

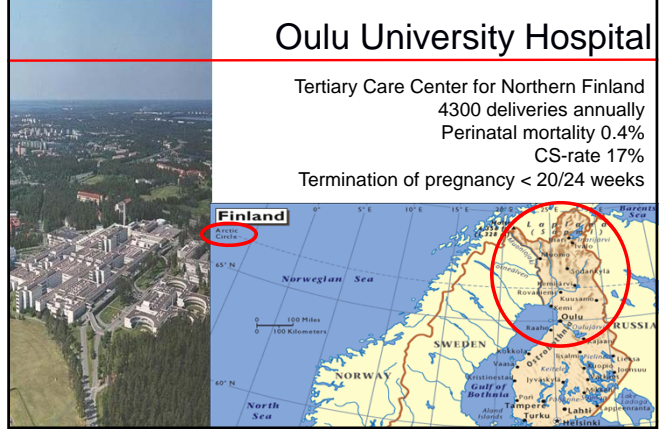
# Management of Intrauterine Growth Restriction



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# Oulu University Hospital

Tertiary Care Center for Northern Finland  
4300 deliveries annually  
Perinatal mortality 0.4%  
CS-rate 17%  
Termination of pregnancy < 20/24 weeks



# Intrauterine growth restriction, IUGR

Normal growth (n=24 585)  
No prenatal IUGR dx (n=573)  
Prenatal IUGR dx (n=681)

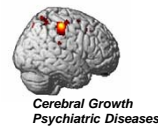
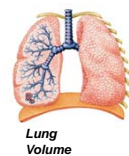
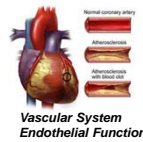
Adverse short term  
outcome  
OR (95% CI)

**16-fold** 4.1 (2.5-6.8)  
**2-fold**

Lindqvist PG et al 2005

# Intrauterine growth restriction

## Long term outcome



Godfrey KM, Barker DJ, Am J Nutr 2000

## Intrauterine Growth Restriction

Differential diagnosis  
Follow-up  
Delivery  
Future pregnancy



## IUGR suspicion

What next?

### Detailed anomaly scan

### Amniocentesis

Associated anomalies  
Early /Severe IUGR  
AFI / Doppler normal

### Viral screening (maternal / amniotic fluid)

Recommended (ACOG)



ACOG/RCOG Technical Bulletins 2000-2002

## IUGR

### Interventions

#### No improvement in neonatal outcome

Bed rest  
Nutrient treatment  
Calcium or Zinc supplementation  
Maternal oxygen therapy  
Betamimetics,  
Ca-channel blockers  
Hormonal therapy

#### May improve neonatal outcome

Smoking cessation ( increase in BW)  
Malaria treatment in endemic areas  
Energy/Protein intake (malnourished mothers)

ACOG/RCOG Technical Bulletins 2000, 2001

## Non-anomalous IUGR

### Follow-up

Biophysical profile (BPP)  
Cardiotocography (CTG)  
Amnion fluid index (AFI)  
Doppler ultrasound  
    Placental circulation  
    Fetal circulation



ACOG/RCOG Technical Bulletins 2000-2002

## IUGR

Follow-up: Cardiotocography

'Most common test despite any significant evidence'  
*Hui 2008*

A normal CTG has a good negative predictive value.  
*Pattison, Cochrane Review 2000*

Computerised CTG in IUGR with abnormal Dopplers (n=24)  
STV threshold 4.5 for predicting pH < 7.0  
Sensitivity 100%  
Specificity 70%  
Negative predictive value 100%  
Positive predictive value 33% *Hui 2008*

## IUGR

Follow-up: AFI and BPP

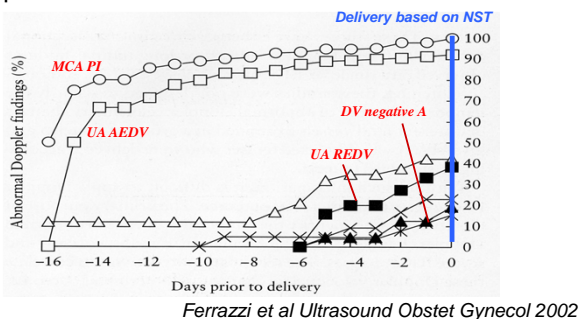
Meta-analysis: AFI < 5 cm associated with increased risk for  
Cesarean delivery for fetal distress. *Chauhan et al 1999*

Not enough evidence to evaluate the use of BPP as  
a test of fetal well-being in high risk pregnancies.  
*Alfirevic Z et al, Cochrane Review 2000*

Observational studies: Fetal death within 1 week of a normal BPP  
is extremely rare even in a high risk pregnancy.  
*Dayal AK et al 1999*

## IUGR

Doppler examinations



## Follow-up: Umbilical artery

Growth Restriction Intervention Trial

### Material

1993-2001  
13 European countries, 69 Hospitals  
548 Mothers with IUGR and UA recording at 24-36 weeks  
588 Fetuses

### Method

Randomized after UA, MCA, BPS, CTG for immediate  
(0.9 (0.4-1.3) days) or delayed (4.9 (2.0-11.0) days) delivery

### Outcome

Death  
Criffith's developmental quotient < 70

*GRIT-Study group, Lancet 2004*

## Follow-up: Umbilical artery

### Growth Restriction Intervention Trial

At 2 years age

	All gestations		24-30 weeks		31-36 weeks	
	Immediate (n=290)	Deferred (n=283)	Immediate (n=107)	Deferred (n=93)	Immediate (n=183)	Deferred (n=190)
Number of deaths (%)	34 (12%)	32 (11%)	25 (23%)	23 (25%)	9 (5%)	9 (5%)
Number with disability (%)	21 (7%)	12 (4%)	14 (13%)	5 (5%)	7 (4%)	7 (4%)
None of the above (%)	235 (81%)	239 (84%)	68 (64%)	65 (70%)	167 (91%)	174 (92%)
Giffiths DQ score for survivors (median [IQR])	100 (90-111)	100 (92-110)	97 (82-108)	99 (91-108)	102 (93-112)	101 (92-110)

GRIT-Study group, Lancet 2004

## Umbilical artery and IUGR

Prenatal detection (Barcelona 2002-2004, n=7 645)

Adverse short-term outcome  
OR (95% CI)

AGA

SGA + normal UA profile (n=299) 2.3 (1.0-4.4)

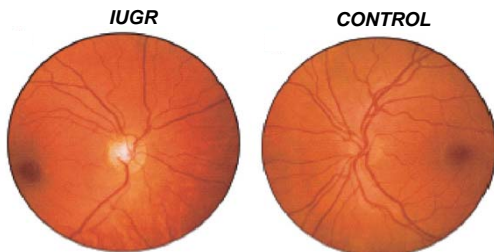
SGA + abnormal UA profile (n=70) 4.0 (1.0-11.0)

Figueras et al BJOG 2008

## Umbilical artery / Descending aorta

Long-term outcome in IUGR

Retinal artery branching points



Hellstrom A et al Pediatrics 2004

## Aortic isthmus

Neurodevelopmental outcome at 2-4 years

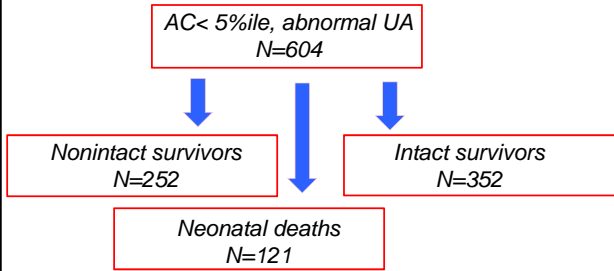
Delivery > h33+

Umbilical arteries	Aortic isthmus	Optimal	Nonoptimal
Decreased	Net antegrade	13	16
	Net retrograde	—	—
Absent	Net antegrade	6	2
	Net retrograde	—	2
Retrograde	Net antegrade	1	1
	Net retrograde	—	3
TOTAL	Net antegrade	20	19
	Net retrograde	—	5

Fouron et al Am J Obstet Gyn 2001

## IUGR and early neonatal outcome

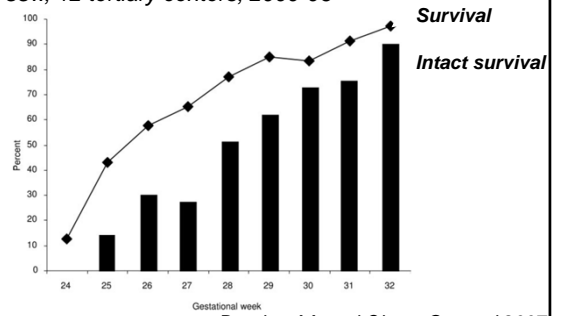
IUGR < 33w, 12 tertiary centers, 2000-06



Baschat AA et al Obstet Gynecol 2007

## Survival and intact survival in IUGR

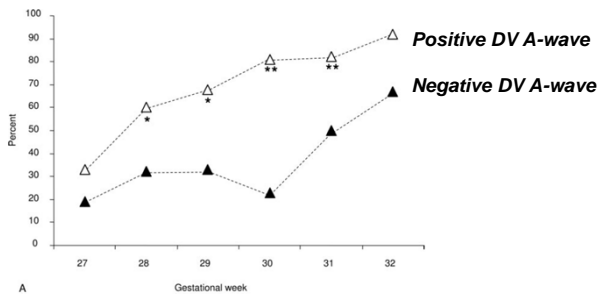
IUGR < 33w, 12 tertiary centers, 2000-06



Baschat AA et al Obstet Gynecol 2007

## Ductus venosus and neonatal survival

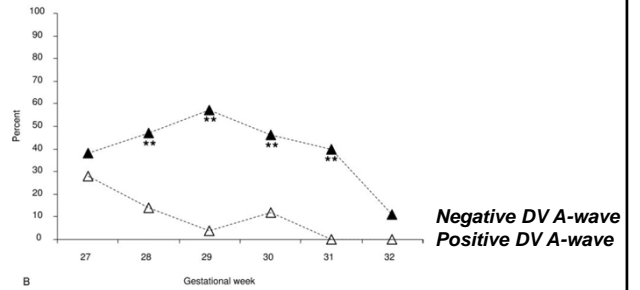
IUGR < 33w, 12 tertiary centers, 2000-06



Baschat AA et al Obstet Gynecol 2007

## Ductus venosus and neonatal morbidity

IUGR < 33w, 12 tertiary centers, 2000-06



Baschat AA et al Obstet Gynecol 2007

## Predictors of early neonatal outcome

IUGR < 33w, 12 tertiary centers, 2000-06

### Discussion

H26+0 survival exceeds 50%

Neonatal survival improves 2% daily up to H27+0.

→ Gain gestational age until H27+0 or 600 g

Abnormal DV related to adverse neonatal outcome > H27+0

→ Delivery trigger > H27+0

→ STV F/U for extension of pregnancy < H27+0

Baschat AA et al *Obstet Gynecol* 2007

## IUGR – Delivery

Steroid administration (up to 36 weeks)?

Adverse effects in animal studies (Miller SL 2007)

No benefit in human IUGR (Torrance HL, 2009)

Individualized timing of delivery

Gestational age, Antenatal testing

Delivery

Continuous CTG

Optimal neonatal expertise

in the delivery unit

ACOG/RCOG Technical Bulletins 2000, 2001



## Maternal postnatal testing in IUGR

Maternal	OR ( 95% CI)
MTHFR C677T	1.55 (0.83 -2.90)
Factor V Leiden	1.18 (0.54 -2.55)
Prothrombin	0.92 (0.36-2.35).

No associations between maternal thrombophilia polymorphisms and an increased risk of IUGR.

Infante-Rivard C et al *NEJM* 2002  
FACCO et al *AJOG* 2009 (Meta-analysis)

## Future pregnancy after IUGR

2000-2006, N= 116, Canada

Inclusion: < 16 weeks, previous severe preeclampsia, IUGR, IU death, no thrombophilia

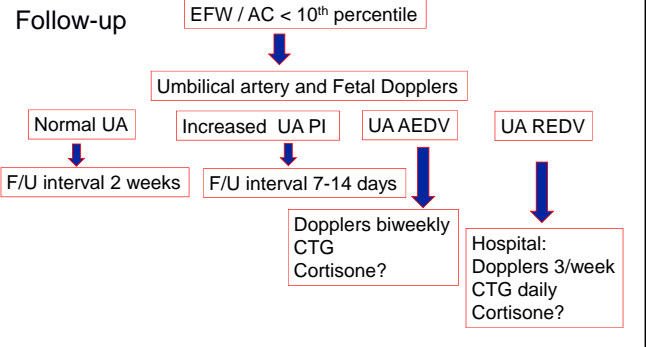
	Dalteparin 4000-6000 IU daily (N=55)	No dalteparin (55)
Severe preeclampsia	5.5 (3/55)	23.5 (13/55)
IUGR		
IU death		
Placental abruption		

**OR (95% CI) 0.15 (0.03-0.70)**

**No significant side effects**

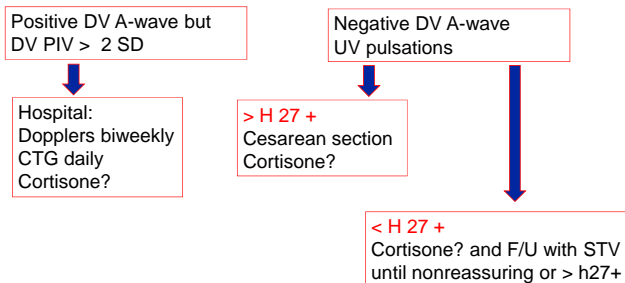
Rey E et al 2008

## My opinion



## My opinion

Follow-up



## My opinion

Follow-up

