Anbefaling av prøverør til forsendelse ved glukosebelastning

Lutz Schwettmann

Gruppe for årets tema - diabetes

Noklus fagmøte 11. mars 2020

NOKLUS

Nasjonale og internasjonale retningslinjer

Recommendation 3

World Health Organization

The diagnosis of gestational diabetes mellitus at any time during pregnancy should be based on any one of the following values:

- **Fasting plasma glucose = 5.1-6.9 mmol/l (92 -125 mg/dl)**
- **1-h post 75g oral glucose load >=10.0 mmol/l (180 mg/dl)***
- **2-h post 75g oral glucose load 8.5 – 11.0 mmol/l (153-199 mg/dl)**

Definisjoner

Hyperglykemi i 1. trimester (ikke diabetes)	Diabetes i svangerskapet	Diabetes oppdaget i svangerskapet	Svangerskapsdiabetes
• **HbA1c 5,9-6,4% (41 - 46 mmol/mol) i første trimester** • **Henvis kvinnen til spesialisthelsetjenesten**	• Kjent pregestasjonell diabetes • Henvis kvinnen til spesialisthelsetjenesten	• HbA1c ≥ 6,5 % (48 mmol/mol) *eller* fastende plasmaglukose ≥ 7,0 mmol/l, *eller* 2-timers verdi etter glukosebelastning ≥ 11,1 mmol/l • Henvis kvinnen til spesialisthelsetjenesten	• Fastende plasmaglukose: ≥ 5,3-6,9 mmol/l, *eller* 2-timers verdi etter glukosebelastning: ≥ 9,0-11,0 mmol/l • Oppfølging av fastlege, jordmor eller annet helsepersonell med egnet kompetanse

Clinical Chemistry 57:6
e1–e47 (2011)

Special Report

Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus

David B. Sacks,[1*] Mark Arnold,[2] George L. Bakris,[3] David E. Bruns,[4] Andrea Rita Horvath,[5] M. Sue Kirkman,[6] Ake Lernmark,[7] Boyd E. Metzger,[8] and David M. Nathan[9]

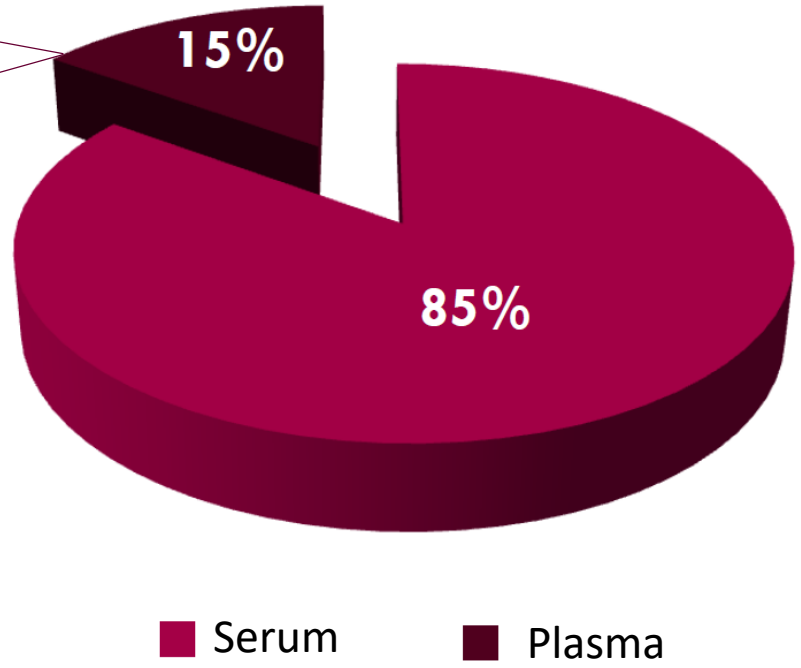
RECOMMENDATION: WHEN GLUCOSE IS USED TO ESTABLISH THE DIAGNOSIS OF DIABETES, IT SHOULD BE MEASURED IN VENOUS PLASMA
A (high).

Prøvemateriale til forsendelse ved oGTT

Li-Heparin

Fluorid-Citrat (FC)

N=800 legekontor

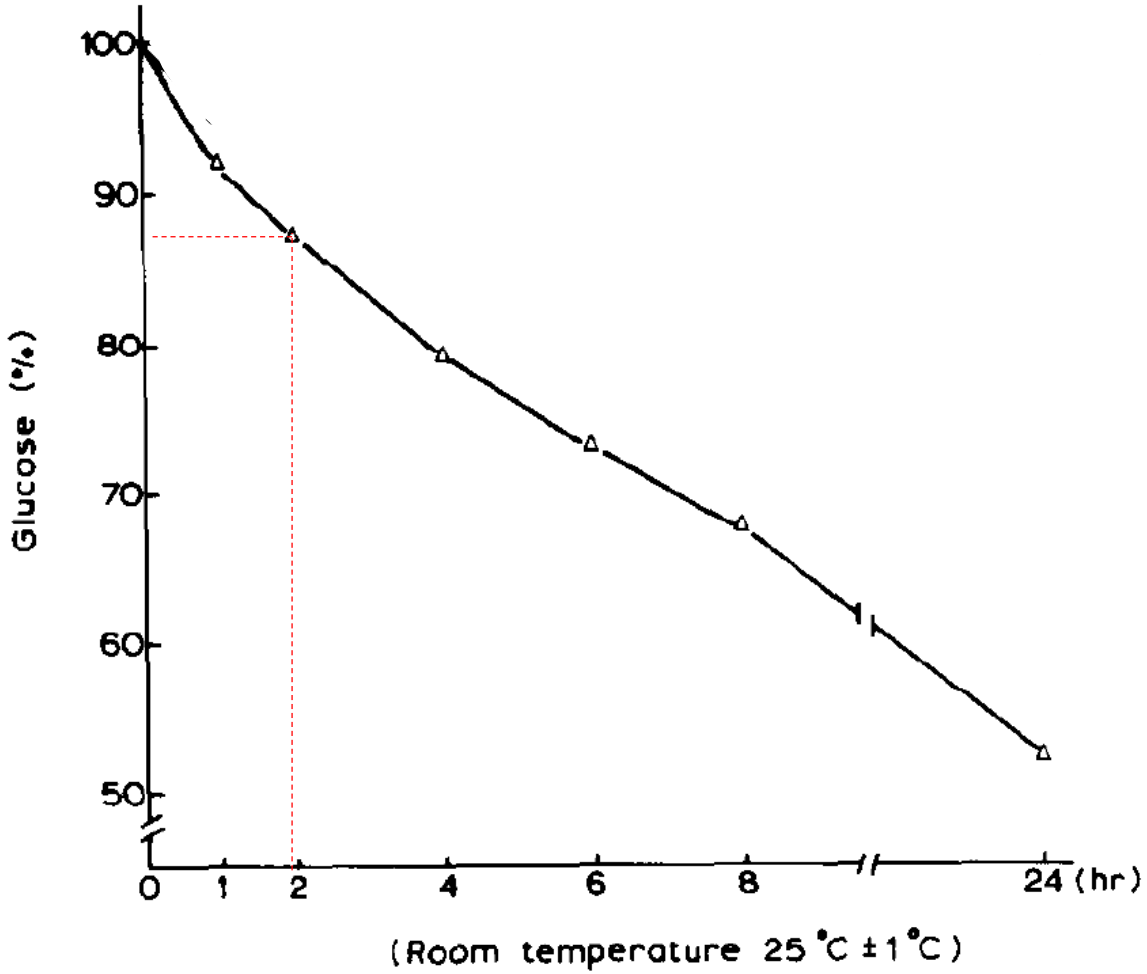


45% av legekontor sentrifugerer ofte eller alltid prøvene innen 2 timer sammen med øvrige rør

Endring i plasmaglukose over tid i fullblodprøve

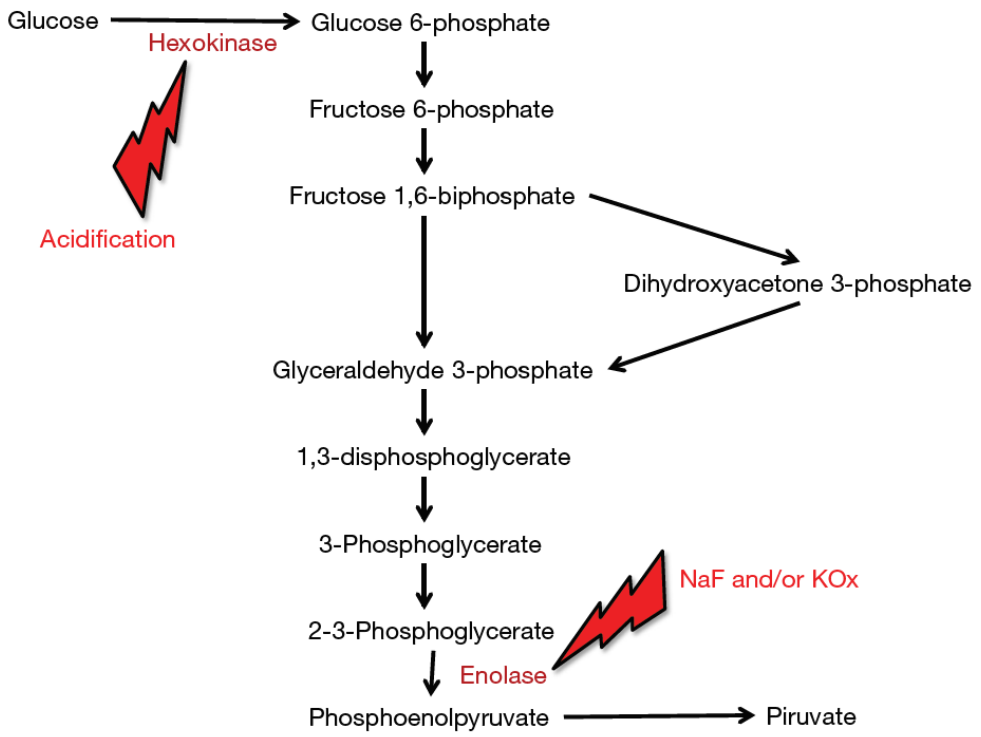
Glykolyserate:
5-7% per time
ca. 0,6 mmol/L per time

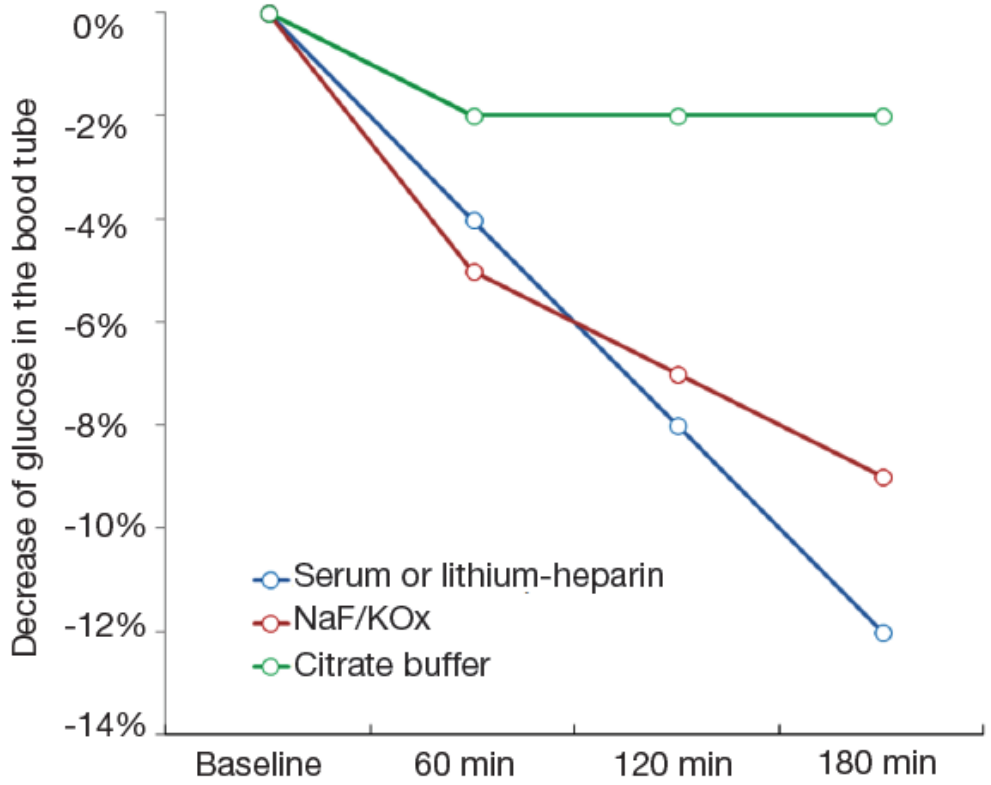
Avhengig av:
Glukosekonsentrasjon
Temperatur
Antall leukocytter
etc.



Modifisert fra Uchida et al. Clin Chim Acta. 1988;172:101-8

Virkemekanisme fluorid-citrat





Montagnana M et al. Ann Transl Med 2017;5(12):257

Anbefalinger i andre land

World Health Organization

Plasmarør settes på is

ADA og NACB

RECOMMENDATION: TO MINIMIZE GLYCOLYSIS, ONE SHOULD PLACE THE SAMPLE TUBE IMMEDIATELY IN AN ICE–WATER SLURRY, AND THE PLASMA SHOULD BE SEPARATED FROM THE CELLS WITHIN 30 MIN. IF THAT CANNOT BE ACHIEVED, A TUBE CONTAINING A RAPIDLY EFFECTIVE GLYCOLYSIS INHIBITOR, SUCH AS CITRATE BUFFER, SHOULD BE USED FOR COLLECTING THE SAMPLE. TUBES WITH ONLY ENOLASE INHIBITORS, SUCH AS SODIUM FLUORIDE, SHOULD NOT BE RELIED ON TO PREVENT GLYCOLYSIS
B (moderate).

EQUALIS Rekommendation 1 (2)

Expertgrupperna för allmän klinisk kemi och patientnära analyser

2016-04-20

Rekommendation för provtagningsrör med surt citrat vid glukosanalyser

Sammanfattning

För analys av glukos i venöst taget prov rekommenderar vi provtagning i rör med surt citrat (FC-blandning) som torrsubstans.

Finland: Fluorid-Citrat rør

Danmark: Fluorid-Citrat rør

Tyskland: Fluorid-Citrat rør

Holdbarhet av glukose i Fluorid-Citrat-rør

Your Power for Health

greiner bio-one

20 December 2017

Product handling: Updated Instruction For Use of FC Mix Tubes

Dear valued customer,

Based on further internal studies to evaluate the glucose stabilization of our FC Mix Tubes,

454510 | VACUETTE® FC Mix TUBE 2 ml, 13x75, pink cap-white ring
454511 | VACUETTE® FC Mix TUBE 2 ml, 13x75, grey cap-white ring
454513 | VACUETTE® FC Mix TUBE 3 ml, 13x75, pink cap-black ring
454514 | VACUETTE® FC Mix TUBE 3 ml, 13x75, grey cap-black ring

we would like to inform you of an updated handling instruction of our FC Mix Tubes. Our internal studies have reconfirmed that the mixing of the FC Mix Powder is critical for the long-term stabilization (up to 48 hours) of glucose in these tubes. Since we cannot guarantee that the inversion of the tubes (10x) is strictly followed by all of our customers and hence to ensure the integrity of the correct glucose stabilization in the samples, we have decided to revise our current Instruction For Use for the FC Mix tubes. This revision is also based on the fact, that the correct mixing of the FC Mix tubes is essential for the stabilization of glucose for 48 hours.

Revised handling protocol of FC Mix Tubes:

- FC Mix Tubes (Primary Tubes) can be stored after correct inversion for up to 24 hours at room temperature without centrifugation.

Holdbar i 48 timer ved RT <u>etter</u> sentrifugering

Holdbarhet av glukose i **Li-Heparinrør** med gel

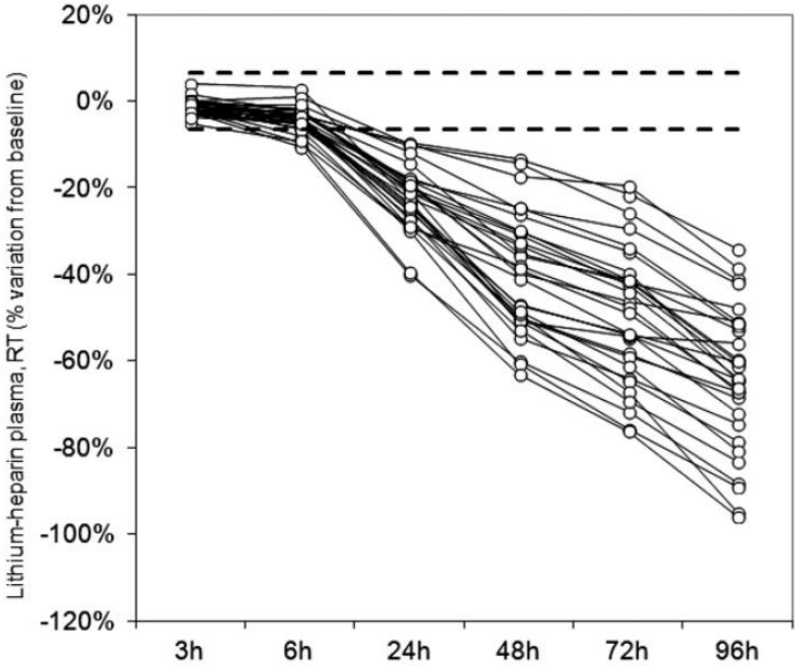


Table 2. Variation of glucose concentration (median and interquartile range) in centrifuged serum or lithium-heparin tubes ($n = 30$) stored for up to 96 h at room temperature (RT) or at 4 °C.

Sample matrix; temperature	T0	3 h	6 h	24 h	48 h	72 h	96 h
Serum (mmol/L); RT	5.9 (0.9)	5.9 (1.0)	5.9 (1.0)	5.8 (1.0)	5.8 (1.0)	5.8 (1.0)	5.7 (1.0)
		$p = .447$	$p = .387$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
– Median % bias (and IQR) vs. T0	–	0.0% (2.0%)	0.0% (1.8%)	−3.0% (2.1%)	−3.0% (3.9%)	−2.8% (2.3%)	−3.4% (2.6%)
Lithium-heparin plasma (mmol/L); RT	5.7 (1.0)	5.6 (0.9)	5.6 (0.9)	4.5 (0.8)	(1.2)	2.9 (1.3)	2.0 (1.4)
		$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
– Median % bias (and IQR) vs. T0	–	−1.3% (2.2%)	−4.1% (2.8%)	−21.9% (8.0%)	−39.3% (20.0%)	−48.3% (19.3%)	−64.1% (21.8%)
Serum (mmol/L); 4 °C	5.8 (0.5)	5.8 (0.6)	5.8 (0.7)	5.7 (0.6)	5.7 (0.7)	5.7 (0.6)	5.7 (0.7)
		$p = .368$	$p = .187$	$p < .001$	$p < .001$	$p < .001$	$p = .002$
– Median % bias (and IQR) vs. T0	–	−0.2% (0.1%)	0.0% (2.0%)	−1.6% (1.9%)	−1.4% (2.6%)	−1.6% (2.2%)	−1.5% (2.7%)
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		$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
– Median % bias (and IQR) vs. T0	–	−2.1% (2.6%)	−2.0% (2.1%)	−7.1% (3.2%)	−10.0% (4.8%)	−14.5% (5.2%)	−17.8% (6.8%)

IQR: interquartile range; T0: Baseline; RT: room temperature.

Balboni et al. SJCLI 2018;7-8:546-550

- Glukose har begrenset holdbarhet i Li-Heparinplasma tatt på gelrør
- Ellers ingen studier som har bekreftet holdbarhet i Li-Heparinplasma ved RT

Holdbarhet av glukose i **serum** med gel

Table 2: Median glucose concentrations (1st–3rd quartile) according to tube type, storage time and storage temperature.

Storage	Number of subjects	Number of measurements	Time, h	Glucose, mmol/L					p-Value
				BD FX	BD serum	Greiner	Terumo EU	Terumo JP	
4 °C	31	152[a]	0	4.60 (4.20–4.90)[e,f,g]	4.50 (4.30–5.10)[e,f,g]	4.80 (4.60–5.40)[c,d]	4.80 (4.60–5.40)[c,d]	4.90 (4.70–5.30)[c,d]	<0.001
		154[a]	24	4.40 (4.00–4.80)	4.60 (4.10–5.00)	4.70 (4.50–5.30)	4.90 (4.60–5.40)	4.80 (4.60–5.20)	<0.001
		153[a]	48	4.50 (4.10–4.90)	4.60 (4.00–5.00)	4.70 (4.50–5.60)	4.90 (4.50–5.40)	4.70 (4.40–5.10)	<0.001
		154[a]	72	4.30 (4.00–4.80)	4.50 (4.10–5.00)	4.90 (4.40–5.40)	5.00 (4.60–5.50)	4.80 (4.50–5.30)	<0.001
		154[b]	96	4.10 (3.50–4.40)	4.50 (4.10–5.00)	4.90 (4.60–5.50)	4.90 (4.70–5.30)	4.75 (4.50–5.20)	<0.001
Room temperature	30	150	0	4.85 (4.60–5.20)	4.80 (4.50–5.10)	5.30 (4.80–5.60)	5.25 (4.80–5.50)	5.20 (4.90–5.50)	<0.001
		150	24	4.60 (4.40–4.80)	4.70 (4.30–5.10)	5.10 (4.70–5.40)	5.10 (4.90–5.50)	4.90 (4.60–5.20)	<0.001
		149[a]	48	4.60 (4.30–4.90)	4.65 (4.50–5.10)	5.10 (4.70–5.40)	5.20 (4.70–5.40)	4.80 (4.30–5.00)	<0.001
		150	72	4.15 (3.70–4.60)	4.90 (4.60–5.20)	5.10 (4.70–5.50)	5.10 (4.50–5.30)	4.80 (4.50–5.40)	<0.001
		145[b]	96	3.40 (3.10–3.80)	4.80 (4.60–5.30)	5.20 (4.80–5.50)	4.90 (4.40–5.30)	4.75 (4.10–5.10)	<0.001

Winter T et al. CCLM 2018:56(8):1251-1258

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Lithium-heparin plasma (mmol/L); RT	5.7 (1.0)	5.6 (0.9)	5.6 (0.9)	4.5 (0.8)	(1.2)	2.9 (1.3)	2.0 (1.4)
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IQR: interquartile range; T0: Baseline; RT: room temperature.

Balboni et al. SJCLI 2018;7-8:546-550

Systematisk forskjell mellom serum og plasma

Systematisk forskjell ca. 0,2 mmol/L

Trombinrør

Systematisk forskjell mellom serum og plasma?

Sentrifugert etter 5 min

Table 2: Data for each analyte with non-normal distribution from the three different tubes by Wilcoxon Matched-Pairs Ranks test.

Analyte	Units	n	GBLiHep median (IR)	BD RST median (IR)	GBBCAFC median (IR)	% Difference (GBLiHep – BD RST)	p-Value (GBLiHep vs. BD RST)	% Difference (LiHep – GBBCAFC)	p-Value (GBLiHep vs. GBBCAFC)
Gluc	mmol/L	40	5.6 (1.3)	5.5 (1.4)	5.6 (1.5)	−0.8±2.3	**0.0271**	0.8±2.3	**0.0389**

Dimeski et al. 2017

Ingen publiserte studier for holdbarhet ved romtemperatur!

BD attesterer holdbarhet i 24 timer ved romtemperatur.

Forslag til anbefaling ved forsendelse

Trombinrør eller serum bør anbefales for glukosemålinger ved oGTT

- Riktighet
- Praktikabilitet
- Holdbarhet
- Kostnader

Endelig anbefaling forventes før sommeren