

Metabolic consequences of incorrect insulin administration techniques in aging subjects with diabetes

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Abstract Only few insulin-treated (IT) people with diabetes mellitus (DM) reach the target due to poor compliance and/or to sedentary lifestyle and/or to inadequate treatment regimen. The latter may be also brought about by often overlooked factors including insulin injection into altered skin areas, often brought about by incorrect habits, namely needle reutilization or poor compliance to the suggestion to continuously rotate skin injection areas. The aim of our study was to evaluate the rate of skin lesions within the sites commonly used for insulin injection in our IT DM patients and to verify whether a short-acting insulin analogue yielded different metabolic effects when injected in altered vs. normal skin areas. One hundred and eighty well-trained IT people with type 1 and type 2 DM (64 ± 15 years of age) consecutively referring to our unit underwent a standard clinical examination involving an accurate skin inspection protocol meant at looking for any alterations eventually affecting all possible injection sites, including bruising, multiple needle pricks and lipodystrophic nodules (LN). They were also tested for HPLC HbA1c determination and asked to fill in a standard questionnaire on injection habits. Furthermore, seven male,

T1DM glulisine–glargine basal-bolus-treated patients in this group were randomly injected 10 IU glulisine into either normal skin (NS) or an LN by a nurse before a standard, 405 kcal breakfast, for blood glucose and free insulin determination at 0, 30, 45, 60, 75, 90, 120 and 150 min. More lesions were found in people over sixty ($P < 0.01$) and in women ($P < 0.05$). A higher prevalence of HbA1c $>7.5\%$ was found in patients with lesions (with an O.R. of 3.74) and further confirmed by data obtained from head-to-head comparison of insulin injection into an LN and NS. In fact, injection into an LN proved to impair and slow down insulin absorption, resulting in a higher absolute value and a larger variability of blood glucose levels than those observed by utilizing NS. This suggests us to pay more attention to all aspects of patient–team relationship to try and obtain good metabolic control in all people with diabetes and even more in the elderly.

Keywords Aging · Skin · Glucose · Insulin · Metabolism

Introduction

Only few insulin-treated (IT) people with diabetes mellitus (DM) reach the target due to poor compliance and/or to sedentary lifestyle and/or to inadequate treatment regimen. The latter may be also brought about by often overlooked factors like wrong drug storage habits, different administration tools (syringes vs. pens) and random injection site selection. In fact, the reason for such discrepancy is mostly that time allowed to the dedicated team for psychological support and education is rarely enough to yield the desired patient empowerment resulting in longstanding lifestyle changes and appropriate treatment adaptation to different environmental and metabolic conditions.

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