

CGM: Clinical need and Physiology

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Conflicts of interest

None to report



Outline of presentation

- **Association between glucose levels and complications**
- The need to monitor glucose variability
- Feasibility of monitoring glucose levels



Micromethods for blood glucose determination

Bang: Wiesbaden, 1913

Hagedorn and Norman Jensen,
Copenhagen, 1918
(100μl, 30-60 min)





Glycaemic control vs late diabetic complications

M. Siperstein, JCI; 47:1973, 1968

R. Østerby, Acta Med Scand; 574:1, 1975

J. Pirart, Diabete Metab; 3:97, 1977

Steno I study, Lancet; i:121, 1982

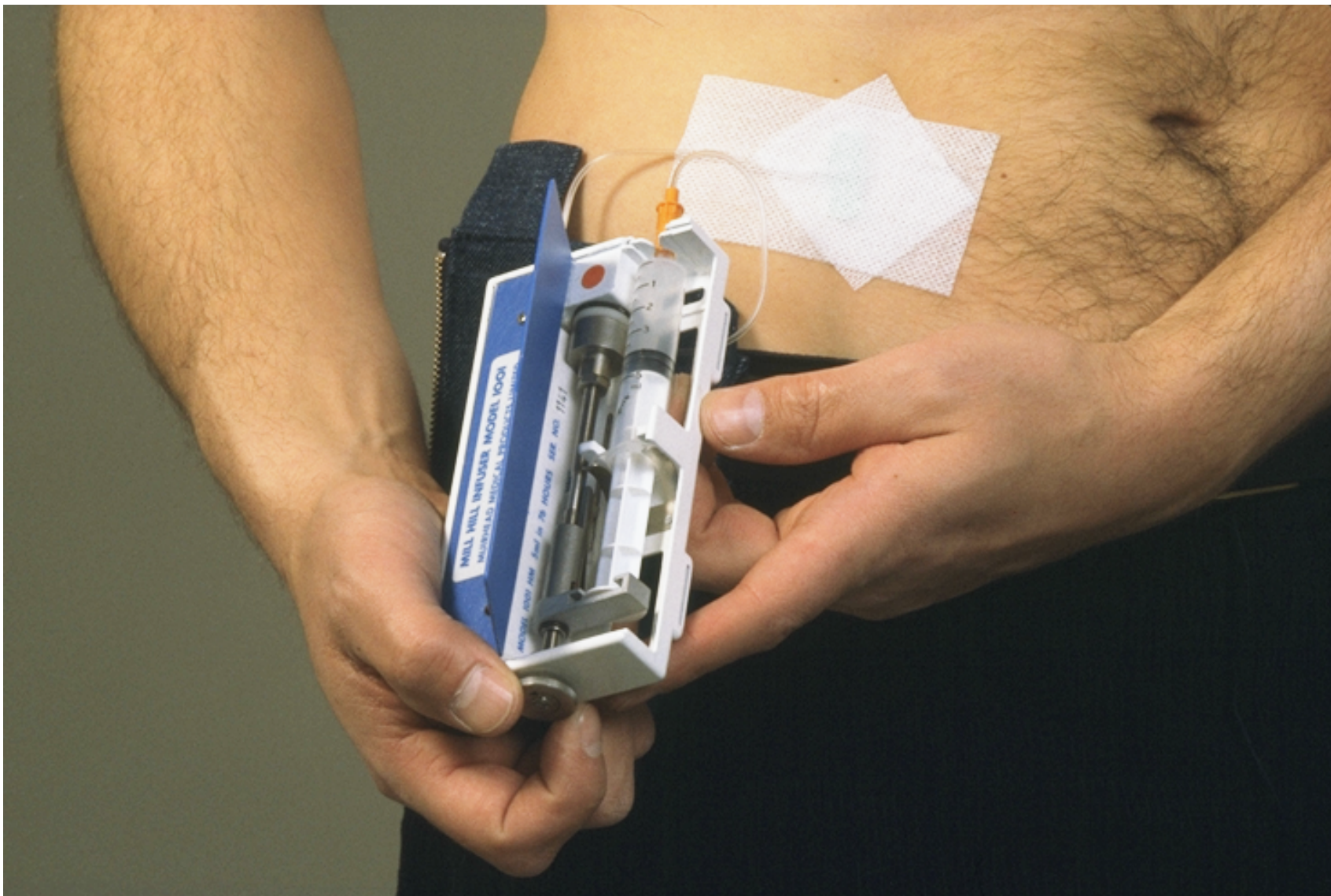
DCCT, N Engl J Med; 329:977, 1993

UKPDS, Lancet; 352:837, 1998

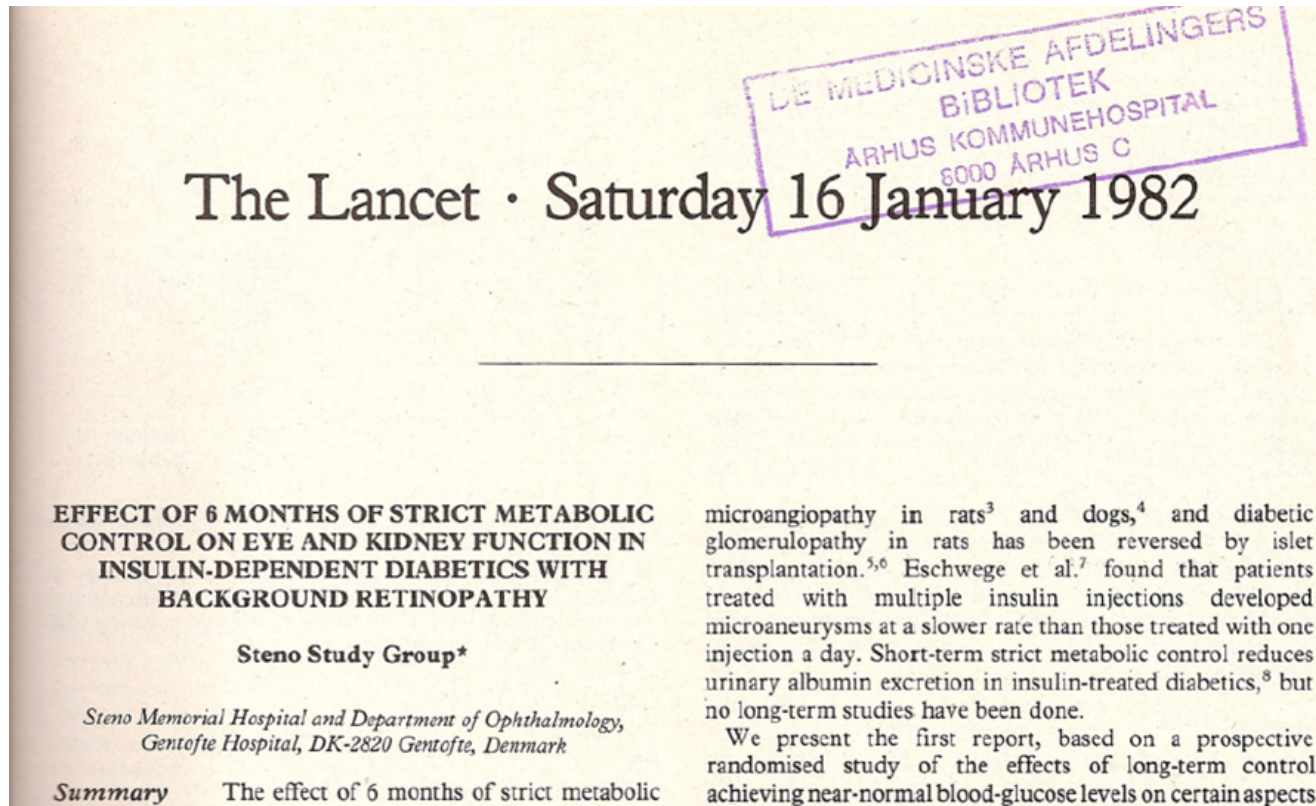








Steno I study, Lancet; i:121, 1982



DCCT, N Engl J Med; 329:977, 1993

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THE EFFECT OF INTENSIVE TREATMENT OF DIABETES ON THE DEVELOPMENT AND PROGRESSION OF LONG-TERM COMPLICATIONS IN INSULIN-DEPENDENT DIABETES MELLITUS

THE DIABETES CONTROL AND COMPLICATIONS TRIAL RESEARCH GROUP*

Abstract Background. Long-term microvascular and neurologic complications cause major morbidity and mortality in patients with insulin-dependent diabetes mellitus (IDDM). We examined whether intensive treatment with the goal of maintaining blood glucose concentrations close to the normal range could decrease the frequency and severity of these complications.

interval, 62 to 85 percent), as compared with conventional therapy. In the secondary-intervention cohort, intensive therapy slowed the progression of retinopathy by 54 percent (95 percent confidence interval, 39 to 66 percent) and reduced the development of proliferative or severe nonproliferative retinopathy by 47 percent (95 percent confidence interval, 14 to 67 percent). In the two cohorts



UKPDS, Lancet; 352:837, 1998

ARTICLES

Articles

Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33)

*UK Prospective Diabetes Study (UKPDS) Group**

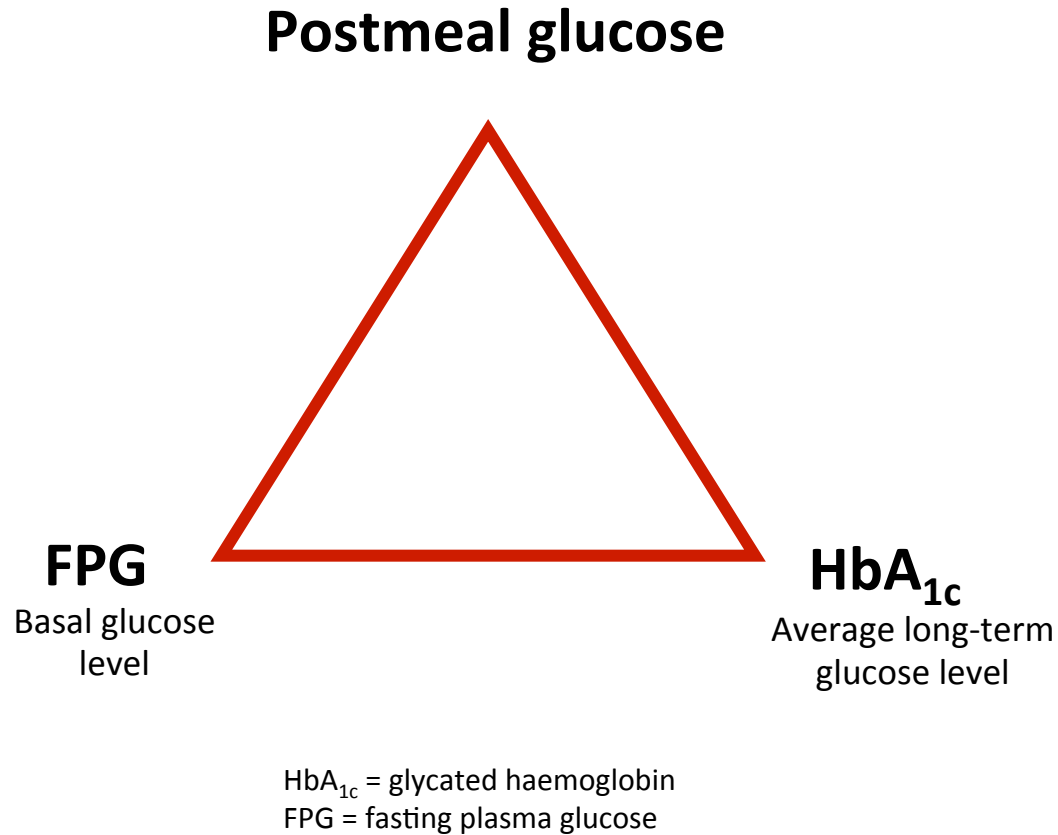
Summary

Background Improved blood-glucose control decreases the progression of diabetic microvascular disease, but the effect on macrovascular complications is unknown. There is concern that sulphonylureas may increase cardiovascular mortality in patients with type 2 diabetes and that high insulin concentrations may enhance atheroma formation. We compared the effects of intensive blood-glucose control with either sulphonylurea or insulin

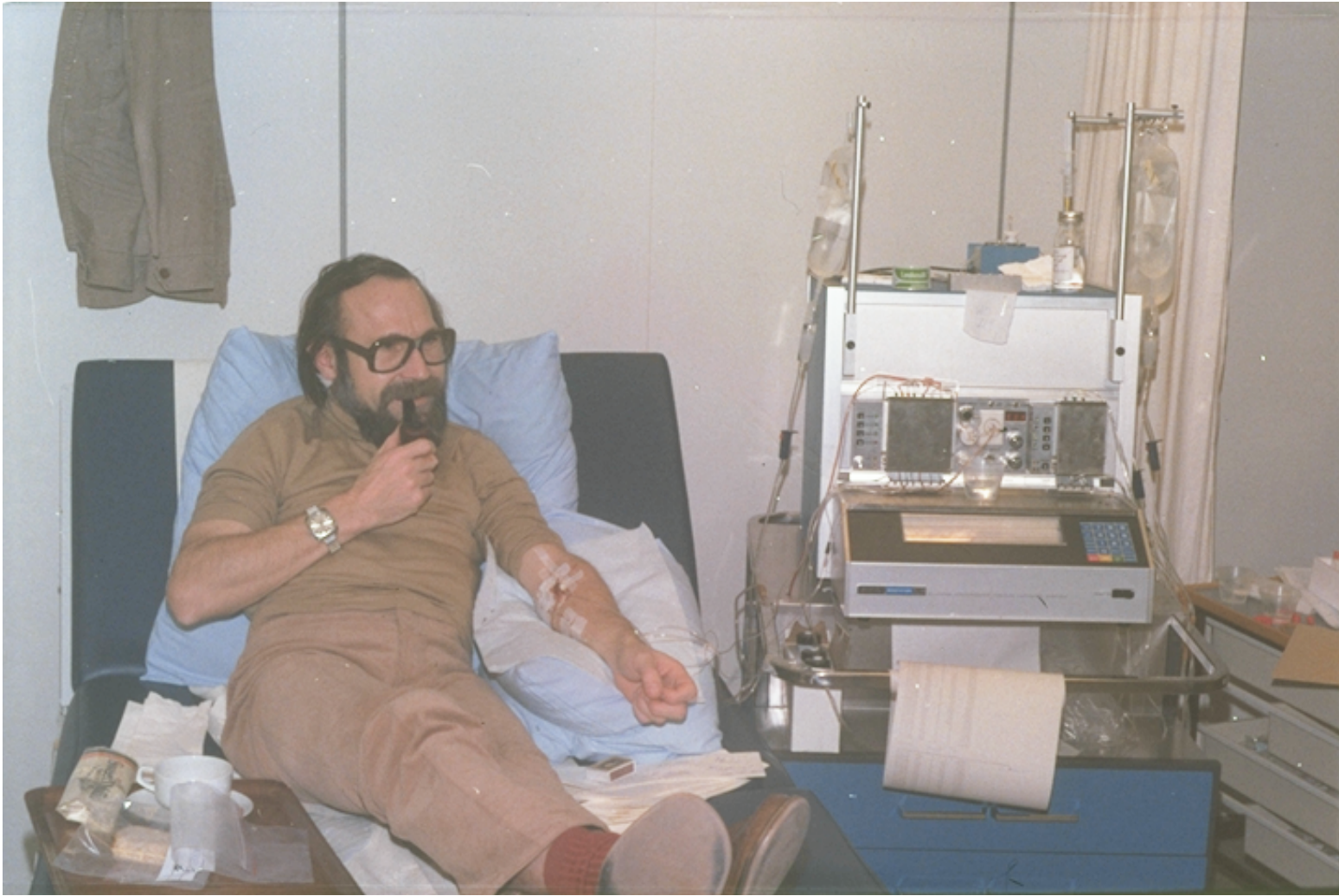
Findings Over 10 years, haemoglobin A_{1c} (HbA_{1c}) was 7.0% (6.2–8.2) in the intensive group compared with 7.9% (6.9–8.8) in the conventional group—an 11% reduction. There was no difference in HbA_{1c} among agents in the intensive group. Compared with the conventional group, the risk in the intensive group was 12% lower (95% CI 1–21, $p=0.029$) for any diabetes-related endpoint; 10% lower (–11 to 27, $p=0.34$) for any diabetes-related death; and 6% lower (–10 to 20, $p=0.44$) for all-cause mortality. Most of the risk reduction in the any diabetes-related



'Glucose triad' of diabetes management



... using an artificial beta-cell



Outline of presentation

- Association between glucose levels and complications
- **The need to monitor glucose variability**
- Feasibility of monitoring glucose levels



The clinical importance of CGM

- Postprandial glucose
- Hypoglycaemia(nocturnal)



Key questions assessed by IDF

- 1) Is postprandial hyperglycaemia harmful?
- 2) Is treatment of postprandial hyperglycaemia beneficial in improving clinical outcomes and glycaemic control?
- 3) Which therapies are effective in controlling postprandial plasma glucose?
- 4) What are the targets for postprandial glycaemic control and how should they be assessed?



Question 1:
Is postprandial hyperglycaemia harmful?

Is postprandial hyperglycaemia harmful?

IDF Recommendation:

Postprandial hyperglycaemia is harmful
and should be addressed

Question 2:
**Is treatment of postprandial
hyperglycaemia beneficial in improving
clinical outcomes and glycaemic control?**

Is treatment of postprandial hyperglycaemia beneficial?

IDF Recommendation:

Implement treatment strategies to lower postprandial plasma glucose in people with postprandial hyperglycaemia



The clinical importance of CGM

- Postprandial glucose
- Hypoglycaemia(nocturnal)



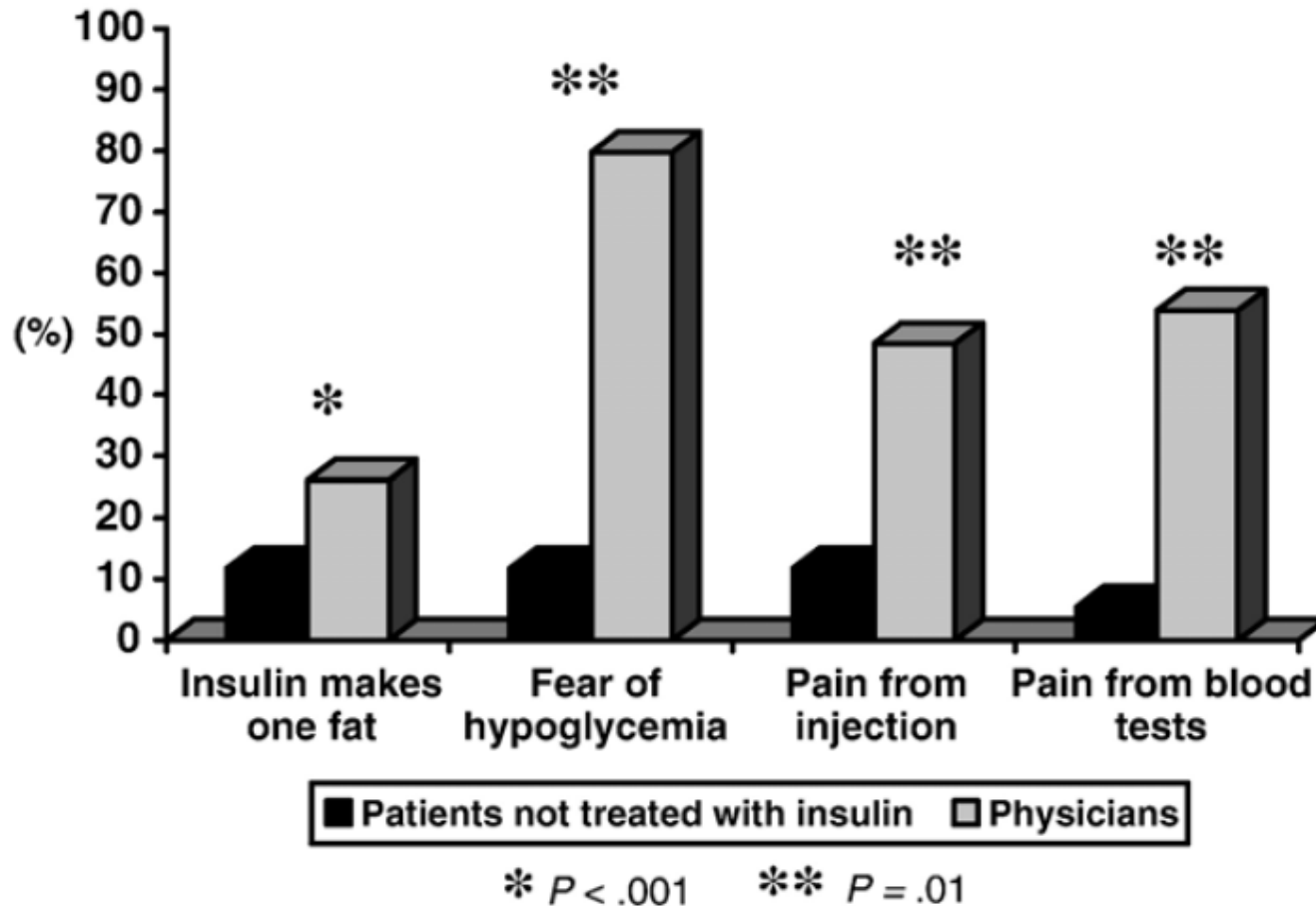
Management of glycaemia

The journey between Scylla and Charybdis





Barriers for insulin treatment



Journal of Diabetes and Its Complications 21 (2007) 220–226



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- Association between glucose levels and complications
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- **Feasibility of monitoring glucose levels**



What and where to monitor?



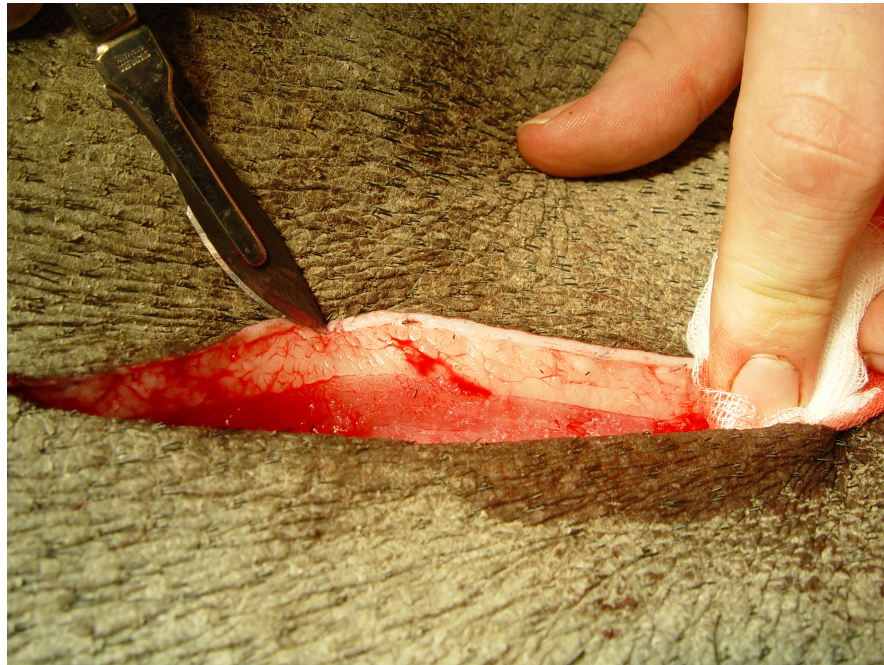
Vietnamese potbellied pig



Muscle



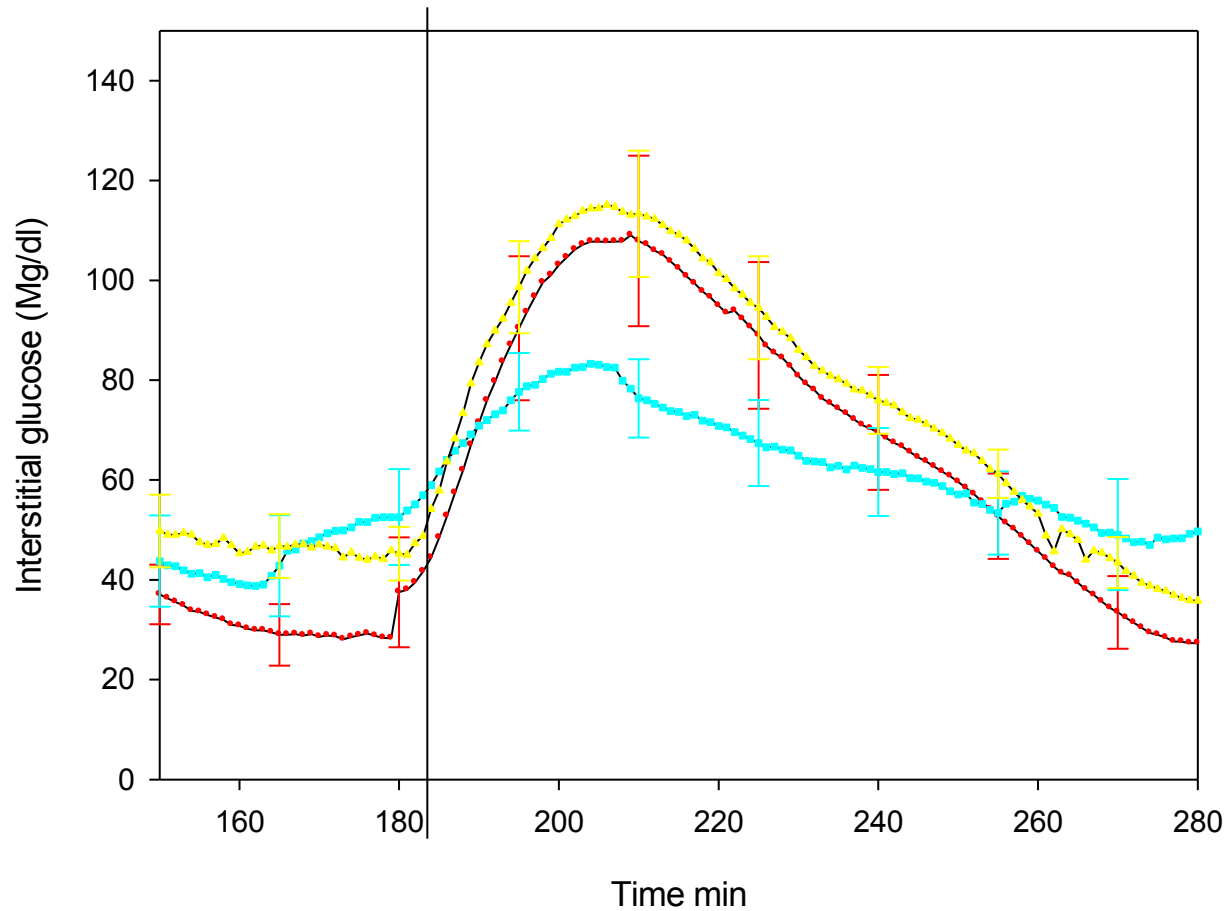
SCAT



CNS



In Vitro Calibration



CNS

SCAT

MUSCLE

*20 g iv glucose Challenge,
Diabetes, 54:1635, 2005*



SCAT is clinically appropriate in
continuous monitoring of glucose



Barriers to practical use of the CGM

- Financial
- Technological
- Organisational



Barriers to practical use of the CGM

Technological

- Robustness
- Reliability



Optimal vs. pragmatic solution

For the first manned space shuttle flight, the Americans developed an ink-pen that could not leak in a zero gravity environment.
The costs for this development were \$ 1 million.



That's how the Russians solved the problem:



Barriers to practical use of the CGM

Organisational

- The difference between RCT and everyday clinical reality



Barriers to practical use of the CGM

Organisational

- Instruction (time needed)
- Calibration (in-house, out patient)
- Maintenance



Barriers to practical use of the CGM

Financial

- Development is needed to provide low cost monitoring to 3. world





Beneficial effects upon
Morbidity and Mortality still
needs to be finally
demonstrated



American Sociological Review 2013 78: 26

Egalitarianism, Housework, and Sexual Frequency in Marriage

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<http://asr.sagepub.com>



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and Katrina Leupp^b

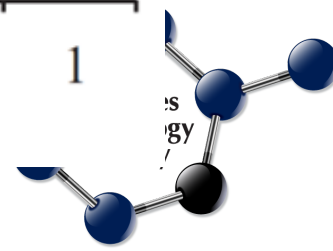
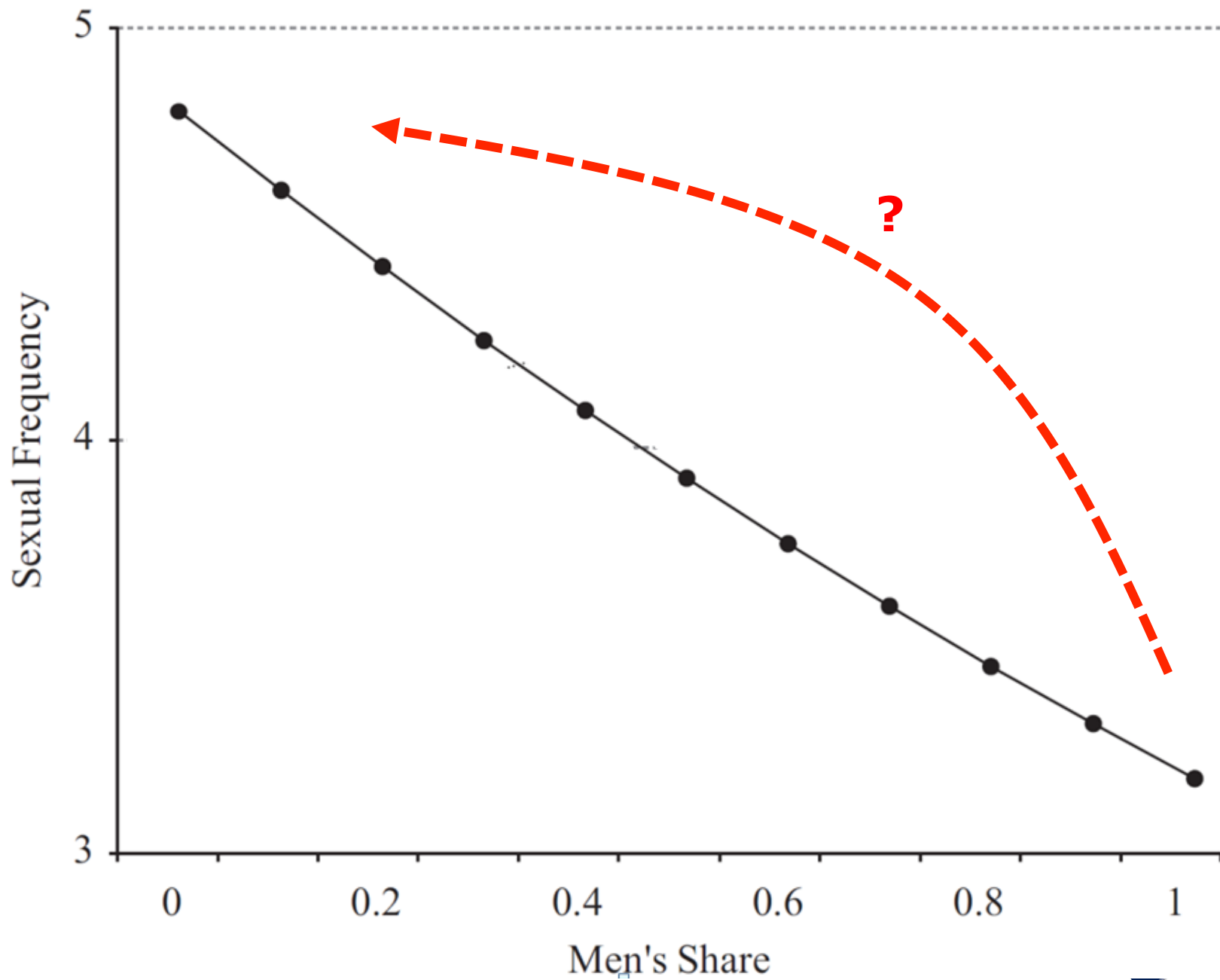
Abstract

Changes in the nature of marriage have spurred a debate about the consequences of shifts to more egalitarian relationships, and media interest in the debate has crystallized around claims that men who participate in housework get more sex. However, little systematic or representative research supports the claim that women, in essence, exchange sex for men's participation in housework. Although research and theory support the expectation that

This study investigates the links between men's participation in core (traditionally female) household tasks and sexual frequency.

JSC of gender display rather than marital exchange for sex between heterosexual married partners.







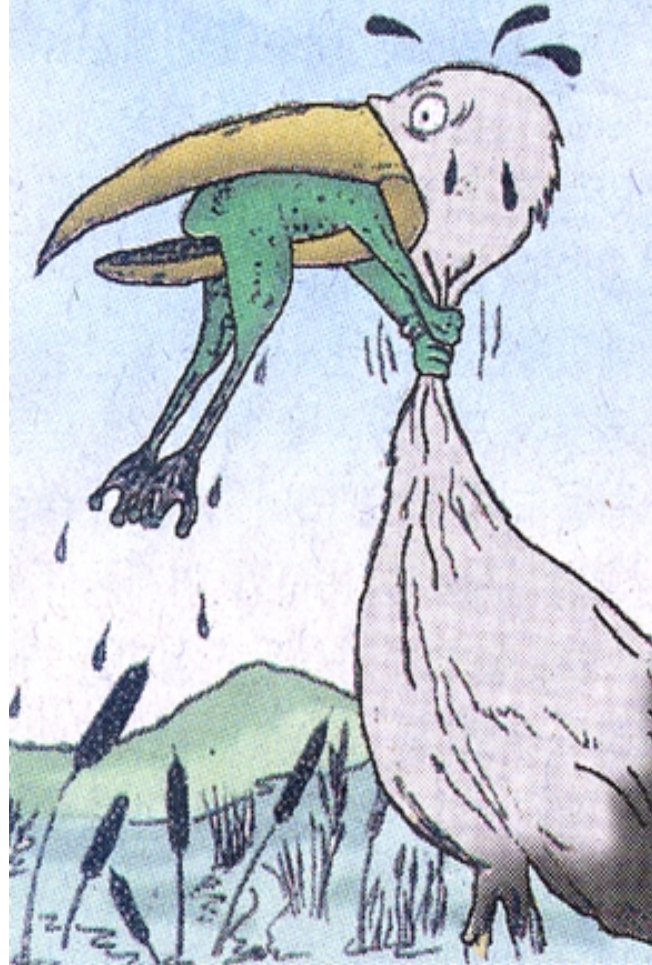


“It is my aspiration that **health** will finally be seen not as a blessing to be wished for, but as **a human right** to be fought for.”

Kofi Annan



Never ever give up



THANK YOU FOR YOUR ATTENTION !!