

Program Information:

Title: David Ewing Duncan

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We are honored to have the opportunity to host author and journalist, David Ewing Duncan. This event is presented by INFORUM, a division of The Commonwealth Club for people in their 20s and 30s with the mission to inspire, debate around civic issues. The Commonwealth Club is a non-profit speaker's forum bringing national and international leaders to San Francisco. Members enjoy free or discounted tickets to all club events and if you join tonight we will waive the \$50 initiation fee. So you have absolutely no excuse not to join. We have lots of great events coming up. Next week on January 16th author David Morgan will talk about worst case scenarios and how to survive the mundane to the extreme. Then on February 1st Inforum's going to host a lively discussion to talk about social capitalism to examine the revolutionary change in business and to see where we will go from here. So we hope to see you at one of these events. Before we begin I do want to mention David would be signing books in the library after the program. So be sure to go, see books and you can check out his book. We are going to record this program for radio. So please turnoff your cell phones and remember to use the mike in the aisle for your questions during the Q&A portion of the program just to make sure that they are picked up on radio. I am going to pause for a moment now and then begin the radio portion of our program.

Good evening. Good evening and welcome to tonight's Commonwealth Club INFORUM meeting with author, journalist and human guinea pig David Ewing Duncan. David Ewing Duncan is an award winning, best selling author of six books, numerous essays, and short stories and is television, radio and film producer correspondent. Duncan is on a quest of chemical self discovery. National Geographic sponsored a test for 320 chemicals he might have picked up from food, drink, the air and ordinary products - compounds acquired by merely living. He ran the test to learn what substances buildup in a typical American over a lifetime and where they might come from. What he found was disturbing. Please welcome David Ewing Duncan.

Thank you Caroline and thank you all for coming. I am here to talk about something few of us think about although I imagine some of you in the audience probably think about it more than others since you are here. Most of us take for granted the whole realm that we call chemicals. And also I am going to talk about what happens when one man just me little old me - me sets out on a chemical mystery tour of sorts of his own body. I want to start out by asking some questions to you all and I am want to just get your brains going here just a bit to rap around some of the topics I want to talk about. These are very simple questions. It will may be get you to raise your your hands. How many people here will be willing to give up are you ready for this scented deodorant? Okay nearly everyone. Oh boy, imagine this room. All right cell phones. I wonder if you really would. Okay, gets tougher as you can tell here. How about automobiles? Okay, we are city people, I would say that's probably about a third of the audience. And here is one

that may shock you a bit it certainly does me since I'm an author, what about the books? Would anyone give up books? One person books too contain chemicals actually quite a few of them and I just wonder as we walk through this journey here this evening for the next little bit think about all of that because those are the sort of things that chemicals give us and I am going to talk about what some of the consequences have been for us living in this chemical world and I do want to thank National Geographic who allowed me to do this story and the photographer for this story who is Peter Ezek and we know him well here even if we don't realize it for earth quake story he did and also the story on San Francisco he was the photographer that illustrated the stories and for those of you who are listening on the radio the audience here is going to see some of you all will see some of Peter's photos up on the screen and for those of you who are not here to see them you can check online on the National Geographic site you can either put in my name or something about toxins or pollution or something and you probably end up on the article and you will be able to see those photographs. Also if you happen to have the hardcopy it was the October 2006 issue.

Now the title of this talk is "My Toxic Body". And I would like to change this ever so slightly, to "Toxic Man?" with a question mark. And this will become apparent because a lot of what I am going to be talking about here these trace amounts of chemicals that are actually inside of all of us much is unknown, much more is unknown than known about these chemicals and what they do inside of us these tiny little quantities. The subtitle is "One mans journey to find the pollution within", sounds like one of those National Geographic television shows. As Caroline said, I did have myself tested for 320 chemicals and as far as I know for a single individual that's as many as ever been tested in a single person and these are chemicals in the environment and the scientific term for this is called as our body "our chemical body burden study" and that takes some of the punch out of it a bit but its what obviously what I have on board and what all of us carry and I will be telling you my results, but these are actually all of our results because the point of the story is that I am just an average person what I have got on board most likely most of us have most of these chemicals on board as well.

So it's a typical person's result.

Now before we talk about me I want to go back in time for a minute and to 1935. Now chemicals I am sure many of you coming here tonight view that word with a great suspicion and the fact when you hear some of the my results and some of the things that maybe inside of us I know that that will support that contention that you would feel at least an unease about this. But that hasn't always been so. Back in 1935, DuPont came up with this slogan "Better things do better living through chemistry" and this term was part of the culture at the time because for the previous 50 years or so before 1935 chemicals had changed life dramatically for people at least in the west and they continued to do so through the 1980s which is how long this slogan actually was the official slogan of DuPont. And I want to emphasize what we are talking about here, these little chemicals and for those you are here tonight you can see just a very simple chemical structure here. It a man made chemical and we all know what this is even if you don't recognize that from the diagram it's DDT. DDT of course was banned in early 70s but I wanted to show what we were talking about here at least this is the schematic and DDT by the way back in the 40s was considered to be sort of miracle substance and this gets to

the slogan the DuPont slogan "Better life through chemistry", there was actually the fellow who had invented this or actually discovered it his name was Paul Muller, he was a Swiss chemist and in 1948 he won the Nobel prize for discovering DDT. And again we think of this you know I mean it's a sort of different sort of audience who might be giving hisses at this point, hiss to DDT because it was discovered much later in you know, by the 60s in Rachel Carson in Silent Spring to be a chemical that did a great deal of damage in the environment, but back in 40s especially during the World War II, it was used widely to get rid of malaria there were the mosquitoes that cause malaria and that's why it was considered a wonder chemical. It saved many, many lives not only in World War II but even through my childhood growing up in Kansas which we will talk about in a minute. They were still spraying DDT it was still legal and we were the nutty kids that went on our bikes back behind - you know, the truck spring, you know, going to the smoke and you will find out the repercussions of that here in a minute.

Anyway some other chemicals that are in use today are been recently banned say in the last 30 or 40 years but are very much part of our environment. I mentioned DDT, we have got flame retardants, plasticizers, pesticides, plastics, the metals like, mercury and lead, PCBs which are flame retardants, phthalates, you know, things that many of you may have never heard of but were in all over the place and products and things as you are using. This was a number that astonished me, 82,000 chemicals have been approved by the environmental protection agencies since 1976 and to give you an idea of the scope of this industry this is the sales in 2005 of all chemical the revenues of all chemicals in the world - all companies and sales, \$2.24 trillion. Now, I have been trying to figure out the global GDP, its somewhere around \$35-\$37 trillion. So this gives you some idea of the activity that goes into creating these chemicals and how much of an impact that really is on our lives. I mean that's an extraordinary number, I don't know of any other industry that even would come close to that. And of course we get great stuff which I suggested earlier, when I asked you your questions. We get plastic, we get cell phones, we get electricity, we get television, deodorant, you know, deodorant is bit small - Airplanes and one of my favorites, teddy bears and the reason that teddy bears are on the list is because of various chemicals that are used to make the materials in there and also flame retardants. PVC pipe, toilet paper, Teflon - I mean, we could go on and on and on and on, they are there everywhere. And it turns out these chemicals are everywhere on earth. They are in polar bears in the Artic. They have been discovered in lots of animals in very remote places. They are in our rivers and streams, in our trees. They are in our cities. They are on our food. They are in our children and they are in me and you.

I want to emphasize again that these are tiny amounts and what you have got in most cases is chemicals that are parts per billion and just to visualize that if you think about dropping a teaspoon of red dye into an Olympic pool and you know how that would immediately dissipate and you wouldn't see the red, that's what we were talking about here - in some cases its even parts per trillion. And so, these are teeny-weeny weeny little amounts. In fact they are small that science couldn't even trace most of them in the human body or in other organisms and so this recently - this technology is much to learn. So, are they dangerous? That's the big question. You know, are we carrying these things? Are they harmless? Are they dangerous? What is the deal?

There have been tests run on many of these chemicals. It's a pretty scary litany of what

happens when you have high doses of these chemicals. Lowers IQ, neurotoxins, cancer and in many of these hormone disruptions, birth defects, nervous system, toxins etcetera, etcetera and a pretty scary list. But most of these tests have been done in animals. And we still don't really know much about what happens in humans, except, you know, few very extreme cases where people been exposed to large amounts. For those of you listening, this is one of Peter's photographs of three women in Richmond, California, just across the bay here who have had breast cancer and they have all been treated and they are they left the cancer, but they live very near the refineries over there, the chemical plants, which are in our backyard here in San Francisco and they are convinced anyway that they acquired their cancer through contact with these chemicals.

We too have some disturbing statistics. Autism is doubled in the last several years, leukemia is up 62 percent, children's brain cancer is up 40 percent, sperm density is down actually male sterility is on the rise. But what exactly does that mean? Because, none of those diseases have actually been positively linked to these chemicals or at least the trace chemicals inside of us, these small amounts of chemicals, which of course means that, we are dealing experts and as a journalist I always love this, because you'll get one person saying one thing, one person saying the other, and in the absence of real data this is what you get. So we have had - well, one of the people who was very helpful on my story was Leo Trasande, a physician at Mount Sinai Hospital in New York. He told me the chemical exposure is an uncontrolled experiment on America's children. Obviously he is in the camp that believes that even small amounts of these chemicals are probably dangerous. Another very respected medical toxicologist in Denver, Scott Phillips, told me "Chemicals are not all bad, while we've seen cancer rates rise we have also seen the human lifespan double in the last century". And again, we have to keep that in mind, you know, we are all, I think anyway most of us here are reasonably healthy. You know, I have had many, many people after writing the article write and call me and email me about illness that they have caused by chemicals, so there are certainly a lot of people out there who have had problems. But the vast majority of people are still walking around, you know, at least as far as we know relatively healthy. And I ran those quote by the chemicals are not all bad, Leo Trasande from Mount Sinai and the idea that we double lifespan in the last century, and he said, well, maybe we'll live even longer, if we don't have all these chemicals running around.

Human tests - we talked about animal tests a minute ago. You obviously or at least ethically its difficult to test large - the large doses you would need to find out what toxicity levels are for humans. But there are some kinds of funny tests going on. Another one in Peter's photographs is a man, whose head is in a box, and there are scientists around in lab coat spraying various - I don't know if you can see those but its deodorants and perfumes and things. So he is breathing those in and they are going to test his blood to see how much of those chemicals that these various - you know, common household products, how much that have saturated inside of his blood. So there are some human tests happening. There are also very recently - well in 2005, was the first time ever a major study on average levels of many of the major chemicals in the U.S and this was done by the Center for Disease Control in Atlanta, the CDC and this was a huge breakthrough, because one of the problems with human toxicity in these small levels has been, you didn't even know what averages are in America and that's a baseline which

needed to be established and this report which is online on the CDC site is actually quite interesting. It talks about averages, it talks about the highest percentiles of people who say have occupational exposures, things like that for a 148 chemicals and if you are really interested in this somewhat a no doubt a little bit, go hang it on the site and check that out. Now we have been talking about small amounts, but of course there have been accidents overtime, various other means for testing more profound exposures. And by the way I should have prefaced earlier in the talk that we are talking about humans tonight. There are all sorts of other issues and very interesting topics and scary and interesting things about the environment, of course, but this is focused primarily on one organism which is us. So we have got a little catalogue in some of Peter's photographs here of some cases of extreme exposure. This is a little girl in Cleveland who was exposed to lead, probably lead paint in an old house. This is the photograph that was the most controversial and talked about in the article it's a little girl in Vietnam whose mother was exposed to Agent Orange during the Vietnam War and she was born without eyes, and it's a particular syndrome that was probably caused by the dioxin.

Also in the developing world, we have enough problems here with pesticides. But in the developing where lot of our food is grown, pesticides are used by workers there with very little protection, and especially - at least that I looked into Central-America, its used in other places too there have been higher than usual instances of leukemia and sterility, so you get an example here of what happens to humans when you have exposure to certain pesticides. Here is an image of an X-Ray being looked at by a physician of a child who has ingested lead. I don't know if you can see those little specks in there. But this child actually survived and did okay, because they were able to flush it out before it did too much damage. So where do they come from? Where do these chemicals come from? We talked about some of the items that we used, but obviously, they come from lots of different places. I want to talk about, you know, again Peter's fabulous photography here and this is Bangkok and what you got here is a huge chemical plant in the background with some of the wealthiest homes in Bangkok right in-front of it, its some upper class neighborhood just hard on one of the the huge expanse of chemical factories. They come from cell phones, as we talk about. They come from common household products. I think this is actually a friend of Peter's - he just went down to the basement and took a photograph. Its very interesting for a National Geographic photographer who used to going out on his exotic assignments, you know, trying to capture the, you know, the snow leopard or something and now here he is getting photographs in his friends house in the basement. We get it everything's we do every week, you know, putting gas in our vehicles, painting, you know, our living rooms. Our living rooms have flame retardants, lots of other chemicals in them, plastics. And of course, one of the chemicals that I assess it for are some of the breakdowns of cigarettes and that's one we can control by not smoking. In the article and on the website, we created or the wonderful graphic artist at National Geographic created the toxic home and I encourage you all to go on the site. Its interactive, it's sort of interesting to play around with. This is the static version but this tells you where in your house and your environment or in typical environment you might find some of these chemicals and again not to I want to keep emphasizing not to terrify anybody here because these are tiny, tiny, tiny amounts. And frankly there is not a lot you can do about most of it or at least the exposures. Some of them you can get rid of

through various means but you are going to probably get them back again and they are tiny small amounts. Bedroom, the living room and of course there is my life with chemicals and what I get in my house. They ask me to look very stern in that photograph by the way. Cooking here is me cooking breakfast and I have got the Teflon pan, the plastic coffee cup, the flame retarding clothes - just dinner with my family. We have got chemicals of various resources. Buying food in the store I you know, like a lot of people in California try to buy organic I'm not even really sure that means sometimes I guess it mostly means that it is not grown of pesticides but still lot of chemicals that will get into the our food no matter what we do isn't really exciting pictures I know but it does illustrate, you know, just the mundane of this really or daily lives. In my office with my younger son, with my, you know, plasticizers on my computer in various other chemicals. My journey began up for the story we are having 14 vials of blood drawn. I don't know if you ever had that much blood drawn felt like it's about three quarters of my blood and it was quite dramatic. I nearly passed out and had to use smelling salts and Dr. Trasande was there do you really want to do this, I was like, yes, for science, for journalism. And so we shipped the blood up. There are only few labs in the entire world that actually can do this very fine-tuned testing of these minute chemicals and if you think about a drop of blood or the chemicals that are in there that are supposed to be there, you know, these are the chemicals in your body much less these tiny little ones that, you know, we would hope it not be there and there are couple of photographs here of the lab up in Canada. It's on Vancouver Island and they specialize mostly in testing the environment but they also do some human testing. There is also a wonderful lab at the CDC in Atlanta but they they don't allow individuals to be tested there. Those are larger tests. So they use these filtering mechanisms, they try to wine out these chemicals and as I said earlier this is pretty recent technology that we would be able to even find these chemicals and some of them are undetectable. I ended up having 165 chemicals of the 320 tested and that were just those were detectable. I may have all of them for all we know but they were just not detectable. After they run through all of those various filters and they finally get out their little parts prevailing then they run up through these fancy machines called mass spectrometers which look sort of like a white coffin here. And these actually throw the atoms of the particular chemicals down to vacuum and they are measured that way by their atomic weight how fast they hit a filter at the other end. They cost about a million dollars a piece which makes these tests difficult to do.

I'm not the only one who has been tested and I'm not sure why we don't see Bill Moyers here but Bill Moyers was tested on PBS you know, his program on PBS for 214 chemicals and he had 87 detected and there have been a lot of us individuals in small groups that have been tested, you know, partly actually I just got the press release the other day that four members of the parliament in Canada were just tested for several chemicals up there and its all kind of saying the same thing and we can compare it now so the study I talked about earlier with the CDC I'm not sure why these aren't coming out but there is a core blood study done by the environmental working group in Washington and they also have a chapter here Oakland who are doing some great work on kind of pioneering these high profile studies. They had 10 babies tested for 413 chemicals where 287 chemicals detected and these are babies, these are people just just born and what that means is that they have chemicals in them for the moment well, pretty much have a

bloodstream or somewhere for them to get into passed on by their mothers. So I get my report card. I go through that whole blood drawing, lab work - all of that. I'm sitting there, waiting anxiously and finally it arrives and this is a compendium of the report card and the details are on my website which I will give you later and also on the National Geographic site but as I said 320 chemicals tested a 165 detected and the whole cost was \$15,000 and I even got a discount. There would normally be about probably close to twice that. The lab in question gave us a discount but it's very expensive for these to run for them to run these tests so they did charge us for some. So before you race out to get these, you know, there is a bit of a price tag even if you can find a lab that will do it. Although some of the tests are cheap and easily available like saying mercury or lead those are about \$30 or \$40 a piece and you can go out and get them at any lab. What's inside me? Again, 320 tested, 165 detected, 155 a days were higher than the mean not by much in those cases but I will go over just some samples here of some of the chemicals I won't go through all of them to give you an idea of what was inside of me - pesticides. Part of what by the way I did for National Geographic was in typical geographic form I did go on a tack or a journey and I actually they sent me back to where I grew up and some of the highlights of my life where I happened to be trying to figure out where I may have been exposed to some of these chemicals and as I went back to my childhood in Kansas, you know, I was remembering riding my bike through clouds of DDT, things like that. So not surprisingly I have a very high-level of DDE which is a metabolite of DDT breaks down into and you know, its closed off the chart there and its fairly typical people of my age who were around the Midwest when they were spraying DDT. Now this is actually according to the toxicologist I talked to has gone down substantially since I was a kid. Each of these chemicals has a certain amount of time they last inside your body and DDT is about 20 to 30 years. Some of them like some of the plasticizers last only few hours but you know, you are constantly re-exposed or mercury lasts about 30 to So my childhood in Kansas I grew up in a place called Lake Quivira which is right outside of Kansas City and I had a rather surprising thing happen - for journalist that was great for me as a individual not so great. It turns out I grew up in this lake and that was wooded, nice place to grow up as a kid. The Kansas River was within a mile or so of the lake. We as boy just roam the woods and there was a big dump there and we used to play in the dump. It turns out years later when I went to check this out this is a major super fun site filled with all kinds of nasty chemicals and they spent hundreds of millions of dollars cleaning this thing up and there is a list on line where I could go and see what the chemicals were and then compare that to my results and sure enough some of them showed up in there. So that was a coincidence but that shows you, you know, what where you can be exposed. As I said I grew up when pesticides were so great. Everybody loved them especially out in my part of the world. You know, we saw scenes like by planes spraying pesticides all the time. I was right on the edge of the city and on one side was you know, the big the suburbs and on the other side were farmland. So we roamed around a lot and saw seeing this like by planes doing the pesticides and all sorts of other means of applying them pretty much everyday. Kansas City when I was a kid not far from where I lived looked like kind of polluted nightmare. It was an area of heavily industry. There were some auto plants, chemical plants and I remember driving through the soup one way to get into the city was to drive

through the soup of chemicals and we would roll up our windows and hold our breath like that was going to help. And this is the actual report online if you go and look at where it says that the groundwater, soil and leachate are contaminated with volatile organic chemicals - pesticides, polychlorinated by phenols, which are PCB's etcetera, etcetera and this goes on and on and on page after page after page, you know, place where I played. PCB's this was another fantastic chemical to people up until the time that we discovered or scientists discovered that it was polluting rivers and lakes and it was getting inside of fish and inside of humans. I went to school at Vassar College on the Hudson River on Pokipsy and the plant one of the major plants in the world that produce PCB was a general electric plant up in Hudson falls and in Fort Edward. There was two plants very near each other and for the better part of about 30 or 40 years they produced huge quantities of PCBs and basically they much of it or some of them anyway leached into the Hudson and its all you know, its all over the place still and there is a huge battle going on up there as they are trying to clean it up and this is it may be the largest super fun site, I have to check that its certainly one of them - its 200 miles of the Hudson River there. They are talking about dredging and cleaning up because these PCBs are heavy, they sink to the bottom, fish eat them and if we humans eat the fish we get them inside of us and Pokipsy by the way is one of the few towns on the whole Hudson River valley that actually draws its drinking water directly from the Hudson. And I tried to investigate, this is like in the late 70s when I went to college there - where they you know, they do test at the time for PCBs, did they discover any and it was like I never did really find the answer to that. They said that they tested it and they were actually standards on the books but there were no records of them having done it, so I do this was a general electric plant up in Hudson falls, its closed now. It has been closed for many years. On the lower right hand corner there is a close-up of that beach and you can actually see little pellets if you look really closely and those those are PCBs. The worst PCBs have traits of dioxin which of course is a known carcinogen and I am not I haven't really checked why I have such a high-level of PCB 66 or what exactly that is. But I had fairly typical results for PCBs even though I may have been exposed to them when I was in college these stick with you by the way these these guys hang around for several centuries. So their half life and wherever they are - is- is several centuries. Another class is phthalates and I had to kind of learn how to pronounce that, p-h-t-h-a-l-a-t-e-s - phthalates and most of us have no ideas what phthalates are and yet they are everywhere. They are in plastic kids toys, they are in the plastic wrap we put on food, they until recently were in IV tubes although they have not they are not in there anymore apparently. I have higher than normal levels that another thing that the phthalates are used for it's a it's a very interesting chemical, its its used as a plasticizer, its also used to help facilitate putting scents, some things like mints or Lavender into shampoos and the deodorant that we talked about earlier and that's where most of us are exposed to it.

The plastics there are some debate over how much it actually you know, breaks off or is removed from the plastics. I was told by some of the experts it's probably not a great idea to microwave plastic containers. Now and some of them says you know that they are microwave safe and that should mean that they don't have phthalates or other plasticizers but what the heck why not just microwave and some other substance. There

are many by the way chemicals where I can say or an expert or anyone can say, you know, here is what we can do about it but that is one thing you can do.

I came out with higher than average phthalates or at least two phthalates any way by the way many different types of these chemicals are very closely related in the same chemical families and I was not nearly as high as the highest levels that were tested in the CDC study but higher than average. And when I asked Dr. Trasande about that he said it was because I had my blood drawn in the morning right after I took a shower, I probably had used something that smelled really great when I was washing my hair. And I would have dissipated by say the middle of the day or the afternoon only to be to come back again when I shampooed my hair next.

The final group of chemicals that I will talk about tonight and there are several more and you can look up the rest of them if you want to on the website Polybrominated Diphenyl Ethers - PBDEs these are flame retardants. And they were introduced mostly by law and regulation to great public acclaim 30 or 40 years ago to protect us from being burned up. Now I sent all of my results to various experts around the world. And you know got back reports. One of the great experts of PBDEs in the world is Ake Bergman from Stockholm University in Sweden and I was sitting in an airport and you know I was scheduled to call him, so I called him up and he said I hope you are not nervous but this concentration is very high, can't do his Swedish accent, I am sorry, it sounded very guttural to me that I don't know maybe because of what he was saying, anyway I hope you are not nervous but this concentration is very high. I was like, okay. I already knew that comparing with some studies but to hear the experts say these are a couple of things that happened when you get high levels of PBDEs in animals thyroid disruption, neuro-developmental disorders and I have question marks after that because this is not a hugely well understood chemical, its fairly recent its been building up in the environment some of the tests have been done on animals but its not as sensitive as some of the other chemicals. Okay now PBDE 47, which is called Pinter PBDE and that's because of its chemical structure I was extraordinarily high in this, for those of you who can see this chart its gigantic green column right next to the tiny little red column and the green is my results and the red is the average. And I had 10 times the average of the average American and I had 200 times the average in Europe, that's because Europeans don't use the Pinters as much as some other PBDEs. This was rather shocking and the CDC by the way has not studied PBDEs so these were some small studies, they are not as comprehensive as the CDC studies, but this was a little alarming 10 times the average as I said in the US, 200 times in Sweden and EU, now of course this means if you light me on fire I will not burn. Where do they come from where do they come from? Now it did not come from my dog, there is a picture of my dog up here, but the couch that my dog is standing on was a likely culprit often times these these particular flame retardants spike in people because you bought a new piece of furniture or a mattress or new computer or any kind of electrical appliance you know, they are loaded with these these PBDEs and they in their early stages after you bought them they they when they heat up these appliances you get a little gas of the stuff coming off and so your levels might spike, but I didn't have any of that, I didn't have any new stuff, just same old same old and so Ake Bergman and I were sitting there and talking in the airport saying, well, you know where do they come from and then I got an idea. Because I have been reading up on this maybe

they come from airplanes. I do a lot of flying not nearly as much as some people but I fly a couple of 100,000 miles a year and planes are drenched in these things everywhere, seats, the trays, you know, the electric the electrical wiring and you know behind the panels and you are sitting there for some times hours on end with these chemicals floating around and not long ago they discovered the entry point all of these chemicals have an entry point, its breathing in, its eating them, its drinking them, its through your skin, this particular one is dust. So these chemicals attached to dust, people bring dust on the plane, little guys break off from wherever they are and they attach to the dust and you breath them in. Now, note that I said that when I got this news I was sitting in an airport, San Francisco International actually and I was about to board a plane so this was not good news. Now we don't know that that's for sure. That was just total speculation although it did trigger Dr. Bergman he has been for a while wanting to run some tests on pilots and flight attendants to see in fact if they have higher than the normal levels of PBDEs.

Now, I had mentioned here throughout the talk that we have this somewhat devils bargain with chemicals and this is a very good example with that. We have these flame retardants for a reason you know, this isn't something that you know, we demanded to have in products in terms of you know, like having a better cell phone or something, its not something that the chemical industry just decided to put in you know, that we never knew about these were things that were required by law and the specifications for airplanes which looked up are extensive. So these save a lot of lives. It saves hundreds of lives a year and they prevent thousands of people from having serious burns. There is no evidence right now that these tiny quantities and even though that my chart was huge on that, its still a tiny amount. There is no evidence that causes harm for humans. So, you know, we need to constantly be thinking of this balance, this sort of double-edged sword of these chemicals and you know whether we can live with them or not.

By the way I am nearly finished here in about five minutes and if people have questions think about moving up towards the microphone and we will start those in a few minutes here. Oops, I do have one more chemical - I am going to talk about mercury. This is not the kind of mercury that get in the thermometer - it's not the silver stuff. This is actually called Methylmercury, it's a form of mercury that happens when it gets - when mercury comes in contact with organisms in the environment that turn it into a substance that is much more prevalent than the heavy metal like in a thermometer. And so, what you do - most of methylmercury comes from coal burning power plants and we have been reading a lot about them recently in China. And in fact, I have seen satellite images of clouds of smoke coming across from, you can actually see from space coming across from China and they get caught up in the upper atmosphere and they basically sprinkle methylmercury out over the Pacific Ocean. And its - coal is obviously burn for electricity, it's released into the air, it settles over the ocean. The plank is - it's absorbed by the plankton, the little fish eat the plankton, bigger fish eat the little fish, huge fish eat the big fish and then we humans eat fish of varying sizes. But the mercury - the methylmercury accumulates in - mostly in the huge fish, and that would be a tuna fish sandwich if you could see it. But I used to love a tuna fish sandwich a couple of times a month and - but tunas are large fish and they - methylmercury accumulates in these large fish much more than in smaller fish.

And this is home sweet home here that is San Francisco Bay and you know again, you can see these clouds of these effluents coming over. And I am not - I don't mean to pick on the Chinese, although they have been building a lot of plants recently. They also - we get this from our own plants and from lots of other places around the Pacific Rim. Here is the tuna, I was just talking about that would be another tuna meal right there. My test for this I did the methylmercury panel just with all the other tests and I got a pretty normal reading of five parts per million. The danger level is considered to be around 10 parts per million you don't want to go over that threshold. So I don't eat a lot of fish except for the tuna fish every so often. So this is probably fairly typical somebody doesn't eat a lot of fish. But I did this study around a little experiment. I went out and I bought down at the farmers market in San Francisco at the building a big stake of tuna and a halibut and I ate those and I don't know why we are not getting this in here but I those for dinner and for breakfast, I have my blood tested that afternoon and I spike up to 12 parts per million. So I more than doubled my load of mercury and mercury does last in your body about 30 to 60 days. So that put me up over the safety threshold to 12 parts per million and I am by the way going to be working on a new book which I'm going to get into more of the stuff and run some more experiments like that - I don't know I am kind of a nut, don't you think? Okay, the good news in this is that we as humans have been together in the past and we have done something about some of these chemicals. So we passed the cleaner act in the 70s when most of these happen the cleaner act, the water act, the toxic substances act and we have managed to - you know, go from my childhood memories of vast pollution to cleaning up some of these environment. This is an image of not far from where I grew up and not far from where that scene you just saw of all the pollution was taken. It's a pristine Kansas River not far from where I grew up. So we have been able to solve these problems so we should take some heart in that. DDT was banned in 1972, PCBS in 1977, the PBDEs - the flame retardants I talked about have been banned in Europe already, California will have them fully banned by 2008 and in fact the Penta PBDE that I had such a high-level of is already been voluntarily phased out by the company, and another flame retardants out there which had not been tested for but one of the ways out of this and asking the question can we do better well, can we do better, can I ask that. I looked around just to see what the public thinks about this and then Harris poll that asked "Do you agree or disagree with the following statement, protecting the environment is so important, the requirements and standards cannot be too high and continuing environmental improvements must be made regardless of the cost", that was a quote and 74 percent of Americans who were polled agreed with that and I am not a huge one on polls but I think that's pretty pretty clear the way people wanted to go with this. We have 1700 new chemicals every year, 90 percent of which come out into released officially approved by the EPA with no restrictions, but we still love these chemicals, all the things we get from them, cell phones, electricity, automobiles. There are some solutions coming up which are quite interesting which should be the subject hopefully of future articles by me and others and its already been being written about the green chemistry movement and clean tech and hopefully enlighten self interest by some companies realizing that we do need to do something about this as the levels of some of these chemicals continue to increase.

In Marine County one of Peter's photographs here these these young women are using

cosmetics that are chemical or at least have bad chemicals taken out of them carcinogens and others and you know, they look fine to me, so may be we need to switch. Am I worried? Yes these chemicals not only are neither in my children and no, I am still using most of these stuff, I mean I am still living in the same environment driving my car, using my cell phone, the main thing is here we need to know more and that's really the message I want to leave you all with. We don't know how harmful these these small amounts of chemicals are. They might be slowly doing damage to us, they may not. We need to know more and that's really the message the central message here and if you need more information you can checkout my website and the National Geographic website. The CDC has a great site the national institutes of health, environmental working groups and some others, I also want to thank again the folks at National Geographic, Peter Ezek, the photographer and others and special thanks to my family who put up with photographers and people running around in the house and that's the website, its basically my name.com and you can find out some more information on that, so I really appreciate it and thank you all for listening.