

## INTERVIEW

# Tackling obesity: the concept of energy balance



**Laura McGuinness, Commissioning Editor, speaks to Dr James O Hill\*.**

Dr Hill is the Founding Executive Director of the Anschutz Health and Wellness Center at the University of Colorado Anschutz Medical Campus. He also holds the Anschutz Endowed Chair in Health and Wellness. He is Professor of Pediatrics and Medicine. He holds a BS degree from the University of Tennessee and MS and PhD degrees from the University of New Hampshire (USA) in Physiological Psychology. He served as Chair of the first WHO

Consultation on Obesity in 1997. He was President of The Obesity Society during 1997–1998 and President of the American Society for Nutrition from 2008 to 2009. Dr Hill was a member of the NIH Expert Panel on Obesity that developed the first US guidelines for the treatment and prevention of obesity. Dr Hill has published more than 500 scientific articles and book chapters; many of these focus on the importance of healthy eating and physical activity in weight management. He is the recipient of the 2007 TOPS award and the 2012 George Bray Founders Award from the Obesity Society. He has received the Centrum Center, McCollum and Kritchevsky awards from the American Society for Nutrition, and is the 2012 Atwater Lecturer for the US Department of Agriculture. Dr Hill is a cofounder of the National Weight Control Registry, a registry of individuals who have been successful in maintenance of a reduced body weight. He is cofounder of America on the Move, a national weight gain prevention initiative that aims to inspire Americans to make small changes in how much they eat and how much they move to prevent weight gain. He is the author of several books and he lectures around the world on obesity, health and wellness. His current work focuses on developing science-based strategies to reduce obesity rates.

### Q Why did you begin working in the field of obesity?

I began working in the field in the early 1980s. At first I wasn't interested in obesity because it was not a very interesting issue at the time. I was interested in how the body regulated weight. What fascinated me was why most people remained weight stable over a lifetime. I started out really interested in how our bodies regulate energy

in and energy out and how they maintain such a constant balance over time when our eating habits and our physical activity habits are so changeable.

### Q What changes have you seen since you have been working in the field?

I think it was really in the early 1990s that people began to realize that rates of obesity were starting to greatly escalate in

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the USA. After a long period of being relatively stable, obesity rates suddenly began to increase in the mid-1980s. This created a great interest in the topic among researchers. They became very interested in it from a genetic point of view, from a physiological point of view and from a behavioral point of view. Obesity quickly became one of the hottest topics in behavioral and biological research. Many people are now working in the area, because it is very clear that obesity is a significant public health problem in just about every country in the world. The major change has been the level of interest and the amount of research being devoted to this. Despite this we still are not very good at treating or preventing obesity.

**Q Your recent work focuses on energy balance & the dynamic system between energy intake, energy expenditure & energy storage. Can you explain this in more detail?**

Energy balance really describes the fact that 'energy in' has to, at some level, be related to 'energy out'. That is the first law of thermodynamics; it is a given, it is not all that exciting. What is exciting is how the body achieves that balance of 'energy in' and 'energy out' [1]. The first thing – it should seem so obvious but it is not – is that you've got to look at both energy intake and energy expenditure. It really frustrates me to see my colleagues talking about food intake as the way to solve the major problem of obesity, because from an energy balance point of view you would never say that you can just focus on food, because it's so clear that 'energy in' and 'energy out' and body energy storage are so interrelated that it's impossible to focus on one or the other.

The second thing to consider is that physical activity is way more important than just calorie burning. People say that if you eat a hamburger, then you get a lot of energy, and you have to spend so many hours to burn that off. Actually, that is not the point at all. The way the body regulates energy balance is such that we do it at a high level of energy coming in and a high level of energy coming out. In other words, our bodies are set up to eat. Our appetite is controlled by so many mechanisms that

we are not naturally very good at restricting food. We try to put people on diets and often they can only do it for the short term. Your body's physiology is geared toward consuming a high number of calories. If you're going to eat a lot, you have to achieve energy balance by having a high energy expenditure. The way to achieve a high energy expenditure is either to be physically active or to become obese. It is possible to maintain energy balance at a lean, healthy weight by being physically active. Alternatively, if you consume a lot of calories but are sedentary, the way to increase energy expenditure is by becoming obese. As your body increases in size it requires more energy to be expended in maintaining and moving your larger body. So unless you are an exceptional food restrictor (few people are) you have the choice of achieving energy balance at a healthy weight by being physically active or achieving energy balance at an overweight or obese weight if you choose to be sedentary.

The third thing we can learn about energy balance regulation is that our body is more protective against weight loss than weight gain. If you are already obese and you begin eating less to lose weight, your body compensates by reducing energy expenditure. What that suggests is that we're going to be much more effective in the long run at preventing obesity than we are at treating it. Interestingly, while eating less is the key to losing weight, being physically active is the key to keeping it off.

Prevention over treatment would be the big take-home message from an understanding of how the body regulates energy balance.

**Q You say that prevention is going to be easier than encouraging weight loss. How do we get the message out & tell people how to avoid putting on weight?**

There are two questions; one is the 'what to do' and the second is the 'how to do it'. I think we know much more about 'what to do' than 'how to do it'.

My team and I have been big proponents of the small changes message [2,3]. If you are already overweight or obese and you want to lose weight and keep it off then you

need big changes. If you want to prevent the 1–2 lbs that most Americans are gaining each year, you can do this with small behavior changes. You do not have to radically turn your life upside down but you do have to consistently make small changes in diet and physical activity; for example, we promote walking. We think walking is the greatest form of exercise and if we got everybody walking it would be one of the most effective things we could do. However, the question is important, how do we get the message out that prevention is the key, how do we get the message out that you can do this with small changes but those small changes have to be consistent day in, day out? I think we became obese due to so many little changes that the way we get back to where we want to be is with little changes, but those have to be consistent, and we have to get a consistent message out there. So, I agree, knowing what to do is only one part of it, we have got to get a consistent message out to the public.

**Q One of the small changes that you mention is walking, are there any other small changes you can recommend?**

It is simply about looking for ways to reduce portion size or to reduce fat and sugar. My team and I very much support low calorie products, so we recommend that people who drink regular sodas should switch to diet sodas, because they can get the sweet taste with no calories. They should look for reduced calorie and reduced fat foods. We think that simply making some of those switches can be very easy and sustainable. It has never been easier to eat healthier. You can go to the grocery store and there are lots of good options, but we've got to get people to consistently choose those options.

**Q Why is it so important to be a healthy weight? What are the problems for people who are obese?**

If you look at the diseases that are driving healthcare costs, they are what we call chronic diseases. Once you are overweight your risk of Type 2 diabetes goes up, your risk of cardiovascular disease goes up, your risk of orthopedic problems goes up, and your risk of Alzheimer's and other cognitive

problems goes up. What we know from lots of research is that as you accumulate this extra body fat, it negatively affects just about every system of your body. If we could deal with the cause, which is the weight gain, we could greatly reduce these diseases like diabetes, heart disease and even some forms of cancer, which are fuelling our healthcare costs. Rather than looking at the consequences of obesity we should be addressing the cause, the obesity itself.

**Q You were involved with setting up the National Weight Control Registry; what does this entail?**

With the National Weight Control Registry we're following about 10,000 people in the USA who have lost weight and kept it off for long periods of time. To qualify for the registry you must have maintained at least a 30 lb weight loss for at least a year. In fact, the average in this group is keeping off 70 lbs for approximately 6 years. It's a highly successful group. The intention is to get a group of people who have succeeded and try to learn from their success. It's not a cause and effect study, it's associational, but I think what we have learned from these people can help us to better develop effective weight loss and weight loss maintenance programs.

**Q What have you learned so far?**

First, there was no similarity in how they lost weight [4]. They lost weight on just about every diet imaginable. I think that sits with the scientific understanding. We know there are lots of ways to lose weight. You can lose weight on low-fat diets, low-carb diets or many others. What we have found is that there is much more similarity in how they are keeping the weight off. I think the most important thing they are doing is lots of exercise. You don't have to exercise to lose weight, you can do perfectly fine losing weight with diet alone. But once you start trying to keep that weight off, I think that exercise becomes much more important. These people do an average of approximately 1 h a day of exercise. It doesn't have to be one high-intensity hour; they do a lot of walking, they break it up in chunks, but

they all get a lot of exercise. I think what that exercise is doing is making up for this biological drive to regain weight. Thus, as you lose weight your body adjusts. It conserves energy. Once you've got the weight off, if you're trying to remain at that weight by diet alone you have to eat so little that it becomes very difficult. The level of physical activity these people perform is overcoming this biological drive to regain weight and giving them a level of expenditure that it is feasible to meet considering all of our appetite mechanisms [5,6].

Second, they generally eat a low-fat diet but they also watch total calories. In the USA a few years ago, we told everybody to eat low-fat diets but we did not tell them about calories, we put sugar in everything and so the low fat diets didn't have any effect. The people who manage to keep weight off eat low fat but they are also very conscious of the total calories. They are also very consistent; they maintain their physical activity and diet patterns day in and day out. They do not take days off. They do not take holidays off. They eat breakfast virtually 7 days a week. These people almost never miss breakfast. They pay attention. They monitor their weight, usually on a daily basis. They keep track of what they are eating. So they put some attention to their lifestyle choices and behaviors. Those are the major characteristics that we have learned from these people.

**Q Are there any differences in exercise recommendations for people trying to lose weight & for those trying to keep it off?**

I think exercise is very important both for prevention and for keeping weight off. I think the difference is that people who have previously been obese and are trying to keep weight off have to do more exercise.

To prevent weight gain something like 15 min of exercise a day is important, but to keep weight off it takes close to an hour [4–6]. Once you've been obese you're paying a metabolic penalty. For the rest of your life you're going to have to do more than someone who has never been obese. That is why I think that in the long run we are going to be much more effective at preventing

obesity than treating it, because preventing it is going to require less behavior change.

**Q What is the idea behind 'America on the Move'?**

America on the Move is set up largely for the prevention side. It uses this small-change approach to say that if we could change behavior by only 100 calories a day then we could prevent weight gain in most people. The idea is that instead of telling people to go out and make all these big changes, in America at the moment we are saying "let's get started by making small changes". We advise people to get pedometers, which count your steps, and to do 2000 steps a day, which most people can do. We also advise them to make one small food substitution a day; it might be drinking a diet soda rather than a regular soda, or reducing portion size. The whole idea is that we give people lots of ideas for small changes and we try to help them choose those small changes and stick with them. Someone who walks 2000 steps a day might not meet the physical activity guidelines of 30 min exercise a day. But for the moment, we are not worried about that, what we are worried about is where you are now and moving you in the right direction. What we find is that, by making small changes, people prevent weight gain or lose a little bit. It's not an approach to go out and lose 50 lbs – you need bigger changes for that, but the small changes can get people started on the road to bigger changes, and it can prevent the gradual weight gain that's happening in most of the population. People find it's easy to get started. It is a message that really resonates. I have had so many people say to me, "Someone's finally asking people to do something I can really do." Many of the things we ask people to do are very difficult. We are trying to get everyone to make a start; it is as simple as recommending that someone walks to the end of the driveway today and then does it twice tomorrow. What we find is that over time people make more and more small changes so they might actually end up having made big changes; but they do it in these small gradual steps.

The easier you make it, the more likely people are to stick with it. If we engage people in the small changes, we can engage the people who are not ready to lose weight or are not ready to go out and exercise 1 h a day, but they start small and they might build up to that.

**Q Is there anything else you are working on that you would like to elaborate on?**

It is clear that the environment in which we live is encouraging us to over-eat and not to exercise. Therefore, we have looked at the people who live in this environment but who are not gaining weight. In the USA only approximately a third of the population are at a healthy weight. So the question is, what are they doing, are they just genetically fortunate? I do not think so. I think what they are doing is that they are basically using their cognitive powers to manage their environment. They are eating less than they would if they were not paying attention and they are exercising more. They are essentially using their conscious energy to manage their lifestyle. If that is what it takes to succeed, we thought that we should teach our kids those skills. It would be great if we could go out and change the environment, I am not saying we should not do that, but I think its going to take a while to do it. There is an alternative option in the mean time.

We started a program to help kids manage better within their environment. We call it '5th Gear'. In total, 7200 kids are currently participating. We are taking fifth graders in school and teaching them the energy balance concept. For example, we would teach them that if you 'super size' your French fries, you have to walk 8000 steps to burn that off. So rather than telling them not to super size their fries, we are giving them the information so that they can make their own choices. Along with that, they get a special card that allows them to earn points and get discounts if they make healthy choices in the community. So if they go to a restaurant that is participating and they make a healthy choice, they either get a discount on that, or they earn points that can be traded in for prizes such as tennis shoes and basketballs. Even

if their family goes to the local grocery store and makes healthy choices there, then they get a discount and get to earn points. The program is empowering our kids with the skills to manage energy balance and then reinforcing those skills. Hopefully we are turning out healthier consumers, people who are going to be out there looking for healthy choices and physical activity. It has been fabulous. We have got so much interest from all over the world. We are not quite ready to send it out there to others yet, we need to work out some of the details, but the hope is that in another year or so we will be able to disseminate the program to people that want it.

**Q What are your hopes for the next 5–10 years in the field of obesity?**

I think the biggest single challenge is giving people the right reason to make behavior changes. We complain about our environment, but we like our drive-through take-aways, big screen TVs and computers, and we like food that tastes good. We know how to change that, but I think our biggest single barrier is encouraging people that they need to change. How do we somehow make healthy living a part of the life that people are aspiring to? How are we going to get people to make and sustain these behavior changes? If we can crack that nut then I think we can make progress.

My goals in the short term are to stabilize obesity rates all over. I'm not necessarily saying to reduce them; I am saying lets stop the increase in obesity so that everybody weighs the same next year as they do this year. I think it's very achievable because it can be done with small changes. I think we have to get everybody at the table, including industry. We have got to get the grocery stores, restaurants, computer companies, all to the table if we have any chance of doing this. But if we were able to do that, and we could help people make small changes, then I think it is totally achievable.

**Disclaimer**

*The opinions expressed in this interview are those of the interviewee and do not necessarily reflect the views of Future Medicine Ltd.*

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