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LETTER

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Comment to: Hoi-Hansen T, Pedersen-Bjergaard U, Thorsteinsson B (2005) The Somogyi phenomenon revisited using continuous glucose monitoring in daily life. Diabetologia 48:2437–2438

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To the Editor:
Using a continuous glucose monitoring system (CGMS), Hoi-Hansen and coworkers [1] recently rejected the existence of the Somogyi phenomenon, having analysed valid glucose data obtained in a large group of type 1 diabetic patients, representing 594 nights. We believe this is an important paper since, in our experience, health care professionals frequently believe that the Somogyi phenomenon exists. Because it remains an important issue, we investigated this concept further.

The Somogyi phenomenon was first recognised in 1949, when Dr Michael Somogyi presented a paper at the American Chemical Society meeting in Atlantic City (NJ, USA) indicating that many diabetic patients were receiving such large doses of insulin that they were 'actually victims of chronic insulin poisoning'. He hypothesised that insulin-induced hypoglycaemia at night generated the release of counter-regulatory hormones, which, in turn, caused insulin resistance and hyperglycaemia. Since at that time the methodologies required for measuring blood levels of glucose and counter-regulatory hormones had not been developed, it should be noted that his hypothesis was based on the assessment of urinary glucose excretions alone. M. Somogyi published over 70 papers on various aspects of clinical chemistry, and his last major article was published in the *American Journal of Medicine* in 1959, as outlined in the elegant review of his scientific contributions, written by H. Walker Jr and published in 1972 [2]. In his paper, M. Somogyi summarised his ideas in the phrase 'hypoglycaemia begets hyperglycaemia', which became known as the Somogyi effect.

In their article, Hoi-Hansen and coworkers cite the well-known papers by Gale et al. [3] and by other groups, referring to these investigations as experimental studies that provide evidence against the existence of the Somogyi phenomenon. Going through these papers, we believe, however, that it would be more appropriate to address these studies as observational rather than experimental, and would like to point out that although experimental studies have documented that nocturnal hypoglycaemia induces a state of insulin resistance in type 1 diabetic patients [4], this causes post-breakfast rather than fasting hyperglycaemia [5].

Given that counter-regulatory hormones released by hypoglycaemia would mediate the Somogyi effect, we have to consider the mode of action of these hormones, particularly growth hormone, which is known to induce insulin resistance after a lag period of several hours [6]. In our opinion, the question of whether an alteration in insulin sensitivity, evoked by the release of growth hormone, would generate a glycaemic effect prominent enough to be detected in clinical practice in diabetic patients still remains to be fully elucidated.

A few studies in which glucose profiles after hypoglycaemia were monitored beyond fasting values have been presented [7, 8].These observational studies were unable to convincingly detect significant hyperglycaemic effects of nocturnal hypoglycaemia during the following daytime period. These observational studies, which were conducted over 15 years ago, were unable to detect significant hyperglycaemic effects during the day after nocturnal hypoglycaemia. However, nocturnal glucose levels were not monitored continuously (blood samples were taken every several hours), which means that episodes of undetected hypoglycaemia may be a confounding factor.

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Since, in their recent paper Hoi-Hansen and coworkers do not present CGMS data beyond fasting values, we would encourage them to do so in order to provide further evidence to reject or support the existence of the Somogyi phenomenon.

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