

Hypoglycemia and Driving Performance

A flashing yellow light?

Are people with insulin-requiring diabetes a potential liability to the public welfare while driving? In this issue, the data presented by Cox et al. (1) on driving impairment during progressive hypoglycemia might be interpreted to affirm this point of view. We submit that this would be a grievous error that could have a significant negative impact on millions of people with diabetes worldwide. The potential impact of hypoglycemia on cognitive function and motor skills in people with diabetes is not disputed. Moreover, it is clear that severe hypoglycemia while driving may contribute to traffic accidents. As a result, agencies that regulate the issue of driver's licenses have historically restricted people with diabetes from operating commercial transportation vehicles, and many states require proof of medical fitness to drive before a standard driving license is issued. However, these regulations have been viewed by some as overly restrictive and not based on evidence. Indeed, there exists no evidence that people with diabetes have higher accident rates (2–7), and two studies suggest a decreased risk among people with diabetes (8,9). Nonetheless, the article by Cox et al. (1) will intensify discussion of whether people with type 1 diabetes should have their driving privileges restricted. The study by Cox et al. (1) demonstrates that for some people with diabetes, hypoglycemia induced while operating a driving simulator was associated with decrements in driving performance. More provocatively, many of the subjects took no corrective action even when they were able to recognize that their blood glucose was in the hypoglycemic range. Only a third treated their hypoglycemia and/or stopped driving.

These observations are of concern in that they may be used to adversely affect driving privileges of people with diabetes. Even though Cox et al. (1) took great pains to argue that their findings should not be used to regulate driving privileges, as Frier (10) states in the accompanying editorial, "it is naive to believe that the results of this study will be ignored by driving license authorities and their medical advisors, for whom public safety is paramount." Given the ubiquitous need for driving in this

country, it is imperative that we exercise great caution in the interpretation of the data, particularly when considering the potential burden if driving privileges for all people with diabetes are adversely affected.

In this context, it is important to examine the study design used by Cox et al. (1) and critically consider the data. For example, the data reflect performance on a simulation of driving, not the act of driving on the roadway itself. Simulators, regardless of their sophistication, require a different set of skills than those required to drive a car in real space. It is simply unknown the extent to which the simulation environment caused stress, anxiety, or contained sources of distraction that may have adversely affected driving skill. Similarly, the simulation setup may not have provided important performance feedback cues that are used in everyday driving. Clearly, one does not usually drive with an intravenous (IV) line and electroencephalogram (EEG) cap on. In addition, the subjects were used as their own controls, i.e., they were not put through the same simulation testing with an IV line and EEG cap for the same duration of time during similar conditions without an insulin infusion. What is known is that in real-world driving situations, there is little evidence suggesting an increase in traffic accidents among people with diabetes.

The observation that many of the subjects failed to take corrective action when hypoglycemic glucose levels were induced is the most potentially inflammatory and also requires care in interpretation. On one hand, it may truly be the result of cognitive impairment. On the other hand, it may be the result of the simulation exercise, in which the consequences of "pushing ahead" have no real consequence to the subject. In the video-arcade world of realistic simulation games, the experimental situation may have been viewed in a more game-like fashion than would be the case in normal driving situations. Clearly, people with diabetes are not eager to endanger their lives and the lives of others. Data from the study by Cox et al. (1) should not be interpreted to mean that problems with driving are a result of conscious bad deci-

sions on the part of the diabetic driver. Indeed, by knowing about the possibility of hypoglycemia, people with diabetes are in a better position to prevent adverse events than people who have other health conditions (e.g., seizure disorder, heart disease) that can also contribute to traffic accidents, but that are either unknown to them or difficult to control or predict. Consistent with this view, there is evidence, albeit limited, that people with diabetes have lower automotive accident rates (8,9).

It is important to note that there is considerable variability in both hypoglycemia awareness and driving performance at all glucose levels. In this regard, it would be an error to assume that the hypoglycemia-related driving impairment is an axiomatic class effect that is inevitable in all people with insulin-requiring diabetes. In a similar fashion, there is a tremendous amount of variability in individual responses to many prescription and over-the-counter drugs as well as alcohol ingestion. Clearly, each person with diabetes must be approached as an individual with a unique medical history. This view was expressed by Cox et al. (1): "While driving performance was clearly impaired at mild hypoglycemia, the blood glucose range at which driving was impaired and the exact driving parameters disrupted were quite idiosyncratic, consistent with neuropsychological test findings."

The heterogeneity of response to hypoglycemia and driving is also consistent with the current legal stance about driving privileges for people with diabetes. The California Court of Appeals has noted that a person with type 1 diabetes is not automatically subject to license forfeiture or nonrenewal, and an agency may do so only if the diabetes affects the driver's safe operation of a motor vehicle (11). Thus, if a person has already demonstrated the ability to drive safely and has received a license, he/she has the right to operate a motor vehicle.

Hypoglycemia is a real and ever-present complication of insulin-requiring diabetes. The study by Cox et al. (1) clearly illustrates the importance of maintaining hypo-

glycemic awareness for the health and safety of people with diabetes as well as those around them. It also stresses the important role health care providers have in ensuring that all people with diabetes understand how to identify and correct hypoglycemia, particularly in the context of operating a motor vehicle. It is obviously important that we teach strategies for avoiding hypoglycemia that are specific to driving. Blood glucose testing before driving needs to be stressed, and minimum glucose values for safely operating a motor vehicle need to be established. Just as other diabetic complications can be controlled and avoided with proper planning and care, so can driving problems. It is important that we do not increase the burden of diabetes by aggressively seeking to regulate the driving privileges of people with diabetes. Efforts to do so may impede the need for a more thoughtful educational response to minimizing possible accidents that may be caused by hypoglycemic episodes. As Joan Hoover, Diabetes Interviews' patient advocate advisor suggests, to "blame the victim for

hypoglycemia-related motor accidents serves only to misinform the public and to push the eventual solution just that much further out of reach" (12).

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