

question is if we could duplicate it theoretically, could we prevent the vascular complications.

The second part to this is; alternatively, is there some factor or factors involved other than proper insulin delivery which leads to these harmful effects on the blood vessels? Basic and clinical investigators are working on this question with respect to insulin at present.

Mr. GORDON. Can you give us some more information about the kinds of research being conducted in this area?

Dr. LARNER. Yes, very simply, for example, the question that is now being investigated in diabetic humans is whether to return to the early methods of therapy, using several injections of rapidly acting insulin, for example three injections of the rapidly acting insulin, coordinated with meals, leads to a better situation with regard to the prevention of thickening of the blood vessels and the vascular complications.

In other words, biopsy studies are being done to investigate whether an insulin delivery system of three injections or multiple injections of rapidly acting insulin, rather than a single injection or several injections, or slower acting insulin are more effective in preventing the vascular complications than the therapy with long-acting insulins.

Now, this type of questioning is being done in humans and analogous and even more sophisticated experiments are being done in animal systems. So, my point is, we don't yet have the answer to that question with insulin. And, insulin is itself a direct hormone replacement therapy. And for this reason, if we don't have the answer with insulin yet, we certainly don't have the answer with the sulfonylurea drugs.

What we need is accelerated research in this area to answer this question. Fortunately, we have enough information now to be able to phrase the question in a sound way as an either/or type of question. Either it is the insulin delivery system, or it is not. And we should be able to get a yes/no answer on this situation. Until we do, we can't go forth, in terms of other applications, until we understand the theory.

For this reason, I feel there is no direct evidence that these oral agents are beneficial, that is, in the sense of life saving or life preserving.

Mr. GORDON. You seem to emphasize "directly." Is there any indirect evidence, whatever that means?

Dr. LARNER. Neither direct or indirect. I didn't mean to distinguish between them.

Number four, the problems of translating the results of basic research developed by medical scientists to the practice of medicine.

This is a very broad question, and we could spend a great deal of time discussing it. Briefly, I am of the opinion that scientists today are more aware than ever before of the importance of applying their fundamental studies to the practice of medicine.

For example, in my own field, pharmacology, there has been a strong development in the area of clinical pharmacology which addresses itself to this problem: Namely, the application of fundamental