not show reduced glucose consumption when exposed to increased glucose concentrations for up to 6 days [1], in contrast to rat and bovine arterial smooth muscle cells exposed to high glucose concentrations for 24 h [7–8]. Accordingly, human arterial smooth muscle cells incubated in the presence of 15 mmol/l glucose reduce glucose concentrations to near normal (4.8 ± 0.97 mmol/l glucose) in 3 days (Fig. 1).

In conclusion, our observations show that normal human aortic smooth muscle cells in culture consume large amounts of glucose and, as a result, these cells rapidly deplete cell culture media of glucose. The results further indicate the advantage of monitoring cell glucose consumption in studies that aim to compare the effects of normal compared with high glucose concentrations on different processes in human arterial smooth muscle cells and other types of cells that could share similar characteristics.

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Corresponding author: K. E. Bornfeldt, Department of Pathology, Box 357470, University of Washington School of Medicine, Seattle, WA 98195-7470, USA, E-mail: bornf@u.washington.edu

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Observation(s)

Increased hospitalization with longer distance from treatment centre in diabetic paediatric patients in Germany

To the Editor: Several factors are believed to determine the effectiveness of diabetes treatment in young people, including the structure of diabetes care [1–4]. It is not clear whether a few large centres, offering highly specialized care but resulting in longer patient travel distances, or a higher number of smaller patient-near centres are more effective. An important indicator of quality of care is hospitalization because of its high individual as well as social cost [5]. We therefore investigated a possible effect of the distance between patients' residence and their treatment diabetes centre on hospitalization in paediatric diabetic patients in Germany.

Based on a prospective computer-based documentation programme, we ascertained hospital admissions and days in 1999 after diabetes onset for each patient under 20 years of age in 89 paediatric departments belonging to a Working Group on Quality Management in Childhood Diabetes [6], as well as sex, age, diabetes duration, metabolic control (HbA_{1c}: SDS-score < 3, 3 to < 5, ≥ 5), occurrence of severe hypoglycaemia (yes/no) and the distance between home and clinic (derived from areas' postal codes and corresponding centrally defined geographical coordinates (Gauss-Krüger): < 20, 20 to < 50, ≥ 50 km). Adjusted relative risks (RR's, 95 %-CI) were estimated using multivariate negative binomial regression models.

A total of 8493 patients (52 % male; mean age 12.3 ± 4.2; mean diabetes duration 4.7 ± 4.2 years; 7455 years of observation time in 1999) were included in the study. The estimated hospitalization incidence and the number of hospital days (per person-year, 95 %-CI) were 0.33 (0.31–0.34) and 2.21 (2.18–2.24), respectively. Hospitalization incidence was significantly higher in girls than in boys and in pubertal subjects aged 10–14 years with diabetes duration of more than 1 year compared with subjects with diabetes duration of less than 1 year. Hospital incidence and days were significantly higher in subjects with poor metabolic control or occurrence of hypoglycaemia (Table 1). Independently from these clinical variables, hospitalization was higher when the distance to be travelled by the patient was more than 50 km compared with under 20 km (Table 1). When the treatment centre was included in the model, an association between hospitalization and centre was found ($p < 0.001$). The association between distance and hospitalization was weaker (hospital incidence: RR 1.14, 0.97–1.34, $p = 0.099$; hospital days: RR 1.37, 1.03–1.82, $p = 0.028$). The magnitude of the association of the other variables did not substantially change (data not shown).

In conclusion, a long distance between a patients' place of residence and their treatment centre is associated with increased hospitalization in diabetic children and adolescents in Germany, in particular, with an increased number of hospital

Table 1. Predictors for hospitalization rates and days in diabetic subjects (multivariate negative binomial regression analysis)

	IRR[a] (CI)	*p* value	DRR (CI)[b]	*p* value
Age and diabetes duration (years)				
all ages, diabetes duration < 1 year	1.00		1.00	
age 0–9 years, diabetes duration > 1 year	0.96 (0.79–1.16)	0.641	0.75 (0.55–1.02)	0.063
age 10–14 years, diabetes duration > 1 year	1.24 (1.02–1.50)	0.028	0.85 (0.62–1.15)	0.283
age 15–19 years, diabetes duration > 1 year	0.82 (0.67–1.00)	0.045	0.78 (0.57–1.07)	0.118
Sex (female vs male)	1.14 (1.03–1.26)	0.015	1.16 (0.94–1.43)	0.162
HbA_{1c} (SDS)				
SDS < 3	1.00		1.00	
SDS 3 to < 5	1.07 (0.92–1.26)	0.387	1.22 (0.92–1.62)	0.173
SDS ≥ 5	1.79 (1.55–2.06)	< 0.001	2.19 (1.66–2.89)	< 0.001
Severe hypoglycaemia (yes vs no)	1.64 (1.45–1.85)	< 0.001	1.71 (1.37–2.14)	< 0.001
Distance between patients' residence and treatment centre (km)				
< 20 km	1.00		1.00	
20 to < 50 km	0.99 (0.88–1.13)	0.921	1.07 (0.80–1.43)	0.673
≥ 50 km	1.33 (1.13–1.56)	< 0.001	1.64 (1.21–2.21)	< 0.001

[a]Ratio of hospitalization incidence rates
[b]Ratio of expected numbers of hospital days per person-year

days. This association cannot be explained by age, sex, diabetes duration, metabolic control or and treatment centre. This clinic-based study cohort included more than one third of all German diabetic subjects under 20 years of age and can be assumed to be representative for population-based diabetic populations in Germany with regard to age, sex and clinical outcomes [7, 8]. The results of our study therefore support the concept of 'patient-near' care and indicate that the distance between patients' residence and treatment centre should be considered when planning structures of diabetes care.

A. Icks, J. Rosenbauer, R. W. Holl, M. Grabert, G. Giani on behalf of the German Working Group on Quality Control in Childhood Diabetes

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Corresponding author: Dr. Dr. Andrea Icks, Department of Biometrics and Epidemiology, German Diabetes Research Institute, University of Düsseldorf Auf'm Hennekamp 65, D-40225, Düsseldorf, Germany, E-mail: icks@dfi-uni-duesseldorf.de