make sure that they weren't getting too much hormone and getting too much stimulation. And so, with that, with treating women with Pergonal and HCG to reproduce the hormonal changes during the normal menstrual cycle. And _____ those same samples for human chorionic gonadotropin, it turned out that we could diagnose pregnancy before the first missed period, the first time that could ever be done, and it was really impressive with how rapidly the level of HCG took off before the first missed period.

Leavitt: And that's something that wasn't really known before?

Vaitukaitis: No, because there was no way of measuring it, and the biologic assays were too insensitive to do that, so that if you had a commercial assay using this approach that wasn't as sensitive as the one we developed initially, even the most _____ assays were about 10 times less sensitive because they're trying to make sure that they're not cross-reacting. The serum

was not quite as specific, so they had to make sure that it was really measuring what they thought it was measuring, so that you really didn't have to measure HCG in serum three days before the missed period. You could do it four or five days later when the levels would really start skyrocketing. So that became pretty standard.

I think I told you the story about these women that had been treated with the chemotherapy _____. That was developed in Child Health-NCI, Roy Hertz _____. I kept thinking it was a car's name, but not Avis. Roy Hertz. He was a character.

All these patients were followed so that the amount of hormone they were excreting was consistent with either no ovarian function postmenopausal, but there's a lot of noise in there because that could be predominantly HCG biologic activity because the biologic activity is the same because the hormone secreted by the pituitary gland or that secreted by the _____. And so in screening some of these patients, _____ we routinely _____ blood and measured HCG in them. And we started turning up HCG levels in some of these patients. This was brand-new territory.

And so we agonized over what to do about this, and we felt ethically we had to tell the patients, and we went looking for the tumor in some of these patients. And there was one patient who was a nurse from Pennsylvania. It was the first one that we really worked up and could

find only a small abnormality on the CAT scan of her lungs, and we couldn't be sure whether it was just scar tissue or whether it was a small _____ of HCG-secreting tumor that was just sitting there. And there were more and more data being collected by physicians _____ practice that the longer you did treat a woman who had gestational tropoblastic neoplasm, the less likely they were to respond to therapy that they would readily respond to early on. And so we didn't want to just sit there and watch. And so the patient, this particular patient and another subsequently we told, "We think you have some residual tumor. We can't be sure that it's here or there, but we'd like to give you another course of chemotherapy to see if we can get rid of it." And so that was what was done, and the HCG disappeared.

So the HCG serves as a surrogate for functioning cells within the body that are abnormal. In this case, it's the tropoblastic neoplasm. And when we started out doing structure-function studies of HCG, we had no inkling that we would get involved with anything like this.

And then the other spinoff was that time when new chemotherapy was being developed for dermal-cell tumors of the testes in young men, and those tumors also secreted HCG. And so it was a way to monitor therapy and recurrence in that population, and there were other markers that came along, alpha-theta protein and some others.

But here we were working in a laboratory, and it really underscores

why you need physicians to be involved with clinical research. We were aware of problems with tropoblastic disease in the relative insensitive bioassay, the bioassay that was used back in those days. And just making an observation from this working laboratory, projecting that, you can move on and adapt the, what you're observing for structure-function studies to a clinical problem. But even with doing that, you had no idea of the impact of that observation in terms of early pregnancy detection, abnormal pregnancy detection. In fact, ectopic pregnancy, the levels usually start falling and they don't rise as high as they do within a normal pregnancy. Or the whole class of gestational tropoblastic neoplasms, and that was one of the classes of tumors that was responsive to a combination of methotrexate and a few other drugs. And so if you can make the diagnosis, you had a way of treating the disease. _____ a whole spinoff of things.

One of our concerns was, we developed this assay and we wanted to protect the public from getting gouged with being charged for these tests because we knew it would be picked up by the commercial outfits. But the legal counsel would not at that time allow patenting.

Leavitt: So you talked to them?

Vaitukaitis: Yeah. And so they said, "When you publish it, it'll be in the public domain," but it still doesn't really protect, so that's what we had to do. So we never got a chance to patent it and make any money off it to pay for

our research.

Leavitt: Do you think you had that idea at the time about that it would be so popular, especially the early pregnancy test, for the public?

Vaitukaitis: Never. We personally had no clue how important it would become to diagnosing abnormal pregnancies or monitoring patients with tropoblastic neoplasms. I mean, that was all bonus. And it's nice to have been involved with something like that.

There were several spinoffs: learning to make a specific antibody, small amounts of immunogen, and it was critical for John Robins to be involved with that because he had background. And actually, we tried two doses of immunogen, 10 and 15 micrograms, and so the animal that had the first dose of 15 micrograms of immunogen was labeled SB6, and it was the sixth animal, sixth rabbit, and there were five rabbits immunized with 10 micrograms, and we were told they would never make antibody at 10. I said, "Let's see." We actually went down subsequently to 2 and showed it would make enough of that too. So the first animal that was immunized with 15 micrograms, SB6, became the classic antiserum that had the best relative specificity that was used for years, and we provided it all over the place. But the irony was, within months of publishing this, we were, I was approached by some lawyers to bring a malpractice suit against a physician for not having used the HCG assay. The HCG assay was experimental, and so it was not a standard of practice. We got

someone else to, one of our former fellows to _____ on that, to point out that it was not a standard of practice. I don't believe in suing and all that sort of stuff. You know, you can't hold someone to a standard that is not generally a general standard.

Leavitt: Right.

Vaitukaitis: But when something like this can happen, it usually does happen because the lawyers look at every last little thing.

So, let's see. What else can I tell you about it?

We learned a lot about the cross-species hormone activity. We were able to use -- for instance, we developed _____ HCG on the other glycoprotein hormones. There are three other ones that are, have the same structure that are made in the pituitary gland. _____ study how hormone works at the cell-surface level. I mean, now we know all that. We _____ new tools back in those days. I mean, we were using a front-end loader compared to using the nanotechnology that's used now.

Leavitt: So, tell me about the equipment that you were using.

Vaitukaitis: Well, you know, the year before I came down here, I was working on steroid hormones, and I used to have to draw a 15 milliliter sample of blood to make measurement of two hormones in the blood, and it used to take me two weeks to work up 10 samples. And at the end of that two weeks' time, I may not have anything to measure because there could have been an oxidant that got into one of the chemicals. And so you didn't

know . . . So then the principles that were used to develop hormonal assays for proteins and glyco, sugar-coated proteins, glycoproteins, was also then used to develop antisera for measuring specific steroids, but you have to do some cleaning up of the steroid out of the blood with some pre-purification technology back then. But then, subsequently, you didn't even have to do that. You just _____ move out the endocrine proteins and all that sort of thing. But one could measure now, in a half hour, probably 10 times as many samples as, say, 100 samples in half an hour, whereas it took us two weeks to measure. And that was working all day long, doing all this thin-plate things, very time-consuming. _____ and saying, "Gads, am I going to have anything left here when I get through?" But that initial work was done on dehydro_____sterone sulfate and _____ sulfate. And that was the -- the person I worked with was of no help whatsoever. I had some technical help from somebody, a technician in the laboratory.

Leavitt: This was up in Boston.

Vaitukaitis: This was up in Boston. And so I designed the experiment myself. When I look back, I say, "You know, this was pretty clever, what I did." _____ whatever. But it was a novel observation that led to understanding why and how hormones have to be modified by liver enzymes to make, protect them from metabolism or to enhance their metabolism. It could go either way. To this day, no one knows what the function of DHEA

sulfate is. We make large quantities of it, and we still don't know what its function is, which I find fascinating.

Leavitt: After 30 years of research.

Vaitukaitis: Yeah.

Leavitt: So then, when you got here, where was your laboratory?

Vaitukaitis: It was Building 10, 10B09. It was in a laboratory that was probably a third the size of this room, and there were periods of months, there'd be about 10 of us working in that laboratory space. I used to get over there about six o'clock in the morning and not leave till eleven o'clock at night.

Leavitt: My goodness!

Vaitukaitis: And on weekends, go play . . . _____ early in the morning. Early in the morning, I'd go out and play 18 holes of golf, get back about four or five o'clock in the afternoon, go back to the lab for several hours, and then go back in on Sunday morning. It was . . .

Leavitt: Was everybody doing that?

Vaitukaitis: No, but there were quite a few that worked long hours. Put work in quotes because it really wasn't _____ work. It was just absolutely fun. The second or third year I was here, I think I published 28 papers in one year. They weren't fiddling with _____ kinds of things. They were really -- it's the way things went. I mean, there were so many things that one could do if you decided to think it through to understand what in the world's going on. It was absolutely fun the way research would be.

Leavitt: And do you remember what kind of instruments you were using? Did you have lab animals that you were working with and all that?

Vaitukaitis: The rats, and we had some mice for bioassays, rabbits, using the white rabbits for developing antibody, and then we used to keep some sheep out at Poolesville for making second antibody. We used to have to _____ all those animals. I got pretty good at cardiac sticks, drawing blood, or ear sticks.

And then there's another part. I almost forgot about this. We were doing studies on follicle-stimulating hormones. It was like HCG but it has a different biologic effect. It's the same family, glycoproteins, two subunits that are sugar coated, if you will. And we wanted, we studied the biologic effect of FSH. And so we contacted -- it was a retirement home. You know where the Bolger Center is over in Potomac?

Leavitt: Mm-hmm, mm-hmm.

Vaitukaitis: _____ be a retirement home for nuns. So I arranged with the nuns to collect -- they were postmenopausal nuns -- to collect their urine and put it in these big containers, plastic containers, and go over there once a month or at three weeks or so with somebody who was strong enough to lift these bottles. They were about, I would say probably each plastic container held probably about 30 gallons, not that, probably 15 gallons of urine; take it back and then process it to isolate the FSH from it, then use that to study

what the effect of cyalic acid was on hormone action. It was unbelievable, but got a lot of stuff done with that. I never want to do it again. Now you can buy it. That was the _____. There's a _____ out of Rome that collected postmenopausal urine from nuns in Italy to make Perganol, which is the hormone for ovulation induction. Now they have synthetic FSH _____ and we know genetic makeup is of the genes and that sort of thing, so you can reproduce it and put the sugar _____. Interesting.

Leavitt: And who else were you working with at that time?

Vaitukaitis: Two of the other people were Bob Goldberg, who's on the faculty at the University of Alabama. I did some work with Ed Rider [sp.] and Howard Kuen [sp.], who were both pediatricians. Howard's at Penn State and Ed's at UMass at Bay State Medical Center out at West Springfield, Mass., somewhere in that area. There were various foreign fellows, Ukitaka Niachi. He used to have a symposium. He died earlier this year of pancreatic cancer.

It was interesting. The first day he came in the laboratory, _____ asked me if he could work with me, show him how to do some of these assays and different techniques. And so the Japanese always smile and bow, you know, when you ask a question, and so you don't really know if they understand what you're saying. So I worked with him for almost a whole day, and toward the end of the day I said to myself, "I don't know if

he understands what I'm saying or not." So I said to him, "Do you play tennis?" and he says yeah. And so I said, "I serve like Pancho Gonzalez," and he said, "Yeah, and I play like Lou _____," so I knew he understood English.

Leavitt: _____.

Vaitukaitis: Yeah. And then he used to stay and work in the lab late, and so I said, "I've got a spare TV at home. You can give it to your wife to entertain her at night so she won't be so mad at you when you get home late." So he said, "Yeah, that's a good idea," so we went and got my TV set and brought it over for her. I never saw the TV again. I think he passed it on to some other Japanese who came in. You know, it was lonely for their spouses to stay at home. But she was pretty aggressive. She didn't want to leave the U.S. She didn't want to go home walking three steps behind her husband back in Tokyo. But interesting.

There were people, investigators from Europe, Jean Pierre Bouvet [sp.] from southern France, some folks from various research institutes in Germany, predominantly either from Germany or from Japan.

Leavitt: And they wanted to come here because they were doing this hormone research?

Vaitukaitis: Yeah. They wanted to learn how to do it and all that sort of stuff.

Mort Lipsitt [sp.] was, I believe, _____. He was not intimidated by anybody, whether they were smarter or not so smart as he was. But he

was very perceptive, and I think he was very fair, and he didn't play games and that sort of thing, which, you know, was very interesting.

Mort was aware that -- after I'd been there for a couple of years, I kept putting other people's names on the papers who had very little to do with it, so he said, "Stop doing that," and so I did. And I got a lot of grief from people whose names were, who were contributing nothing. But it was interesting. I learned to speak up for myself.

Leavitt: It sounds like you were one of the only women.

Vaitukaitis: I think I may have been the first woman senior investigator. I don't know. There was one other woman. I think she was _____. I don't know if she was a visiting fellow or a clinical associate. But it was a man's world. But I was so used to it. I had gone through Tufts undergrad _____ no women in there. There might be one other one. In med school there, the class size was about 70. I think there were five or six women.

And I can remember one of these guys walking up to me and saying, "You know, if you weren't in this class, I'd be _____." And I said, "Tough! Why don't you work harder." I'll never forget that. Ridiculous!

Those were probably the most fun days of my professional life. The irony of what I do now is that I hate administration. But I got very good at it because I had to get it done and be very decisive. But there's

an added side to the administration that I do now. Because of my background, having been out in academia, I know the kinds of problems that people are up against out there, and I can relate to it when they start explaining what their problems are. And so it becomes my job to figure out a way to find a solution or help them find a solution or solutions to the problems they're trying to address, and that's very rewarding.

Leavitt: _____.

Vaitukaitis: Yeah. For instance, about two years ago, there was a land-based tsunami equivalent in Houston, where it destroyed a couple hundred thousand animals, the instrumentation, and just wiped out animal research facilities, and this was like in August of 2001, I think. Maybe that's right. And so it was getting near the end of the year, and we have -- one department that we're responsible for is a facility program for renovating facilities and building new facilities, so it was my job to figure out a way to help these people legally in the short time that we had left and do it through peer review. Sounds like an oxymoron, but we did it.

Leavitt: You did it.

Vaitukaitis: They had to help us. We told them what they had to do for us to be able to help them, and so within four weeks, we got a grant application from them, we got it peer reviewed, and we got it funded, which is probably an all-time high-water mark, no pun intended. Because one of the resources they left that got destroyed was a novel electron microscope that could

_____ structure, crystal structure in a frozen-membrane state, and it was one of two in the whole world. So the investigators _____ subscribing it before it was done in by the flood. So we had to find a way of replacing it pretty fast, and we did finally end up doing it legally because it's -- the investigators were lining up to come in there and use _____, and we're not sure it could even be fixed.

We're about to do _____ make an award -- and this is off the record -- to Tuskegee. Remember the syphilis study?

Leavitt: Of course.

Vaitukaitis: The president, _____ President Clinton apologizing for that study, he talked about establishing a _____ bioethics research, and I thought that they were given the funds to start _____. They were given $2 million, I think it was CDC, and that was it. They had no physical facility, nothing, and they couldn't _____ to set up this bioethics institute. And so the president of Tuskegee called me, and I also got a call from Jesse Jackson Jr. and a few other folks, and so I said, "Okay. I think I know how we can help you get this done." So I got Dr. Repper [sp.] to help out with some of his money that was legal to use, with funds I could _____ through the construction program that we have. So we're about to make a $14 million award on top of another award that we made previously, to take the hospital facility that was used for the syphilis study and transform it, a major part of it, into this bioethics institute, including facilities for

scholars to go there and stay there for a length of time to do their bioethics research.

Leavitt: Wow.

Vaitukaitis: And I was, frankly, appalled at the way the apology was done by the White House. What was really misleading is that they basically said, "I'm sorry for what happened, and set up your own bioethics institute." I think that was very unfortunate. But now we've corrected it -- we will have corrected the problem.

Leavitt: Maybe you can have a little exhibit there about just the historical background.

Vaitukaitis: Yeah. There are other studies that happened that were unethical, equally unethical, but they didn't involve minority populations. That was just -- I cannot believe a human being could make the kinds of decisions that were made. There are some studies out in Long Island with some tumor cells injected into normal people. I cannot believe that any human being would even contemplate that study. I don't which is worse, the one with syphilis or that, both equally bad.

Leavitt: _____ or have you followed where the hormone research has gone and where reproductive endocrinology is looking now?

Vaitukaitis: Yeah. By the nature of what I do, I get to see everything. It's like being a perpetual, I'd say candy shop, in the store, but probably more than that. I'm sort of like in the glass-walled gazebo. I can watch everything.

Leavitt: What have been some exciting things that have happened?

Vaitukaitis: We know a lot more about the _____ modulation of hormone action, and it turned out those same principles transcend other systems, like the neural endocrine system. We know a lot more about neuroendocrinology.

And now with the various imaging techniques, some things that we're currently helping develop. I was totally unaware that the imaging capability, the reproducibility, imaging techniques for research purposes, was so poor and gave so much noise that it's hard to do a follow-up study even with us using the same equipment. The same principles that were then what's called _____ between-assay variation, the same principle holds for equipment. So if you measure, if I were to measure or image your brain with an MRI, the same equipment, and just did it twice in a row instead _____ week, there'd be significant differences in the two images -- not because you changed; it's just because of the way the equipment is set up. So we're developing ways of getting rid of that between-assay variation, so we standardize the piece of equipment.

It will also then help with multi-site trials for intervention or studies of degenerative brain diseases like Alzheimer's, _____ diseases, Parkinson's, and develop new techniques so you don't have to use radioactivity. You can use radio-dense materials that can couple with things like dopamine or some hormone or whatever you're trying to measure. That we're doing currently with PET scans. _____ linear

accelerator. It's very expensive. And we can't do those studies in pregnant women or in kids because of the -- the current exposure to radiation is too dangerous. So there are a lot of new tools _____, and they're very interesting.

When an investigator makes an observation that's going _____ a paradigm shift in the interpretation of X and Y. A classic example was gastric ulcers are a complication of helicobacter infection. The first time you hear it, you say, "This guy's off the deep end." But you just watch, on a site visit, watch for the interaction of established investigators who don't believe it and others who have enough sense or enough self-confidence to say, "Look, this person may be right. What he says sounds logical, but we've never seen this." Another investigator will say, "Well, I haven't seen this, so therefore it doesn't exist." And so that could really block investigation on that, in that area, and so it's our job to make sure that it doesn't happen, it doesn't happen in terms of the investigator getting blocked because somebody is biased because of their own personal opinion. I mean, if somebody's really off-the-wall, then you want to get input from several investigators to really _____ it. But when there is a paradigm shift in interpretation of something, it's very hard to get it through.

The first principle of developing a radioimmunoassay was the result of a person in _____ making the observation that, in patients with

diabetes mellitus were treated with insulin, that they developed a circulating antibody, and that was the principle of developing the radioimmunoassay.

Leavitt: And when was that?

Vaitukaitis: That was probably in the early '60s, early, mid-'60s. Then after that, then we started inducing antibody in animal models, and then the rest is history. And now we're trying to develop techniques that are colorometric, depending on colorometric endpoints because it's safer than using radioactive endpoints. We do have good tools.

I wish I had access to 1 percent of the tools that are available now. It would have made my life so much easier. When I left Building 10 in the mid-'70s, I wanted to buy a desktop computer. For a desktop computer with 10k, not megabytes of memory, 10k memory, it was going to cost $215,000, which is money I didn't have.

Leavitt: Sure. So you weren't using computers really.

Vaitukaitis: Well, we were, but we . . . Actually, we were using Wilbur. _____ in Wilbur. David Rodgard [sp.] was on the staff in the branch that I was in, Child Health. So he taught me how to do the bioassay calculations and how to shift the data into some sort of data point someplace in New York. _____ the first time we ever did this with them, I entered the data . . .

SIDE B

Leavitt: You never got it? Or you got it eventually?

Vaitukaitis: Never got it. But we recognized it as wrong data. Our data set was not correct. It was hysterical.

Leavitt: That's interesting.

Vaitukaitis: Yeah. So being able to use Wilbur -- that was the forerunner of what we now use, PC's.

Leavitt: Right. So, what kind of setup, like your lab bench, what would be on it? What were you using?

Vaitukaitis: It was very crude. Relative to what we have today, it was very crude equipment. Probably the most sophisticated equipment we had were the new _____ coming out for doing the radioimmunoassays for counting I125 and I131. As a matter of fact, the other thing we developed was using I125 for doing radioimmunoassays and discerning what the problems were with I125 versus I131. I125 had a much longer half-life, but it has a much shorter degree of energy level, so that if you use the mixed bag of blasts and plastic tubes, you get assays that are all over the map. So you had to use plastic tubes that were homogeneous. Otherwise you'd get too much variation between tubes. And so we had to explain all that to everybody.

The first time we tried using I125 -- it had never been used before for labeling hormone as for doing radioimmunoassay -- it worked. I was just, just made some guesses how to do it, and it worked. It's nice when that happens. It saves a lot of grief.

I did that with Ukijaka Niatsi [sp.], the Japanese investigator that I was talking about before. But you start doing things and you stumble across other things that would be helpful, and you just go ahead and do them.

Leavitt: You had the freedom to do that?

Vaitukaitis: Yeah.

Leavitt: In your branch.

Vaitukaitis: I had very little technical help. I was my lead technician. Then I did have one technician where working with me who was superb, Ellen Ebersoll [sp.]. Her husband was a clinical associate in one of the neurology branches in Building 10. He was working on cat brain neuronal function.

The imaging technologies that are available now are just mind-boggling, incredible.

We support a network of clinical research centers around the country. There are 82 of them, and that includes serving the investigators who are best at what they do in the whole world. So we get to see the cream of the crop. It's absolutely fascinating. It is. Some of those folks are prima donnas and others are just so down-to-earth. It's like anything, any other field.

Leavitt: Sure, sure.

. . . be there at the beginning of the field when you're just getting to

figure everything out.

Vaitukaitis: It was a blank check. What we did was novel.

Leavitt: How did you decide which direction to go?

Vaitukaitis: Depending on the time I had. Everything worked. There were very few things we did that didn't work, which, in hindsight, is and was mind-boggling. We said, "Look, let's try to make -- see if we can develop assays using I125 instead of I131 because it'll save us a lot of work." We tried it; it worked. Then we went beyond that. We said, "Let's try doing this enzymatically because it may protect," because the _____ we used for labeling weren't really doing the hormone so it would not lose bioactivity. So we labeled I125 now and can use it for studies *in vivo* of biologic action of FSH and LH and all that sort of good stuff, and it worked.

And there's very few fields that you can get into these days. Research moves so much more rapidly because the technologies are different. We have all these high-throughput technologies. We have to develop them. We have to anticipate what investigators' needs are, for they know . . . _____ they say, "We're having trouble doing this," you have to keep listening and get it triangulated on some other investigators in complementary fields and say, "Okay, you've got to do this, then this, get this ready because this is what these investigators needs. They don't know, but they've described it to us." It's mind-boggling.

And then you have all the political things you have to deal with. Human embryonic stem cells. We started that. We're responsible for that whole field. Serendipity.

There's an investigator, John Hearn [sp.], who is the program director of the Wisconsin Primate Center. I've known him for years. He's a reproductive endocrinologist. He was doing work in England and Scotland, and Donna Shalala was then the chancellor of Wisconsin. She hired him. And so I had known him for years professionally. And so he came here one day. He had included in the _____ for the primate center a project to try to isolate embryonic stem cells from rhesus monkeys, and the reviewer said, "It can't be done," and I just knew that was not the case. So he came in to talk to me about it, and I says, "Okay. We'll give you some administrative supplement to do this, and if it works, then we can go on from there. So it cost us maybe $250,000-$300,000, and the rest is history.

Leavitt: Wow!

Vaitukaitis: We were able to do that work, and he trained Jamie Thompson how to do research with embryonic stem cells, and Jamie stayed there and John went to Australia to take on a major position in one of the national universities.

Leavitt: Did you run into any political issues in the Reproductive Health Branch? Was that . . .

Vaitukaitis: No. They didn't know anything about this.

Then we knew it would be very important to create identical monkeys to reduce the amount of monkeys that are needed for research. But not only that, but to take these eggs, the nucleus from the egg, and modify it to create a model that will be _____ gene transfer for patients with cystic fibrosis. There's no good model for cystic fibrosis. And we'd try and get models that more closely mimic what happens in humans.

So we ran into the Jesse Gelsinger [sp.] kind of problem. It takes a lot to do that, but we're very close to actually doing that now. And we have the PETA types and the other Jane Goodall types saying, well, you shouldn't do this, that, and the other thing. But it takes five animals to save, subsequently, hundreds of thousands of lives or make them more functional. It's a no-brainer. I'll take the heat. It won't be the first time.

_____ run across investigators who are their own worst enemies. They apply for a resource, get funded, then provide materials for the end users, and then, because they've made a separate pact with a private company, which they won't tell anybody about, you find out about it, you've got to get everything cleaned up. Peer pressure on that individual is astronomic from their peers who find out about these things. You can't keep anything a secret. Something gets out.

Leavitt: In the '70s, I've been reading a lot about the _____ pregnancy test. Right? That one that first came out, and the commercial history of it. It

seems like it first came out to the public in a general way at drugstores, things like that, in 1978. Do you remember? Like, was that a . . . When that happened, did you think, "Oh, that's because of the research I did"?

Vaitukaitis: I knew it was going to happen. It was just matter-of-fact. I didn't think anything positive or negative about it. I just knew it would happen. But was '78 the first commercial?

Leavitt: That's what it looks like. They came out . . .

Vaitukaitis: That's late; that's a delay.

Leavitt: Yeah. It came out earlier than that, I think. I mean, doctors were using it. It looks like it was available earlier than that.

Vaitukaitis: We were doing all kinds of assays for people all over the place. We felt ethically that we had to because it wasn't available anyplace else basically. So we used to give out a lot of antiserums and show them how to set up the assays.

Leavitt: To doctors.

Vaitukaitis: Yeah. For research labs to make sure they had the appropriate quality control.

Leavitt: Right.

Vaitukaitis: We used to follow a lot of patients, men, young men with tumors, with chorios or normal pregnancies, and then patients suspected of having an ectopic pregnancy.

I did crazy things. I used to work seven days a week, and I used to spend a lot of time doing . . . All the ovulation _____ I did, I did because it was my way of paying a patient back. But the hours I used to have to keep for that work was astronomic.

It was an irony. I lived on the other side of Bethesda, and one day this woman walked up to me and she says, "Are you the same Judy Vaitukaitis that did ovulation induction in the early '70s?" I said, "Yeah." She said, "I'm one of your patients." She lived -- _____ live there now. She or her husband worked for the State Department and had to go to a duty station somewhere in Africa. I don't think she ever -- I haven't seen her around the neighborhood. She says _____ for two years. That was about five years ago. But it was interesting.

Every time a woman would get pregnant, they'd always give me a picture of the baby or sometimes a picture of them and/or their spouse. And I always remembered the picture she gave me. Seth was her son's name, and Peter was her husband. Don't ask me why I remember that.

Leavitt: That's really neat.

Vaitukaitis: Yeah.

In my professional life, I've been able to do everything I wanted to do.

Leavitt: Not everyone could say that.

Vaitukaitis: Yeah. And I had set a goal for myself to be a full professor of medicine

by the age of was 36, and I did that, and everything else after that was gravy. I wanted to teach, do research in _____ patients, and I was able to do that. I maintained my sanity because things got _____ in the laboratory, you had patients to interface with. Sometimes the patients drive me crazy _____ the lab _____.

Leavitt: So when did you come back to NIH?

Vaitukaitis: In 1986. I intended to come back only for two years.

Leavitt: Again. Got stuck in Bethesda.

Vaitukaitis: I had never intended to come to do what I'm doing. But this has been fun. I can't believe it's been 10 years that I've been director of this organization. It's changed a lot. It takes a long time to get good people on the staff. You can't say, "Okay, I'm replacing 30 people with somebody new." Sometimes people don't perform because they're not given the opportunity to perform. And so it takes a while to get the _____ staffing you need to get on board because research is changing, you need different perspectives, and we've been able to do that. It makes a huge difference. It makes your life so much easier. The problem is, we have so much to cover. I don't have enough staff to do it with. We're always concerned about their getting burned out.

But we try and make it fun for them and we try to reinforce the fact that they're doing a good job, and they really are doing a good job. Don't say they're doing a good job when they're not, because then you have no

credibility. And if you're treating everybody the same, whether they're performing well or not, it's bad for morale. You wouldn't think so, but it is. Why should I work so hard? I get rewarded the same as . . .

There's one thing that really impressed me in the early '70s when I was over in the Clinical Center. There were _____ has changed a lot. The reputation of NIH was based on the productivity of probably 5 percent of the folks.

Leavitt: Really?

Vaitukaitis: Incredible.

Leavitt: That was the time when a lot of people, the so-called yellow berets, were coming to NIH.

Vaitukaitis: Yeah. Some of them were losers, but there are others that were _____ *New York Times*, *Washington Post*, and whatever else, and sit at their desk and read them almost all day long. That's changed a lot.

Leavitt: You think so?

Vaitukaitis: Yeah. Probably not enough, but it's changed, I think, for the better.

But what I'm -- I'm concerned about clinical research on this campus. Scientific directors don't have _____ highest priority, and to justify this campus, you need clinical research. The irony is that when the leadership of NIH defends the budget before Congress, it's always with clinical research, yet until Dr. Zerhouni came on board, I can't remember a former NIH director who has rated a high priority for clinical research.

Leavitt: Do you think Zerhouni is?

Vaitukaitis: Yeah. I totally agree with his assessment. I mean, I felt like -- I had felt like I'd been sort of swimming against the current, trying to upgrade extramural clinical research _____ network and some other things. But his, I mean, Dr. Varmus -- I told Dr. Varmus _____ he left, I said, "You didn't have any priority for clinical research." He said, "Yes, I did." I said, "Prove it to me." I said, "You're interested in . . ." I won't tell you what I said.

Leavitt: So you've been with the building of the new Clinical Center.

Vaitukaitis: That's been a farce. That's _____ this 300-bed hospital _____. I told Varmus right from the beginning that they needed nothing that was larger than a 100-bed hospital. He didn't understand why I said that. He was furious with me. But I said, I felt ethically that I had to tell him . . . I don't know if he knew how to figure out the census. It's something he'd never had to do before.

But since he's got to Memorial Sloan-Kettering, they're doing a lot of -- they do a lot of new therapeutic _____, so he needs the equipment of a clinical research center, so he's now hooked up with the Rockefeller across the street. The irony was that this person who was heading up the Rockefeller said, "Do you people ever talk to Dr. Varmus about clinical research?" because he told me he was going to pay me back. And so I said to him, "I'll believe it when I see it." He said _____ he was very

open and very anxious. This is going to save them hundreds of thousands of dollars a year. That's what a GCRC is there for, to help expedite research. So I think _____. He's a great guy, obviously. But _____, he'd be in private practice. We need another way of creating yellow berets.

Leavitt: Besides the draft?

Vaitukaitis: Besides the draft. I'm hoping that they'll only _____ program _____ that. We developed some new programs that are very attractive to physicians and dentists, but we won't know for about another three or four years whether they're attractive. And we're seeing a caliber of _____ we've never seen before. They're really truly outstanding. Maybe there's hope. So when I retire, I'll say, "Gee, maybe those guys did something."

What else can I tell you?

Leavitt: Well, is there anything . . . And NICHD, of course, is having its 40th anniversary, and you'll be speaking there, and you just mentioned that you got nominated to the Hall of Fame, Hall of Honor.

Vaitukaitis: The Hall of Honor. I knew it was one of those.

Leavitt: That sounds good. So, what exactly are you going to be speaking about?

Vaitukaitis: I think HCG and structure-function studies.

What we did back in the early '70s was really novel. I mean, we just blitzed the field very fast. It took a lot of hard work by a lot of

people, but it was actually fun. It was interesting.

Leavitt: Were there people at some other places doing research that you were in contact with?

Vaitukaitis: It was really interesting. I was invited to a meeting in London probably in 1972 or so. I was publishing like crazy. No matter what you did, it was novel. And so they a brief summary of what I had done, that sort of thing. They didn't know how old I was or what I looked like till I showed up _____. "Is this . . ." I said, "Yeah, that's me." He said, "I expected somebody who was a grey little old lady," because of what I had published. And I said, "No."

Leavitt: You had a lot of energy.

Vaitukaitis: Here I am. It was really funny.

There were very few places that were doing reproductive endocrinology research because they didn't have purified hormones, there was no way -- there were just some very tedious ways of measuring steroids. After President Kennedy was diagnosed with Addison's disease, very cumbersome techniques for measuring cortisol were used, layered chromatography and that sort of thing, at Cornell, the TCRC at Cornell, actually. If they could have done it with a new technique that's available now, you'd probably have all your results done in an hour or two _____ push them through real fast. Interesting.

The research tools we had back in the late '70s compared to now,

it's like Neanderthal-modern man, no comparison. It took brute force to get some things done.

Leavitt: Yeah. Well, it's interesting. I'm sure this happens a lot, but it seems like you're more proud of the end result in terms of being able to identify tumors and tumor markers and things like that than maybe the early pregnancy detection; whereas, of course, it was the early pregnancy detection that became well known and popular.

Vaitukaitis: Yeah. These other things we did, we _____ they would have an impact.

Leavitt: So you were more looking for the early pregnancy?

Vaitukaitis: We were just -- we just initially did it. We studied hormone action.

Leavitt: Okay, and just see what would come from that.

Vaitukaitis: And then _____ at least this cohort of patients who really don't know if we really can cure their disease. We know that the bioassay that's used for monitoring the amount of hormone they're screening is very crude, very insensitive, but it's better than anything else we have. So we need another, we need another way of measuring the HCG in the presence of a finite amount of LH at the critical biologic step. It's fascinating. Interesting. _____ back in those days.

Leavitt: I can't even imagine.

Vaitukaitis: It got so the people used to know that I was at the lab at six o'clock _____ used to get phone calls at 6:10, 6:15. I used to go into work early so I could get things done before anybody else showed up. The phone calls

started coming. Interesting.

Leavitt: Exciting times.

Vaitukaitis: Yeah. I can remember Tony Fauci was a clinical associate back then. Gads. He didn't even know how to design a study. And Brody was around _____. _____. _____. They have a high risk for developing different kinds of tumors. They have HCG, abnormal levels of HCG present in probably two out of three patients with "leaky" genes. We still don't understand that. Interesting.

I can remember Bruce Weintraub was in PDK, and after a while he got involved with fooling around with glycoprotein hormones. And we had developed this specific HCG assay. We could measure hundreds of samples in a day. And he developed a technique that was a very cumbersome one. He could measure five samples. It took him about three or four weeks. It reminds me of the _____ sulfate study that was developed initially. So he presented it at Atlantic City. So after he got through, I raised my hand, and _____ one slide, so I showed these thousands of samples done -- blew everything out of the water. _____. But it was just a difference in technique.

Leavitt: Right.

Vaitukaitis: And that was because we had developed the antisera, this technique that was just, we had just published and we were already using it. So we were light years ahead, and this gave them _____ needed. And they were told

this was used _____. We'd already been there and done that.

Leavitt: Was there then collaboration among the different institutes, since you were all in the Clinical Center, I guess?

Vaitukaitis: Yeah. And we used to have endocrine grand rounds, and _____ about four or five institutes, and the clinical associates or whomever would present a case or two. It was absolutely fascinating. I used to enjoy those. And I tried the -- it happened at a time that conflicts with _____ go back. One of these days.

Leavitt: Anything else? Anybody else you worked with, or any particular memory you have of that time?

Vaitukaitis: When we first started out, we were in NCI. We moved to Child Health _____ because we weren't doing enough clinical oncologic kinds of stuff except Roy Hertz's stuff _____ and Al Rabson and was the scientific director for NCI. And his secretary was _____ Ross, the wife of Herb Ross, the guy I worked with. And Nat Berlin was the NCI director. And _____ all the studies we were doing with HCG and tumors, and he used to come to me for slides, present the stuff. It was sort of an irony. We'd been sort of kicked out of NCI and _____ Child Health. It was more _____ to be in Child Health by the nature of what we started doing with reproductive hormones and that good stuff.

Leavitt: Was that -- was reproductive hormone research respected around here, or was that something that was considered so new?

Vaitukaitis: It was so new. But then after about four or five years, some of the clinical associates who had _____ were a little antsy about being in the Reproduction Research Branch, and they changed it to Reproductive Biology Branch or something like that. It was kind of crazy. It was kind of shortsighted.

There aren't that many places in this country to this day that have training for reproductive endocrinologists in non-surgery. I'm trained in internal medicine. Most reproductive endocrinology is done by ob-gyn types, and, quite candidly, they're not trained very well except in a few places. Don't quote me on that. It's _____ research field.

The surgical fields have become very procedure oriented since they're reimbursed by procedure, which is unfortunate because it's removed a lot of really good potential research candidates, and only now are young people in the various surgical disciplines looking to pursue research careers. It's going to take another decade to get _____ give them _____. I've tried _____ if they just tell us what they need, we could help. _____ national network of clinical research centers and other resources we have out there. These folks are just overcommitted, and they're overcommitted because they make too much money. _____ pay too many taxes. So it's a Catch-22. And the malpractice insurance has taken off. So I don't know what the premiums are for a neurosurgeon, at least the hundreds of thousands of dollars' premium every year. It

doesn't take much for them to get sued. It's not even malpractice. But a jury always feels sorry for the victim, so they say, "Well, this guy's got the insurance. Let's just give this award." You can't _____ that way. They're trying to fix it, but I don't know how far along they're going to get.

Anyway, I can't think of anything else right now. If after you hear this meandering back . . .

Leavitt: I'm pretty sure I'll have more questions, yes, absolutely.

Vaitukaitis: You probably won't be able to hear anything I've been saying on that. That's good.

Leavitt: Okay, well, yeah. I'm sure I'm going to have more questions because I'm going through . . .

Actually, one thing, which I think you answered about how the tests would have been different, the pregnancy test would have been different like in 1970, before you did your research. The bioassay just wasn't as sensitive, and so . . .

Vaitukaitis: Right. And _____ bioassays _____, and they're always less sensitive, the *in vivo* bioassays.

Leavitt: I found -- here's one that . . . This is in 1970. It was _____ two-hour pregnancy test. This is like a brochure. I don't know how much you can tell from the brochure of what they're doing. So this would have been . . .

Vaitukaitis: Oh, hemoglutination. Okay. I used the HCG, test like this to guide diagnose my sister-in-law's pregnancy _____, and actually I got a blood sample from _____ diagnosed as pregnant weeks earlier. The problem with these kinds of tests is that there can be some substances in the urine to give a false-negative or a false-positive test at a pretty high frequency, so you had to be careful.

Leavitt: So this kind of thing would be done more in a lab, not at home.

Vaitukaitis: Yeah. But then these principles were adapted for home pregnancy tests. They'd come out positive _____ antibody so they can have a positive or a zero according to whether it's positive or not. You can use this principle with a more specific antibody and come up with ways that . . . It was key to identify what, why these tests had, what were the interfering substances that gave false results, false-positive or -negative results.

Leavitt: This one just looks so complicated. I have an example. First you have to shake it and . . .

Vaitukaitis: Shake and bake. Actually, those were pretty easy to do.

Leavitt: And then it just seemed like it had to _____.

Vaitukaitis: Yeah, yeah. But these were more sophisticated so that they used colorometric endpoints, which they weren't using back here, I don't think.

Leavitt: No. But now that's what they have done.

Vaitukaitis: Yeah. And the endpoints are much clearer. These usually come out plus or whatever, and . . . But you still get false-positives _____ been

excreting something that you've eaten, or it could be something you've drunk would interfere with the test.

Leavitt: So they're still not perfect.

Vaitukaitis: Yeah.

Leavitt: It just seemed like at the time, in a lot of your papers that I was reading, it would say "could be used for early detection of pregnancy," but it almost seemed like it wasn't clear that it would take off so hugely. I mean, now you can't barely turn on the TV without an ad for a pregnancy test. They're everywhere.

Vaitukaitis: Yeah. It's probably the most widely used test besides the hematocrit and hemoglobin.

Leavitt: It's certainly the most home use.

Vaitukaitis: Yeah. But never -- it was not our driving force. We developed it because we knew we needed that for . . .

Leavitt: On the way to other . . .

Vaitukaitis: Yeah. And for monitoring these patients that we were concerned about.

Leavitt: Right, right. Interesting.

Vaitukaitis: It's just serendipity, but you have to recognize the serendipity.

Leavitt: Right.

Vaitukaitis: Actually, probably a major, major portion of research findings that have a positive effect are discovered by serendipity. Usually, when you sit down to write a grant application, you make it sound so logical. _____ going to

happen. You're going to make an observation _____ totally unexpected, but you have to be ready to observe that.

Like I was talking to one of the investigators we supported out at MIT. She had a technician who very carefully recorded everything. She was working with these zebra fish, and the zebra fish developed different kinds of tumors, and they'd actually follow the genealogy _____ tumors occurred and how frequently they occurred and how large they were and _____, and they related to a certain genetic defect, which is actually the same genetic defect that humans get. So I happened to know the other investigator who worked on the human stuff. And so these two people who are working in Boston within a mile of each other don't know it. So I can't tell one what the other is doing, but I can say, "Gee, you might be interested in talking to so-and-so about this," and let them figure out what they have to talk about. Interesting.

But if a technician didn't carefully record these abnormal tumors in these zebra fish, they never would have discovered. So they suggested to them they look at that, at the genealogy, and it became obvious what was going on when they did that, but could not have done that thing had she not had a compulsive technical-support person. Interesting.

Leavitt: It's also interesting to think of what hasn't been discovered that could have been.

Vaitukaitis: That's exactly right.

Leavitt: You never know.

Vaitukaitis: How long have you been here?

Leavitt: I've been here about two, a little more than two years.

Vaitukaitis: What were you doing before?

Leavitt: I was getting my Ph.D. in American studies and women's history at Brown, and then I was working out in Colorado for a year or two _____.

Vaitukaitis: Where are you from originally?

Leavitt: Wisconsin.

Vaitukaitis: Oh. Madison?

Leavitt: Yeah. Where else is there to be from?

Vaitukaitis: _____ place. Tommy Thompson.

Leavitt: Yeah.

Vaitukaitis: If it works in Wisconsin, it works on Wisconsin Avenue.

Leavitt: That's what they like to say.

Vaitukaitis: Interesting. Madison is such . . . It reminds me of Ann Arbor a lot.

Leavitt: Mm-hmm.

Vaitukaitis: They have fantastic faculty.

Leavitt: Yeah, absolutely. My parents are both professors there, actually. That's a great school. It's a neat city.

Vaitukaitis: There's nothing else to do but academics.

Leavitt: Well, it's the capital.

Vaitukaitis: That's a small building _____ Wisconsin.

Leavitt: That's true.

Vaitukaitis: But it's interesting. At those states that invested in their universities after World War II, it made a huge difference. _____ North Carolina, Michigan, Wisconsin, California, Washington, Alabama, Texas, maybe one or two others. It made a huge difference in the state university system. The universities were responsible for developing a program for making the have-not states more competitive, get more money from NIH, and in _____ they attribute their lack of getting the funds because they don't get, they can't compete because they get poor priority scores. That's not the problem. They get good scores. In fact, a couple of the states, like Maine is a have-not state, they have the highest success rate for NIH grants of all the states in the U.S. The problem is there aren't enough investigators who submit grants. They only submit about 6 or 7 percent of the total grants, and they get 6 yo 7 percent of the awards.

Leavitt: Right.

Vaitukaitis: So the reason is that there aren't enough investigators that are trained to do biomedical research, so we need to design programs to enhance that in these states, and we do it through a couple -- there are some states that are more advanced than others in _____ award states. And it's fascinating. The states that aren't eligible, you have to have a success rate of 20 percent or less or collectively, all the institutions in the state have to receive less than $70 million in NIH grant support over the immediate past

five-year period. And so you do that, there are 23 states and Puerto Rico that are eligible, so that gives us half of the country. So _____ fast. You've got half of Congress on your side, so their program has gone from, in 1999, I think their budget was maybe like $5-$10 million. Now it's about $220 million, and it's from building the infrastructure. So there's a program that is designed specifically to take _____ somebody who can be a lead mentor who has peer-review grant support already, to serve as a mentor and for the administrator of the center that will develop new faculty and senior postdocs to become investigators, and the thing looks like it's working. It's just scary as anything.

We're getting people from institutions that are have states. We're just like those people in the have-not states getting all your help. You should be eligible for it, too. And I think it's going to happen.

Leavitt: _____.

Vaitukaitis: It's been the most fun program to work with in the recent past because these folks don't -- they want everything to be peer-reviewed. They don't want _____ earmarked for them except to make sure they have enough money to compete for, which is a small part of the NIH portfolio. And you don't know if we're just getting GIGO, good in, good out, and make sure they have some good people. They put the best up there in the first cohort. But the success rate, once you get your own RO1, you're no longer eligible for the program. And _____ get their RO1's, they don't

want to lose the program, they love it so much. So we have to figure out ways of keeping them interdigitated by having them work as mentors for other young and rising stars. It's fascinating. And these folks are so committed.

We've got Alaska doing research, halfway decent research, not junk stuff, and these are substantial grants. They're _____ $3 million of the direct costs for the centers was paid salaries and paid for research equipment, and _____ get money for renovations or _____ for a construction program for building research facilities. _____. It's nice to see something like that. And if the momentum is sustained, I'll guarantee there'll be a national program for all the states who have to be eligible with certain criteria, which is kind of nice. It's interesting.

You can use SBIR grant. Do you know what an SBIR grant is? Small Business Innovative Research Grant. By law it has to be a certain percentage of the total budget, and we have to dedicate those kinds of grants. They use the surrogate markets for research capacity in these states. Most of these states have no SBIR grants. The states weren't doing any research. Now we've got West Virginia with its first SBIRs. The state has seen the impact of extraneous money coming from the federal government on their research capacity. That's creating new jobs.

The state is now putting money into education. I mean, it's . . .

Leavitt: You have a really neat perspective to see what's going on.

Vaitukaitis: Yeah. We do so many different things and then we keep track of what we do. Even the doctors are _____. But it's fun.

Leavitt: It's really neat.

Vaitukaitis: We're the ninth largest budget out of 27 budgets. And Dr. Kirschstein asked me about six months ago, she said, "How come your budget got so big so fast?" And I said, "Gee, I don't know." I knew damn well _____. We have successful programs.

Leavitt: _____.

Vaitukaitis: Yeah. These folks that they hire their own lobbyists for the idea program, and they have to write standards _____. They don't want handouts. They really want to compete through the system. And so we're giving them the tools to develop the skills and the infrastructure so they can build on that and become a University of Wisconsin.

What some of these states have done is just mind-boggling. It's really been impressive. You have to hold their hand every now and then. You're afraid they misinterpret things that are _____. They always interpret things negatively. You guys gotta think positively.

Well, that's my _____ for the day.

Leavitt: All right. Thank you so much. It's been really helpful. I'll turn this off.

END OF INTERVIEW