Plasma glucose goals and therapeutic management in elderly diabetic patients

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Summary
In the elderly diabetic patient, therapeutic decision making is not entirely based on evidence acquired from large-scale studies conducted in young adults. In this population autonomy, co-morbidity and prognosis are all objective parameters which must be taken into consideration. Frail patients run the risk of hypoglycaemia if the therapeutic goal is too strict. Frail patients can be distinguished from autonomous patients free of serious co-morbidity using evaluation scales validated for geriatric patients enabling the establishment of appropriate goals for the treatment of diabetes without compromising the patients’ quality-of-life.

Key-words: Diabetes mellitus · Elderly · Plasma glucose · Glycated hemoglobin · Co-morbidity · Frailty · Diabetes treatment.

Résumé
Objectifs glycémiques et stratégie thérapeutique chez un patient âgé diabétique
La décision thérapeutique chez le patient âgé diabétique ne résulte pas exclusivement des résultats des grandes études conduites chez des patients adultes jeunes. L’autonomie, la comorbidité et le pronostic sont des paramètres objectifs pris en compte dans la décision. Les risques d’une attitude trop ambitieuse sont les hypoglycémies, d’autant plus mal supportées qu’elles surviennent chez un patient fragile. L’utilisation des échelles validées en gériatrie permet de distinguer les patients fragiles des patients autonomes indemnes d’une comorbidité trop lourde, afin de conduire un traitement hypoglycémiant qui dans les deux situations n’amputera pas la qualité de vie du patient.

Mots-clés : Diabète · Personne âgée · Glycémie · Hémoglobine glyquée · Comorbidité · Fragilité · Traitement antidiabétique.
Blood glucose control is evaluated with two variables: capillary glucose level and glycated hemoglobin (HbA1c).

Why should blood glucose level be lowered in the elderly diabetic? The United Kingdom Prospective Diabetes Study (UKPDS) provides the only evidence proving the usefulness of lowering blood glucose level to reduce the risk of diabetes-related microangiopathy and macroangiopathy [1]. This study was conducted in subjects aged 53 years on average at inclusion. At the present time, no study is available evaluating the usefulness of glycemic control in very elderly patients. The results of studies conducted in selected and motivated young adults are thus applied to older subjects. This raises the following questions:

- who is an old person?
- do old persons constitute a homogeneous group of subjects who could benefit from unique strictly age-dependent recommendations?
- is acute hyperglycaemia in non-diabetics a risk situation?
- does the diagnosis of diabetes apply in this situation?
- how does autonomy affect the therapeutic decision?

At what age does a person become elderly?

While old age is most certainly a factor of poor prognosis compared to young age, for a given pathology, prognosis is not determined by age in subjects aged over... 70 years for example. Multivariate studies demonstrate that the gravity of the initial situation, loss of autonomy (reflecting the chronic nature of disease) and nutritional status are better markers of prognosis than age. Thus a 70-year-old hypertensive diabetic stroke victim has a life expectancy close to that of a disease-free 90-year-old person. In other words, age defined in years of life can be used to determine whether a person is elderly, but not to make therapeutic decisions.

Elderly diabetic patients constitute a heterogeneous group with various clinical and functional situations

Certain patients whose disease began in adulthood develop complications while others, whose disease began much later in life, have not lived long enough for the complications to become apparent...

Certain old patients present serious co-morbid conditions causing loss of physical and/or intellectual autonomy, while others whose diabetes is their only real disease condition maintain a very satisfactory state of autonomy.

Time – and thus the potential duration of the disease – and co-morbid conditions are the essential differential factors in the aging process.

Does chronic hyperglycaemia define diabetes?

Chronic hyperglycaemia results from different metabolic abnormalities, classically divided into two groups: type 1 diabetes which is rare in the elderly population, and type 2 diabetes which begins in adulthood. Diabetes is a serious disease because of its chronic complications: mortality and premature death in the elderly diabetic population as well as loss of autonomy and associated diseases such as high blood pressure, coronary heart disease, and cerebral ischemia. Controlling blood glucose is important in order to reduce morbidity and mortality, but more can be achieved by controlling vascular risk factors. In frail elderly subjects, life expectancy can be shorter than the time necessary to benefit from treatment. It is known that a subject must be treated for eight years for well-controlled blood glucose to have an effect on retinopathy or nephropathy [1] while it only takes two to three years for well-controlled blood pressure and blood lipids to produce a beneficial effect [2, 3]. Thus it is inappropriate to concentrate on blood glucose control without taking other measures to reduce vascular risk: cessation of smoking, maintained physical activity, use of aspirin, appropriate foot and eye care, treatment for hyperlipidemia and for high blood pressure. Like all elderly subjects, with or without diabetes, patients should also be given nutritional counseling to maintain stable body weight, and sufficient protein and calcium intake.

Stressful situations are frequent in the elderly population

Stressful situations (infection, surgery, ischemic event, etc.) are frequent in the elderly population and lead to secretion of cytokines (IL1, IL-6 and TNF-α) which induce an increase in blood glucose via secretion of counter-regulation glucose raising hormones (see Diabetes hyperosmolarity: a consequence of loss of autonomy in this issue [4]). This frequent situation is theoretically temporary, but the glucose level can become very high, reaching the state of insulin requirement. Many of these patients will recover their normal glucose level after recovering from their acute condition and will have no further need for glucose lowering treatment until a subsequent stress. Do these patients have diabetes? The ambiguity raises serious questions about the appropriate therapeutic decision. Nevertheless, controlling blood glucose during the acute episode does have a beneficial effect. It is known that intensive insulin therapy to normalize glucose levels reduces morbidity and mortality related to acute complications in intensive care patients (aged on average 63 years) [5]. No similar study is available in the geriatric population. A less aggressive, and thus less dangerous, treatment of the hyperglycaemia, is sufficient to favor wound healing or limit the discomfort resulting from polyuria, fatigue, or confusion.

Syndromes frequent in geriatric populations are more frequent in diabetic populations

Syndromes frequently encountered in geriatrics, such as depression, impaired cognition, urinary incontinence, falls, and chronic pain, are also more frequent in diabetic patients [6].
All of these elements would tend to favor treatment to improve patient comfort, but all of these conditions are not consequences of vascular complications.

**The therapeutic decision depends greatly on the elderly patient’s autonomy**

There are two ways to define autonomy:

*Functional autonomy:* What CAN the patient do? Can the patient correctly manage the treatment, or if not, can the family or caregivers? In order to avoid the risk of hypoglycaemia, the glycaemic goal will depend greatly on the answers to these questions (even if the principal of equal care for all is not respected).

*Decisional autonomy:* What does the patient WANT to do? Does the patient want to accept the constraints of treatment or not? Correctly implementing a treatment can sometimes have a negative effect on quality-of-life. An obstinate search for excellent glucose control to achieve an uncertain benefit could have a very negative effect on the patient’s willingness to pursue treatment.

Is there a consensus on glycaemic goals for elderly patients?

Guidelines published in different countries specifically focusing on elderly patients are not based on evidence collected from randomized trials, or even non-randomized trials, but rather result from the clinical experience of the experts who wrote them. Four sets of guidelines are currently available [7-10] (*Table I*) for physicians to set glycaemic goals for their patients. Each set of guidelines distinguishes two situations: the healthy elderly patient with one disease (diabetes) and the frail diabetic patient.

Two points are noteworthy:

– the French experts (ANAES) have not set specific glycaemic goals for the elderly population;
– there is a current trend for more strict recommendations.

**Conclusion**

For the elderly diabetic patient, the therapeutic decision depends on objective criteria based on the patient’s state of autonomy, co-morbid conditions, and prognosis. If the glycaemic goal is overall ambitious, there is a risk of hypoglycaemia which can be particularly deleterious in a frail patient. The challenge is to correctly evaluate the patient’s individual situation with appropriate scales validated for the geriatric population and then to conduct a treatment schedule designed to lower blood glucose level without deteriorating the patient’s quality-of-life.

**Table I**
Goals for glycaemic control in elderly diabetic patients according to four recommendations [from ref. 7-10].

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Healthy elderly diabetic patient</th>
<th>Frail elderly diabetic patient</th>
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<tbody>
<tr>
<td>France [7]</td>
<td>• Fasting glycaemia near 1.40 g/l (7.7 mmol/l)</td>
<td>• Fasting glycaemia near 2 g/l (11.0 mmol/l)</td>
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<tr>
<td></td>
<td>• HbA1c near 7.5% (assessment every 3 months)</td>
<td>• No recommendation for HbA1c</td>
</tr>
<tr>
<td>Canada [8]</td>
<td>• Fasting glycaemia &lt; 1.26 g/l (7.0 mmol/l)</td>
<td>• Fasting glycaemia &lt; 1.80 g/l (10.0 mmol/l)</td>
</tr>
<tr>
<td></td>
<td>• 2-hour glycaemia &lt; 2 g/l (11.0 mmol/l)</td>
<td>• 2-hour glycaemia &lt; 2.50g/l (14.0 mmol/l)</td>
</tr>
<tr>
<td></td>
<td>• HbA1c &lt; 15% above the upper limit of normal</td>
<td>• HbA1c &lt; 40% above the upper limit of normal</td>
</tr>
<tr>
<td>USA [9]</td>
<td>• HbA1c near 7% (assessment every 6 months; every year if stable values)</td>
<td>• HbA1c near 8% (assessment every 6 months; every year if stable values)</td>
</tr>
<tr>
<td>Europe</td>
<td>• Fasting glycaemia between 0.9 and 1.26 g/l</td>
<td>• Fasting glycaemia between 1.26 and 1.60 g/l</td>
</tr>
<tr>
<td></td>
<td>• HbA1c between 6.5 and 7.5% (assessment every 6 months)</td>
<td>• HbA1c between 7.5 and 8.5% (assessment every 6 months)</td>
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<tr>
<td>EUGMS* [10]</td>
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*: European Union Geriatrics Medicine Society.

**References**


