

## Auckland Medico Legal Society

PAUL DRURY – 9 May 2006

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Ladies and Gentlemen,

What I am talking about is actually one of the real threats of the health of this country and though the Government has acknowledged that, its actually done sod all about it.

What's new? So, lets see if this works. Can anyone guess which country this comes from? These slides. It is of course, the leader of all nations in most things and in particular in obesity, it's the good old USA. And they have shall we say a massive problem.

Just to get our definitions right, the usual definition of obesity is of a body mass index. Now a body mass index is not a terribly complicated equation which is the weight over the height squared which gives you a figure which if you are really healthy is between 20 and 25, if you are a bit on the tubby side its 25-30, if you are seriously on the obese side its over 30 and if you are the sort of person who everybody else gets out of the lift for is about 40. And its widely accepted and it has its problems. It doesn't work well in non-European populations, for example you can be obese as an Indian at a much lower level than you can and I will show you quite why that is and I will give you some of the science behind it. But lets work on the basis that that's the accepted definition and there is not a lot that I can do this evening to change it. So that's the definition and that is the range of under weight, of which there are not a lot around except those with Anorexia, the healthy range of about 18½ to 25, overweight at 25, obese at 30 and severe obesity at 35 and very severe or some call it morbid obesity at 40. And you can quickly do your own calculations for that, how long do I need to allow for that? You do the sums.

The menu I am going to address in just three or four minutes for each is this. You have had a considerable menu already and you might like to reflect on the number of calories you have consumed or maybe you would rather not reflect on the number of calories you have just consumed. But I am going to look at the epidemic as we see it. The health issues that go with obesity, a little bit of science (so apologies to the lawyers), a little about energy balance which is amazingly sensitive, really one of the control mechanisms in the human which is quite stunning, then look at something about our food environment and some of the cultural issues, a look at the dietary issues, the lifestyle and exercise, what therapies are available and then

the real, as it were, problem in waiting, which is childhood obesity and how we prevent obesity in both children and adults.

Now, look at this slide. The Americans lead the world in this Obesity. As in so many other things, wars and everything else. But this is taking the BMI of obesity i.e. 30 and this is a colour coded chart of every state in the glorious USA back in 1990 and you can see that the medium blue states are where they don't know what's happening at all. The very delicate blue is where there is less than 10% of obesity and the moderate blue is where there is 10-14%.

Let's fast forward 11 years. The scale has now gone up to 25% down in here. Can anyone name that State. That's good general intelligence. That's a good Mastermind question isn't it. I am not sure whether it is Louisiana but it might be but I have to admit to ignorance as well. But just look how that has changed. Lets go back and lets go forward. That is in eleven years. We have gone from the highest State to being 10—14% to the highest State being over 25% prevalence of obesity. So there are not many diseases, bar AIDS between say 1980 and 1990 that would show that change. And the differences in AIDS you would be talking about a few percent. Here we are talking now about 25% of the population being fat. That's not overweight, the delicate word for on the weightier side. This is 25% being plain fat. We have a problem. This has caused "Time" among other magazines to devote whole articles, whole magazines for this. This is one of my favourites which carefully demonstrates the male of the species. An extraordinary attractive subject to all you ladies, but if you notice carefully then, his lady wife conceals it better – she is well dressed. She went to Newmarket last week. But some of the household is a bit podgy. The daughter is not exactly slim and even the dog has got it. Actually there are dog obesity clinics. Would you believe that? And when you get home and those of you who have dogs, just have a look at your dog and just see where he would fit on the obesity scale. I am not sure that BMI have been validated for dogs but it is an interesting thought.

What about New Zealand? This is not the most recent data but it is the simplest to look at. 1982, 1999, 1993, 1997, there is actually 2001 data but this is the predicted data for 2011. This is the average of the population. Its not just a few people, it's the whole average going up and low and behold, sexist comment, hands up, "ladies are fatter than men in the last two recent surveys or predictions". I had better not say any more had I or I will get lynched.

Ethnicity. This doesn't go down too well either. Europeans are actually the least problematic. In Maori, we have always known, but look at the Pacific Islanders. The Pacific Islander is substantially more so in women than in men and I am going to return to why that might be later. But we are talking here about nearly 50% of the Pacific Island female population being obese. And why that matters quite so much, I will show you very shortly. This is the progression of man. The important thing here is its taken a few million, hundred

thousand, tens of thousands of years to go from A to B to C to D to E. Its not taken terribly long to go to E and E is only too recognisable and just think about the implications of that rate of increase.

So, what about the health implications of obesity. This is the textbook definition. You can get liver disease, gall bladder disease, gynaecological problems, osteoarthritis, skin problems, gout, hypertension, stroke, cataracts, coronary artery disease, diabetes, pancreatitis, cancer etc. That's just for starters. This is not an innocent, its not just something, that you are fat and has no consequences. The consequences effect virtually every biological system in the body and many of these are substantial. I am going to come back to this a bit later and I can't through all these or you would be here all night and you don't want to be here all night. But, the implications of this are not just in one area, they are in almost every area that you can think of. And for those of you with a squeamish mind, shut your eyes. These are the increased disease risks that go with those BMI figures.

So under weight. Under weight is actually bad news. The best news is to be normal. Once you get overweight there is a marginal increase, its not massive. Once you become obese it gets pretty high for all sorts of things. Once you get to be jolly obese it gets very high and once you get to the sort of morbidly obese, you know, the situation where you make room when somebody comes into the lift, then it is extraordinarily bad news. And, there are additional risks. If your fat is around your stomach, beware. If you have put all your weight gain on since you were 18 or 20, beware. If you are not fit, bad news. And if you are a non-European, then its even worse news. So, and I have given all the references here. I am not expecting you to go and look them up but, you know most of this, I aim to do this in say 30 or 40 minutes, has to be a speed talk but most of this is very well evidenced and stands up to serious even legal criticism.

There is another syndrome. The metabolic syndrome is a sort of convenient name that the medics give to this particular mixture of abdominal obesity/insulin resistance (which I will come back to) a tendency to be diabetic or on the way to diabetes, a tendency to have bad blood cholesterol and triglyceride and to have high blood pressure. And the bad news of this is that all of these things lead to premature death. Premature death through premature coronary disease, hear attacks, strokes and the like. And in a sense this was only first defined about 15 years ago by a guy called Gerald Raven who spotted it. Sorry it had actually been spotted many many years ago, as I will show you shortly. But this syndrome is now affecting 25, 30, 35% of people in America.

Lets have a bit of audience participation. Who has been to the States recently? Did you find it easy to walk from your hotel to the conference? No, there weren't any bloody footpaths. There were only taxis and cars. Similarly, would you dare to walk, even if you could walk for danger of being mugged. No, you took a taxi for safety. The Americans have got convenience, transport and non-exercise down to a fine art and hands up

those who went hungry at an American legal association dinner. I don't see a lot of takers there. Actually I have to say New Zealand legal dinners don't seem to do too badly either but we will come back to that.

The metabolic syndrome gets more prevalent with age. Except when you get over 70. Now, there are some interesting things here. Those who are over 70 at the moment were born after 1936. 1936 means that you were in your childhood years during the Second World War. That may be of significance because the only time the prevalence of obesity or diabetes has gone down in the last century was during the Second World War. And there were reasons for that. Certainly in most of the Anglo-saxon speaking countries. There were also reasons for it in Germany and Russia but we will pass on that.

Why does it matter? Well this is the relationship between your body mass index and your chance of mortality from death from cardio-vascular disease. And you will see that the best risk here is the relative risk of death with 1 being defined as the lowest, which is when you're in the upper portion of being lean. It's not too good to be terribly slim but after that, it goes up and up and up and goes up to a relative risk. In fact, you are three times more likely in the obese male to die prematurely, slightly less so possibly in women, though maybe that is actually a bit of a statistical artefact. But you know, these are relative risks. Threefold isn't horrendous. You know you wouldn't necessarily convict somebody on a threefold risk would you.

But let's look at some other things. This is the risk of diabetes related to BMI. If you are a woman with a BMI of over 35, you are 93 times more likely to get diabetes than if you are slim. Now that is equivalent to being caught legally with I imagine the gun smoking in your hand. This is like being with Typhoid Mary on the day. This is like being absolutely caught with no defence, there at the time, at the scene period. And even the blokes. The blokes don't actually do quite so badly. They are only 42 times more likely. These in medical terms are ludicrous figures. They are figures we don't see for almost anything else other than as it were, having sex with a prostitute who's got AIDS. And this is the sort of level of risk we are talking about. There is nothing that will give you a relative risk of 40 or 90 except being exposed to an infection at the time. And you will see that the risk is exponential, it's not straight line, it is the more you exceed, the much more you develop the risk. So, this is big business, this is not trivial. If you look at waist circumference. I am going to come back to waist circumference because obesity measured as just mass and height doesn't tell the whole story. Many of the ladies will be delighted to hear this but the ladies come out of this better than the men because the ladies hold their hats somewhere different. And without wishing to embarrass you all and tell you where the ladies hold their weight, some of it is around the breast and some of it is around the hips. Where it isn't in most of them, is around the waist. And again, we have here a relative risk of you are talking of 20-25 fold. This is very very high for any medical scenario. Very very high. And waist circumference is actually an independent predictor of diabetes other than body mass index. So even if you are fat, if you have it around your waist, you are more likely to develop diabetes than if you had it around your hips. Which is why in fact, slightly more men develop diabetes than women. Now my interest is

diabetes and I have tried very hard not to concentrate too much on that but all I say is that these risks, if you talk to gynaecologists, if you talk to oncologists, these are seriously high risks. You will remember a slide similar to this in different colours and I am sorry that I can't match them but this is roughly the same years. This is obesity in 1991 and obesity in 2001 on the same scale. You will see that it goes from the highest level of just reaching 15% in 1991 to nobody being under 15% in 2001 and Louisiana or wherever we are calling it, maybe it is Alabama, I don't know. Tennessee, thank you. We ought to have an award for that. But over 25% of the total adult population of adults in the US being obese. The bottom scale is of diabetes. Look at the parallel. We have gone from a very similar coloured map, lower overall percentages, yes, we have got up to 10% at the end but the correlation between the two is just stunning and look which States have the highest prevalence.

Florida is a bit of a cheat, because everybody actually retires there when they are older so that's a bit naughty and they don't do very much except pop down to the golf course and they don't usually play golf, they usually just have a drink. But just look at the parallel between that. The relationship with obesity and diabetes is so close it is not true. And of course, unfortunately that is my work. I am not going to be unemployed and in fact my problem is controlling the workload. Looking at worldwide these are the prospective number of people with diabetes in 19 years time. Its in the World Health Organisation. Its wrong already the data is tracking above these numbers and you will see that there are vast places in the world, North and South America, Asia, Russia, India, much of North Africa, the Middle East. This is going to have millions of people with diabetes. Just to put this on a slightly clearly scale. This is the 1995 green, Year 2000, orange, and prospective year 2025 figures in blue. Two of the biggest areas are the South East Asia and the Western Pacific and at the risk of being a little immodest, I am delighted to say that Diabetes New Zealand and the New Zealand Society for the Study of Diabetes have managed to win a bid to hold the International Diabetes Local Conference, Western Pacific in Wellington in 2008. So we are going to be trying to give a message there that we have a massive problem and what can we all do about it. But those figures are truly epidemic. They are showing things, as you would have seen with AIDS, in the 1990s, thank God that some of the predictions with AIDS didn't come true. I am less optimistic that these predictions will prove to be wrong.

Going back to this familiar slide. Some of my hosts and invitees, Margaret of course known a lot about this disease and she is going to be busier. I am not sure I have any of my liver disease colleagues but non-alcoholic fatty liver disease is becoming a real issue. This is in danger of becoming the second major cause of Sclerosis. Well, maybe the third major cause after Hepatitis and alcohol. Perhaps we won't talk too much about alcohol.

Gynaecological abnormalities. There is a serious danger that if many women are overweight then their fertility is seriously impaired. Not only their fertility but also their likely success in pregnancy and I haven't

touched on these things that in a sense I have already discussed except for one. There are very clear data from the States and elsewhere that many types of cancer are more common in people who are over weight. Breast, uterus and cervix. That for the ladies. Oesophagus, pancreas and kidney, that for both sexes. Prostate usually for the men. All of those are more common in those who are overweight and according to the American statistics something like 15-20% of all cancers are now related to obesity. Cancer is number 1, 2 or 3 depending on how you look at it on our causes of death. We are stoking up for ourselves and enormous epidemic of secondary cancer to a preventable cause.

So, that's enough of that. A little bit of scientific background. Now, is everyone still awake? This is where it gets serious guys, you are going to have to concentrate. The causes of obesity are complex. Like all good medical diseases this is not streptococcus causes pneumonia, give antibiotic, everyone gets better. There are clearly genes that go with obesity and I am actually going to slightly disagree with this slide which I borrowed from Jeremy Crabbs which says ethnicity. I don't think there is any evidence that ethnicity per say is a problem. The ethnicity goes with the genes that go with ethnicity rather than with the ethnicity. Its actually very hard to find many chromosomes that are different because you happen to be Pacific or Maori or Asian. Where the difference lies is the distribution of genes within those ethnic groups. Sadly for us there are very few single gene defects. There are lots of variations and whether you look at obesity or whether you look at diabetes, none of this comes out as name this gene on this chromosome and we have the cause. So, if you start as lean and you happen to be physically inactive and you happen to expose yourself to energy dense foods in large portions with sugar rich drinks and you give up walking to school or to work, you have supermarkets where you can buy anything you want because actually food as a total cost of living is actually a much smaller proportion of your expenditure than ten years ago. If you have food companies shoving it down your throat, saying this is wonderful, this is great. If family circumstances say you work hard, you don't get much time for exercise, you drive to the supermarket, fill up the trolley, shove it in the boot and take it home and school offers your children Coke from every vending machine there is, you are going to end up obese. And the reasons for that are in one sense very simple, and in another sense very complex.

Medics always love animal models. This guy on the left, whether he is in white or brown is the OBOB mouse. Terribly original OB for obese and OB means it's the homozygous. Its got both sets of genes, its pretty fat. One has to say that the contribution of the OBOB mouse to the understanding of human obesity has been really pretty limited but you wouldn't want to be the OBOB mouse. Getting around becomes difficult. This is modern technology personified. This is a scan of a fat 40 year old, height 165cm, that's a bit small folks. On the left weighing 114kg on the right weighing about 60% of that 65kg. A BMI of 42 versus 24. Now look carefully at this. You can all see the bones. Yes? The bones are the white bits that hold you up and you will notice if you look at it fairly carefully that the ones on the left are looking a little bit ropier than

the ones on the right. Well if you were checking in for Air New Zealand and you had 50kg of baggage in your hand, your knees would be feeling it. The white is fat and the deep red is muscle. And you will see on the right that there is a moderate amount of fat just under the skin, nicely going up both sides and there is a little bit of it in the arms. There is very little of it in the stomach and there is a little bit in the liver. The liver for those who don't know, I am sorry I should have brought a pointer, is this bit here. I had better walk over.

So what happens is when you're fat ... you don't have any more muscle. Look at those muscle sizes, there are very comparable. Look at the heart size. The heart size is the same roughly for somebody of 114kg and somebody of 65 kg. The lungs aren't much different in size either. All the extra goes on the outside and there is massive amounts of fat around the legs, the hips, the tummy, the chest, the arms and that fat is as it were carrying around almost 50 kg every day extra-load. Imagine having a backpack of 50kg. This is the sort of thing they send the SAS doing. You know romping over the Southern Alps to keep them fit. But the other bit is what is in the stomach and you will see in the middle of the tummy there is lots and lots of whitey creamy stuff which is fat in your omentum which is the middle bit of the .... it's the stuff that holds all your guts together and that is the criminal. That is the thing that really causes the damage. But just have a look at that because we will slightly come back to this a bit later in different modalities and in different imaging modes. But this is the pathology that causes the problem. The other thing you might like to look at is, just look at the legs. The fatty guy, actually his legs don't separate. If he tries to run they actually rub together. If he tries to run his knees and his ankles are going to complain and, actually his hips aren't very well shown in that reconstruction, but his hips are going to seriously talk to him and say this isn't a good idea. So there is a disincentive to do anything. Put it in a different modality, here we have clearly labelled your subvisceral fat and the visceral fat, the omentum. And it's the visceral fat that is the real sinner in this scenario. On the right you have got the subcutaneous fat which is where the arrows end which is black. CT scanning computerised tomography gives fat as a dark colour which shows that there is actually lots and lots of fat around the outside but there isn't actually terribly much in the stomach. Compare the red arrowed scenario where there is lots of visceral fat which just shows as black gaps between everything. It's the visceral fat that is the killer, the visceral fat that is the marker of damage. If you walk round the beer belly, a well respected New Zealand institution and there is a sex difference here. I have never thought of it as particularly a good analogy but one ought to mention it. The ladies are the pear shape. They have a waist and most of the weight, if any, is distributed around the hips. The guys have the waist and the weight of the same place and they don't actually have particularly big hips. This in physiological terms is very very bad news. And one of the most useful things is not high technology. You don't need to do these scans. You need to measure people's waist circumference. And an increased waist circumference is one of the worst indicators of impending doom. And this guy has clearly got it, but you will be pleased to know that this has been spotted before. How many of you remember the book 1066 and all that. Well the follow up to that was actually this which went into Europe and described the massive central. Back in the 1940s 50s and you will

see it is an absolutely beautiful description of the metabolic syndrome in a Frenchman of those days. So not much has changed, it's just it's got a lot commoner. The good news is that the waist circumference, waist measurement is actually a very good simple cheap measure of this. This is a correlation between the amount of tissue carefully measured and the waist circumference simply measured and shows that one actually is a pretty good marker for the other. So we have actually got a cheap measure of doing this which is just measuring people's waists. I take no responsibility for anyone who goes home and measures their waist circumference tonight. They must draw their own conclusions and here is the good news for the guys, women are fatter than men. Yes they have more fat than men as a proportion and the orange here shows the relationship between body fat percentage and body mass index on the Y axis and you will see that the women track much higher than the men. Even the skinny women have much more fat and that is probably a biological safety device to ensure safety for reproduction. But, it is a very clear difference and it is a substantial difference. But the important biological issue is that that weight is held in places that is not biologically damaging. It's held in the breasts, it's held round the hips.

Men have their own particular problem with obesity. Not only can you not see your feet, you can't see other things either.

Now what about energy balance. This folks is getting a little bit closer to home every minute. I have had a wonderful dinner, thank you very much but you are going to have to start reflecting on your dinner. If you take a fit lean, 70kg man then nearly all his energy stores (90+% of them) are actually held in fat. And he is lean. I haven't actually got a slide of quite how much is held if you are obese but shall we say it's 95+%. However people say that obesity is caused by the hormones doctor, I am a slow metaboliser, the basic fact is that energy intake must exceed energy expenditure in order to become fatter. And you can argue that as much as you like and you can make special cases and there are a few special cases, but essentially everything else goes into fat and is used when .... there weren't a lot of fat people in the concentration camps. There aren't lots of fat people in Ethiopia and in a sense society is deluding itself by pretending that most people are special cases and that they have lost the simple rules of physiology. More in, less out equals weight gain. And if you look at where energy goes, it is interesting that very substantial proportions actually goes in resting and just keeping you warm and alive.

Most of you still are roughly are at 37.4 degrees, 98.4 or so F, unless you have totally gone to sleep and become hypothermic. That actually occupies 60-75% of our activity the actual effect of burning up the energy uses a small proportion and physical activity is remarkably little. Now this isn't taking the Canadian lumberjack versus the taxi driver. This is taking your average pretty sedentary occupation, like being a lawyer, sorry I said that, as opposed to working on a building site. The doctors are no better than the lawyers and I will come back to that later. There is a small difference but it's not massive. It's not anywhere near as much as you would expect.

But if you look at what burns up energy, you will be pleased to know that your liver, your brain, your kidneys, your guts and your heart burn up a lot of energy but actually don't weigh very much. Your skeletal muscle burns up quite a lot of energy and weighs a fair amount and of course if you exercise that's the bit that will burn up more. Your fat tissue if you are lean won't burn up very much but there won't be that much of it. But if you are fat, there will be an awful lot of it but it won't burn up very much more. So the problem here is that I think the actual ratio is about 18 fold. Fat tissue is 18 times less effective at burning up energy than muscle tissue. Just think about that for a minute, 18 times is an awful lot. This is where we start our ideas, energy expenditure relates to how heavy you are, if you are heavy you actually burn more energy because you have to walk it around than if you are slim. The number of people who tell me that I am a very efficient engine Doctor, I just don't use up much energy.

There are odd individuals, because these are averages, all science is averages, there are the odd exceptions where that's generally true but there are very, very few and you will see here we go from lean females to obese females to lean males, just as early and then go to obese males. It just fits totally and it's actually quite a close coloration in medical terms, that's a good coloration, this is all terribly well down scientifically. This is done by unbelievably complex methods of putting people in metabolic laboratories weighing everything that goes in and comes out, how much they breath and such and such. This is not amateur science, this is serious stuff. And the other bad news is that those who are obese here in the grey use more energy than those who are lean, they have to carry the rest of the stuff round. Imagine if you are 20 or 40kgs overweight carrying those suitcases to the airport all day long, not just a check in, carrying it around morning, noon and night. Carrying it up the stairs, carrying it every where you go. It makes plain simple sense it takes more energy. This is the real killer. This is going to upset a lot of people. This is an incredibly complex, very well done examination of what actually happened in a metabolic ward where everything is weighed going in and out between what people said they had eaten and how much exercise they said they had taken between what they had actually done and these are obese people surprise, surprise and they had taken in merely twice as much energy as they said they had and they had expended about 20% less energy than they said they had.

Now the human capacity for self deception is really quite stunning and as a clinician you have to bear in mind the number of patients who fail to lose weight tell me that never a lettuce leaf has past their lips, it's quite astonishing. And while you are at that level you can make no progress because people have no insight at all. I will always remember one of my first diabetic clinics where a patient was gaining weight substantially despite diet, this was where the inhabitants are not renowned for insight and at the third visit she said you know Doctor it is so hard eating the diet as well as everything else. But you really have to accept that we are all guilty and we can talk about patients in general but actually this is probably true of you and me. That we deceive ourselves as to how much we really eat and how much exercise we really did.

The other bad news is as you lose weight there is less of you to carry around, you actually spend less energy so if you have set your calorie intake to lose weight to start with you may well find after losing 5 or 10kgs that you are not losing anymore, because you don't need it, you have actually reduced your energy expenditure so that you are now imbalanced and you are not losing weight anymore, to lose anymore you've actually got to cut the intake further.

So that's bad news. And this I think is the absolute killer. This is a graph of your energy intake over a year compared with your energy expenditure. If you get the sum half a percent wrong you will gain about a pound a year. You know 0.5% is pretty tight for a tolerance, if you get it wrong by 5% you'll gain 12 pounds a year. The sensitivity of this balance is quite astonishing, it's actually amazing that most of us don't end up enormously obese. But the sensitivity means that if you get it even slightly wrong by whatever mechanism then the weight gain potentially or the weight loss, but that is pretty unusual is colossal.

So what about food, this is now getting closer and closer. Persuading children to eat fruit and healthy food is not easy. And of course you actually have to eat in the first place which implies a degree of physical exercise. What about the portion you get. Let us say macaroni cheese is about my least favourite meal but if you feed bigger portions to people, they eat more. That is serious academic science, isn't it? But you give people more, they don't take 60% all the time, but they do take more in absolute terms. So if you go up from 500 grams to 1000 grams you go up from about 340 or 430 grams that you actually eat. That's getting on to 25%, it is a big deal. This clearly, portion control, one of things that as medics and dieticians we do very badly is actually look at portion size, people don't get it right. Your portion size may be half your neighbour's portion size and just reflect on what you had to eat this evening, how full your plate was. Need I say anymore?

Fast food companies, I'm not going to talk much about fast food companies because it has had a lot of exposure and I'm trying to be a little bit provocative as opposed to just repeating the normal. When Coke was first introduced the standard bottle size was, in America, 6.5 fluid ounces, you can't get that anymore. The child size is nearly double that and if you go for the jumbo which of course is better value, it is 6 times the size of the original and just think about what the companies have done obviously are real issues which kids do not drink soft drinks. The other criminals are all listed there. I won't go into them. Subway may be marginally better than some of them in terms of the quality is a bit healthier but the servings – a 12 inch sandwich – we should do it as a challenge maybe for the lawyers versus the medics – who can get through a 12 inch sandwich quicker. These are massive helpings. And just to make the adults feel really uncomfortable, there is a clear relationship between how frequently you eat out and how fat you are. Now I have called this 'businesses belly' but shall we just ask the lawyers here how often they eat out at lunchtime? Perhaps we don't want to hear the answer. The medics, I have to say, don't have much chance any longer because we are tied to the hospital and nobody will willingly eat the hospital food in the first

place. But this is a real significant issue in terms of modern behaviour: you don't cook at home, you go out. And of course I have got to come back to wine, haven't I?

This is a sort of plagiarised American slide so don't take the numbers too literally. We all tend to drink wine, spirits and beer in addition to our diet; it is actually part of your diet, it's quite a lot of calories and this is actually gin and ordinary tonic, not gin and diet tonic which is actually much better, but, you know, how many glasses of wine have you all got through tonight – or have I got through tonight? Let's be honest, there's a few hundred calories there.

I've got a personal bee in my bonnet. I've tried to be good about presenting the science, but I think a lot of this actually goes back to wartime and rationing. I was brought up in post-war Britain where there was still food rationing and I had to clean my plate because it was all I was going to get, there was no second helpings, there was no spares, there was minimal chocolate or confectionary, that was it. So I needed to clean my plate and I was a very slim youngster. After that of course food became more and more widely available, it got more and more varied – back to that later – it got relatively cheaper and everyone gets larger helpings to begin with, or in the case of a buffet you can choose the size of your helping, and also the available foods became higher and higher in quality and fat and calories. And let me ask most people, do you regard it as polite to clean the plate at home? Does your wife shoot you if you don't? She implies it's an insult to her cookery. Sorry, that's slightly a sexist comment but it does actually have value. Have we continued that culture in families when food is plentiful as is it as it were the norm to finish? If you're having a good conversation do you just finish what's on the plate and possibly have the seconds? Is that par for the course?

This was the UK war time food ration, forgive the quality of the slide but it's getting a bit old these days. You got 50 grams of cheese a week. Many of us may have had 25 or 30 grams tonight; three pints of milk per week; a pound of jam every two months. These are seriously small quantities and interestingly the war time population of Britain was better fed overall than ever before; there were very few who lost out. Which takes us to some other cultural issues.

The Pacific people, body size reflects wealth and respect. We had a Samoan guest at our annual meeting last week who is a little bit overweight and has recently got married, his wife is getting incredible flak because he's losing weight and that reflects his wealth and respect. The family think she is neglecting him and doing him very badly. Hospitality in Pacific peoples requires generous entertaining; you show your wealth by entertaining generously. And politeness as a guest requires that you eat it all, you don't leave bits. And of course if you're senior and respected then nobody does anything, the youngsters do it all for you, so you get even less exercise.

I used to work in south London in Camberwell and Brixton where our major population was Afro-Caribbean and there big is beautiful in sexual terms. When I used to try and persuade a Jamaican woman to lose some weight she would just giggle at me and say “Oh doctor but my husband won’t let me, you go and find somebody more cuddly.” It was serious, it was a bar to actually losing weight and there’s only just beginning to be the signs of some cultural change in terms of the second generation in terms of the Jamaican and Afro-Caribbean in London and indeed in the Pacific Islander in New Zealand thus as it were slim is – but not anorexic but slim – is actually attractive. So the choices of choices of diet are not spend lots of time on Atkins versus anything else, this is the American suggestion, the American approach to medicine is if you can do it, do, because we can charge for it.

So if you’re just overweight you’ll just get some dietary and exercise and behaviour therapy; if you’re moderately overweight you’ll get some drugs if there’s anything else wrong with you, and before you know what’s happened if you’re remotely obese you’ll get surgery. Now, if you applied that rule to New Zealand then roughly 20 percent of the population would have stomach stapling surgery next week. Just think of the implications of that.

This is the sort of dietary regimen you need, so it’s a substantial initial calorie deficit – forgive me, I’m going to rush over these because I want to make the points not dwell on the numbers. But the range of Atkins zone whoever’s diet is just indicative there is no simple solution. If there was a simple solution everyone would have gone for it. There isn’t and a lot of it is actually related to other issues like adherence whether people can cope with it, like whether they actually want to do it.

How many of you could, as it were, give me a rough clue as to the energy density of what we’ve eaten tonight? The salad was good, the fruit’s good, the white fish is nice/good, actually salmon’s not too bad. Once you get into the butter, the bacon, the potato chips you are into serious calories. How many of us know anything about that? Whereas you could all tell me the cubic capacity of your car, how far it would go if the government didn’t stop you going that fast, and every minor detail about your bank account and everything else. But we eat food every day. We don’t know much about it. If you look at the fat content skim milk is stunningly better than whole milk; boiled food is much better than fried; fish is better than meat, but meat is actually quite good once you trim the fat off. French fries/potato chips are extraordinarily bad news in ordinary sizes. How many of us know that? Shouldn’t this be part of normal school education, not something that’s inflicted upon us as a late advance to control obesity, this should be part of healthy children’s education just as much as numbers, just as much as English and so on.

Now some dietary myths. The question is not what your initial diet is. Almost any diet if you’re motivated will do well. The question is, how you decide what you’re going to do after you’ve had the first five months. If there is a clear maintenance therapy you do much better than if there isn’t. Number two, low carbohydrate

diets actually do better than low fat diets. I'm not talking here about Atkins and high fat diet, I'm just saying that carbohydrate is actually the predominance of calorie in our intake and every study that's compared the two has shown a substantial benefit in preference to low carbohydrate.

Here we have the issue of you can eat freely. If you eat more protein you actually end up losing more weight and that's thought to be due to the protein actually makes you feel fuller than does carbohydrate, that old question of what makes people – if you actually have a regular diet absolutely sod all happens.

Meal variety. You've just have a lovely buffet. This is the worst scenario of all. If you serve people the same thing they take less and less and less; if you give them a massive variety they eat more and more and more. Pretty obvious really, but there it is, it's substantial. There is something like a 40 percent increase if you offer massive variety.

If you actually give people what they're going to eat they eat less than if they self-select. That's the buffet again, isn't it? If you give them any form of controlled diet, be it Optifast, be it Soman's recipe they will eat less than if they actually can choose themselves. And yet again the controlled group do absolutely nothing.

What about medication? We'll come to medication in a bit more detail. Medication along produces a miserable weight loss. You have to have it with behaviour medication and if you put it with behaviour modification and dictating what they eat they lose actually massive amounts. The number of people you get to sign up to that regime is actually remarkably few.

How about exercise? This is one guy's idea of exercise. Get the dog to go for a walk. I always ask patients who takes who for a walk? Is it you take the dog for a walk, or the dog takes you? We should be able to prescribe large avaricious dogs would be good. But actually physical activity alone if you don't do anything about the diet actually produces little extra weight loss. The green here is the exercise group, the blue is the control just diet group. There are differences but they're pretty small.

How many of you have tried pedometers? What's the average number of steps around a lawyer's office in a working day? I can say this with some – I tried this at my last place of work and it was around 3,000 steps in a day whereas the recommended is 10,000. The more efficient your office the fewer steps you walk. How many people have got a pedometer, can I have a show of hands? It's not a lot. It's worth trying just once or twice, it's actually very entertaining. 10,000 is, as you can image, from a round number plucked out of the air but actually it does show enormously how much you may or may not be doing, and by implication other people. So exercise doesn't actually make you lose lots of weight. It does mean that you maintain your muscle and lose your fat. It improves the maintenance of the weight loss and it actually makes you fitter and will make you live longer.

This is a lovely slide. How you can work out that everybody climbs stairs at the same rate, gardens at the same rate or, dare I say it, has sexual intercourse at the same rate, is quite fascinating and I've always been fascinated that sexual intercourse is half way between gardening and climbing stairs!

I leave you to take that for later.

But what is very clear is that those who exercise are much more likely to maintain weight loss than those who don't. It has a bigger role in maintenance of weight loss than it does in it occurring in the first place. And what it does is it takes that central fat away.

This is a simple before and after. It's only a five or 10 per cent weight loss, that's achievable but in fact the central stomach fat goes down by about 30 percent and makes you much healthier from the point of view of your risk of cardiac events.

This is a real – if you'll pardon the pun – killer. If you take people who are fit as measured on an exercise test in the yellow, those who are unfit, then whether you are lean, of normal weight or obese your chance of having a cardiac event is around a third to a quarter of your unfit neighbour. That is a stunning amount for a fairly simple degree of fitness.

So we're getting to the end.

What can we do about it? Well, for most diseases we have specific drugs. If Margaret wants to treat somebody with a particular pneumonia she knows exactly which drug will kill the bug, cure the pneumonia and hopefully cure the patient. If I have, as an endocrinologist, a patient who is missing a hormone I give them the hormone, all gets better. If I have a patient whose got high blood pressure I have several specific drugs that do several specific things to bring that down. There is no golden bullet for obesity. Nobody has yet found the drug that suppresses hunger with no side effects and believe me every drug company in the world would give anything they had to lay their hands on this because this would make not billions, it would make trillions. And there is a difference between the US drug companies and the European. The US will always if in doubt treat, whether it be surgery or drugs, because of course they get paid for doing things, whereas the Europeans tend to require some evidence before they will actually do anything and their drug funding agencies require a lot of evidence before they will do anything.

These are the drugs approved in America. The four listed are actually listed in New Zealand, but there are only two long-term drugs available, neither of which are very new. There is one newer one with an astonishing name that I have great trouble remembering but that isn't actually registered yet. But look at what miserable results they get. I just plucked this from the air but it's pretty typical. If you given them a

dummy drug people lose four kilograms after four years; if you give them the real drug they lose seven kilograms. Big deal. That will have cost you hundreds of dollars – hundreds of dollars.

The side effects of these drugs – I've just chosen another drug not because it's the worst, but look, would you want to have a dry mouth, constipation, insomnia and dizziness every day of your life in order to lose three kilograms? I plead no contest at that point. I think the lawyers might not bother to take that to trial.

The current drugs are poorly effective, they have got significant side effects and many of them can't be used in half the population because they're not allowed and anyway Pharmac doesn't fund any of them. If you buy them privately the old drugs are about \$40 a month, the newer ones \$120. Forget this, this is not population health. Not everybody can be funded for this or even buy it themselves. This is a waste of time as long-term treatment.

What about surgery? This is actually from New Zealand, it's from Wellington, and these are seriously fat people, nearly all of whom had major problems and they lost over 40 kilograms. This is a stomach bypass, it's a serious operation, has a mortality, has a morbidity, but it works and it works out 14 years. The trouble is, you can't operate on a third of the population. I mean if you think Helen Clark and Hodgson have got problems at the moment, imagine telling them they've got to operate on 1.3 million of the population. That said, it cures your hypertension, it cures your diabetes, it cures your cholesterol very, very well and your overall risk goes down. But, come on folks, this is not serious medical therapy for a population.

So what do we do about it?

I live in Remuera just down the hill from King's School with these endless jokes about people carriers going up the north face of Remuera, up Portland Road. You can see it, can't you? Some of these kids are just enormous. They are colossal, they're among the worst in the world. Pacific Island ones are worst, Maori are bad, and it applies whether you're in Auckland, Christchurch or Dunedin. Wellington has obviously decided not to do the study because they don't want to know. As I left work this afternoon one of my colleagues told me that they had just seen a child at the age of 15 who weighed 198 kilograms. Now just looking at the table I was sitting at, if three ladies nearest to me all stood up please, come on, stand up. Margaret, stand up. Put together, would you weigh 198 kilograms at 15? This isn't theory any more, this is becoming day-to-day medicine. It's absolutely horrifying. And the kids are just the same, it's where the fat is. If it's in the middle it causes diabetes, it causes bad lipids, it causes cardiovascular mortality. So maybe we should replace the cross country run with sumo wrestling.

This is interesting. I won't go into this in great detail. There's lots of evidence that more television viewing, computer playing actually leads to obesity, but this is actually the other way around. It's decreasing television viewing not actually telling them to go out and exercise on the park or whatever, it's actually just

decreasing the TV viewing produces a significant reduction in weight but it's pretty minimal. So we've got to do something seriously to alter the overall behaviour of most of the population. Not, dare I say it what in England would be social class one and two, we've got to alter the whole population's approach.

And this one is totally politically incorrect. But Tony Baird will enjoy it. It really has got to the stage of our kids, unless we're careful, are going to die before some of us and that is a quite horrifying thought and the implications to the health system are just beyond belief.

So what's happening? Well, the government is talking loud and we have this healthy eating, healthy action thing targeting schools yet we are beginning to see some action in schools. You know, we're losing the soft drink machines a bit. But I need to say that the food industry in this country is astonishingly powerful because it is a massive proportion of our exports. In political terms they dare not stop exporting dairy food here, there and everywhere because it's our lifeblood and only those in the know really understand quite how powerful some of these pressures are. They are much more powerful than the medical or the legal pressures. There are pressure groups. Robyn Toomath in Wellington has led "Fight the Obesity Epidemic". Those of you who have watched the film "Super Size Me" as to what eating McDonald's do to you – somebody said to me tonight their child has never been near a McDonald's since they've seen that film. If you haven't seen it, you should.

The trouble is that none of these public health methods have any clear evidence of efficacy in New Zealand or elsewhere and that's going to lead us to the question of compulsion or legislation which I'm not going to but you'll all prick your ears up.

There are some trials that show maybe 50 or 60 percent effectiveness in a clinical trial situation in preventing diabetes. They're not – you know, that's talking about five to seven kilograms weight loss. But nobody, to my knowledge, has yet shown a really affordable effective programme on a population base anywhere in the world.

This is the Diabetes Prevention Programme. This looks good. If you take a drug it cuts your relative risk by 31 percent of getting diabetes. If you actually modify your lifestyle it reduced it by nearly 60 percent. So actually lifestyle beats drugs. The bad news was this was in around 3,000 or 4,000 patients and cost US\$200 million to do.

Personal psychologists and trainers. Forget it. It's not a viable goer, we've got to find something that's cheaper and more effective.

So what can we do?

Well, we could make you pay more for parking near work. We could build car parks further away. We could make the lifts uncomfortable, smelly, slow. Or actually, I mean isn't it awful that there's some buildings in Auckland where you can't actually use the stairs because it's a one-way door out for the fire escape.

We need to build healthier workplaces. We need to stop the New Zealand culture of you park outside the dairy not 50 metres down the road.

Do we have a fat tax? That actually works very badly against the under privileged and the poorer. Do we subsidise healthy foods? That actually is possibly a slightly better goer. Do we actually have to say, no we can't limit treatment for obesity related – that we actually have to limit treatment for obesity related illness?

And just on one slightly more serious note. When you get on a flight should you actually pay for 100 kilograms and if you're over 100 kilograms, you and your baggage, you pay extra? This is actually a little bit more serious. Some of you may recall that there was a flight accident in the states approximately two years ago which was caused by the passengers and their luggage being heavier than the plane could carry. Now that may seem trivial and it was somewhere in the states. It actually was the same planes that Air New Zealand uses for its very short distance hops, the Beech 1900D. The American aviation authorities realised afterwards they had been underestimating the average weight of passengers by 10 to 20 pounds and of course their carry on baggage and their checked in baggage also very substantially. The plane actually sort of tipped over because it was too heavy. This issue – I mean we've seen hospital beds break, that's a cause of merriment but these issues are actually serious enough that they're going to affect all our lives in the not too distant future and we need to think what we're going to do as a society.

I'd like to thank a lot of colleagues who have leant me slides, a lot of colleagues who have given me good ideas and I've stolen from lots of national obesity organisations. I have gone on too long, but I hope I have actually shown you that this is actually a very, very serious public health issue that may overwhelm AIDS, may overwhelm everything else in the next years and perhaps more importantly those of us who have children may actually shorten their lifespan unless we get our act together.

Thank you very much.