and it increases a well established risk factor for cardiovascular and other diseases.

Mr. GORDON. Dr. Sims, can you explain how both insulin and the oral hypoglycemics promote obesity? You have just said that they do, is that right?

Dr. SIMS. Even in small amounts insulin turns off the release of fatty acids from the fat deposits in both experimental and spontaneous obesity. By providing excess insulin, either by injection or by giving sulfonylureas which stimulate insulin release, weight gain is enhanced. I will go into this in a few minutes in a bit more detail.

With all due respect to Dr. Max Miller, who is here today in the audience, I would like to say that the treatment options selected for the UGDP, which represented the prevailing options of 1960, are out of date now. They do not include exercise or intensive education, or several other newer methods of management, some of which can actually reverse the overt diabetic state.

We must conclude that neither sulfonylureas, since they increase the secretion of insulin, nor insulin itself are indicated for the treatment of the overweight and I emphasize overweight, maturity-onset diabetic.

Four: Much of the problem of maturity-onset diabetes is a consequence of our American affluent post-World War II lifestyle. Altering this may frequently reverse the diabetic state, whereas prolonged use of the sulfonylureas will not.

Five: Exercise or increased level of physical activity is a means of prevention and treatment which has been sadly ignored at these hearings. I suggest that whenever diet is mentioned, as in the proposed package labeling for the oral agents, it should be as diet and exercise or diet and increased physical activity. This is because one is always dealing with both the input and also the energy output side of the problem when working with the diabetic patient.

After giving this brief outline, I would now like to elaborate a bit.

Diabetes incurs in two forms: First of all there is the insulin lacking, lean, hungry type of diabetic, usually young; the second is the non-insulin-dependent type, typical of the majority of the 1½ million people receiving oral agents today. They are usually overweight—53 percent of those in the UGDP were over 25 percent above accepted normal weight. And I think, Dr. Chester, did you not give us a figure of 80 percent overweight in your Cleveland group?

In this non-insulin-dependent there is a resistance to the action of insulin of both muscle and the fat. The insulin in the blood is actually increased, but it is inadequate in the face of the resistance for the normal metabolism of food. This produces a stress on the pancreatic islets, which may ultimately be followed by failure and development of insulin-dependent diabetes.

In treating a patient, we have to know where he is with respect to the natural history of the disorder. And we also have to know whether he is overweight. We know from our work in Vermont with normal volunteers, who have no family history of diabetes or obesity, and who have agreed to deliberately gain weight, that this insulin resistance may develop secondarily to the obesity and overeating. It is also completely reversible.