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EP15.11 :
MULTIMODAL FETOPLACENTAL MRI ESTIMATION
OF GESTATIONAL AGE COMBINING RADIOMICS
AND VOLUMIC FEATURES



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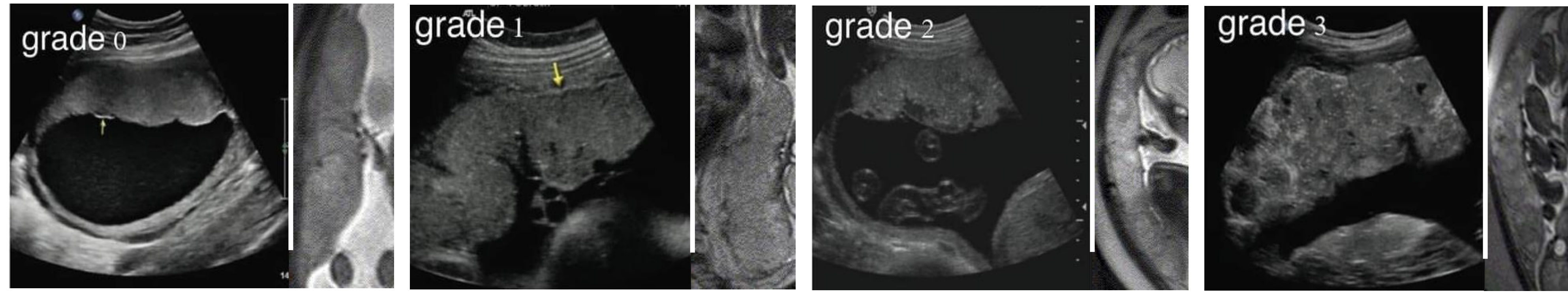
1st trimester
• Menstrual history → 11 - 42% inaccurate

• Crown Rump Length (CRL)
→ ± 2 - 7 days

2nd and 3rd trimesters

Fetal **biometries** combination
→ ± 12 - 14 days (2nd)
and > 14 days (3rd)

Assumption that **fetal growth** is **normal** regardless of GA
Underestimating the GA of **small-for-GA** fetuses
Overestimating the GA of **large-for-GA** fetuses



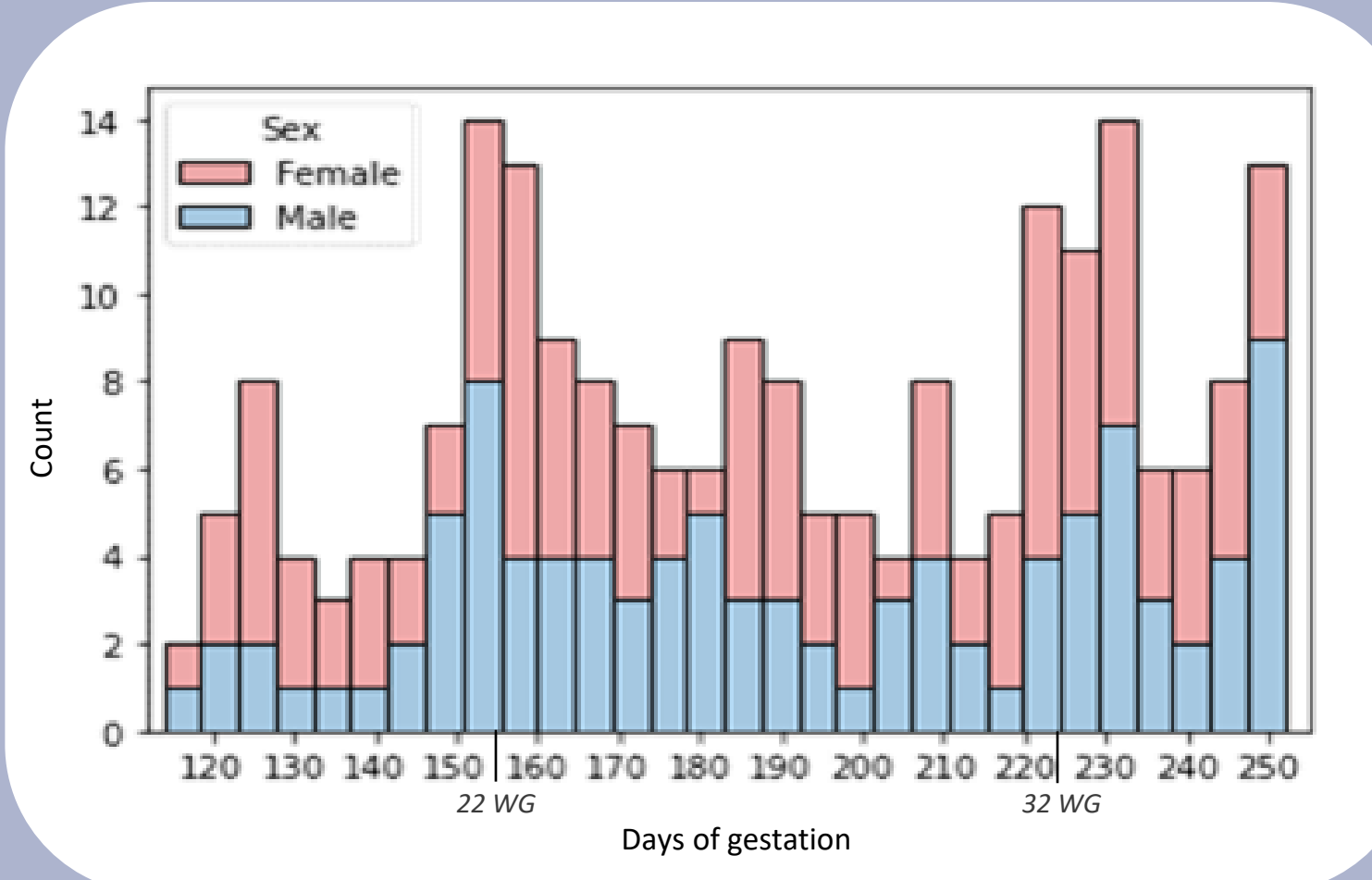
Grannum grades with ultrasound (left) and MRI (right)

→ Considering qualitative parameters to evaluate placental maturation, such as its texture ?

I. Cohort
LUMIERE Plateform
Necker Hospital, Paris, France
Hospital Clinical Research Program
« Lumière sur le fœtus » protocol

16 - 36 WG
Ø pathological conditions → 218 women
or fetal anomalies

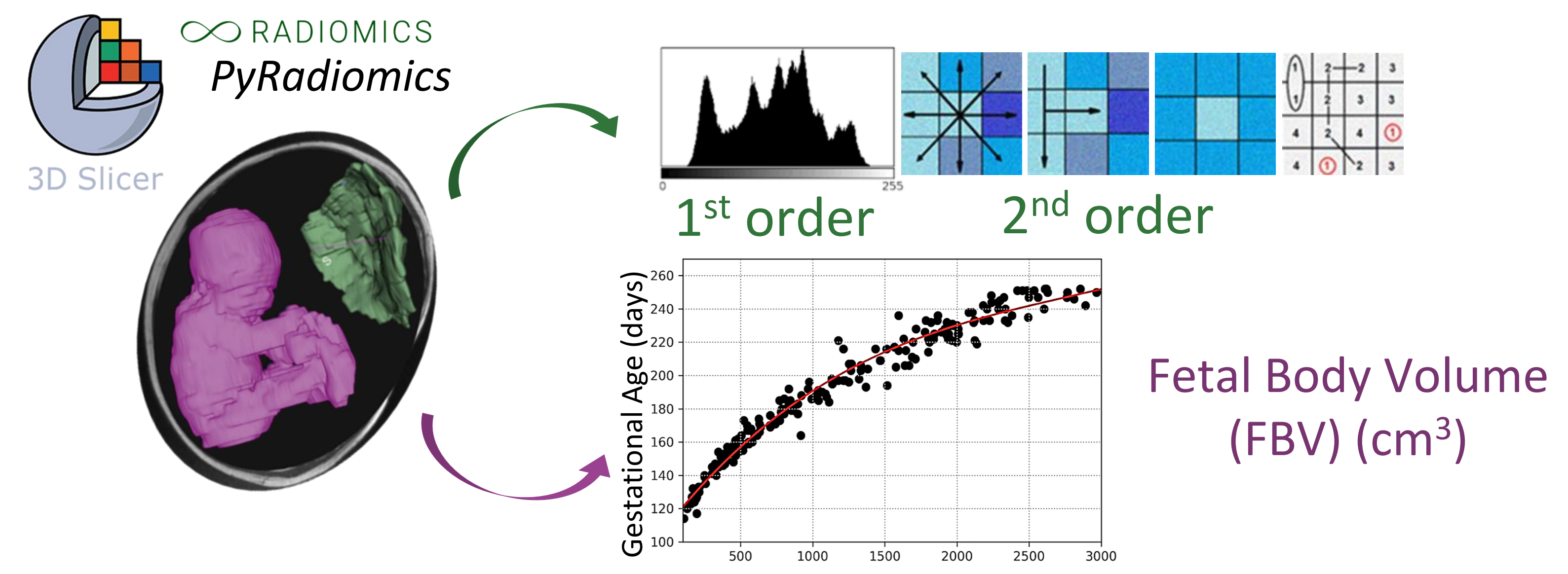
118 girls ; 100 boys
Median GA at MRI : 187,5 (114 ; 252) days (26+5 WG)
Median GA at birth : 39.42 [35 – 42] WG
Weight at birth : 3230 [1600 – 4580] g (22 missing, 10%)



II. Acquisitions

1.5 T whole-body unit
T2-WI FIESTA
(= Balanced steady state Gradient Echo)
slice thickness = 4 mm

III. Fetal Body Volume & Placental Texture Analysis



IV. Treatment



V. GA (days) predictions errors

	FBV only Random Forest	FBV + placental texture features Random Forest	FBV + placental texture features Voting	FBV + placental texture features Stacking
Mean	-0,05	0,18	-0,34	-0,10
STD	6,93	7,07	6,65	7,08
Min	-19,19	-16,71	-14,03	-15,84
Max	14,76	14,51	13,18	14,22
MAE	5,51	5,77	5,53	5,79
r ²	0,97	0,96	0,97	0,96

FBV : Fetal Body Volume

Limitations
Absence of LGA, SGA (or even FGR).
Relatively small cohort compared with cohorts obtained with ultrasound.

CONCLUSION
New method improving GA estimation accuracy (± 5,53 days),
at any term using **placental texture** and **FBV**

Perspectives
Study differences between normal and pathologies.
Correlate image modalities (ultrasound and MRI) with histopathology.