

ACTIVITE PHYSIQUE ET GROSSESSE: Pourquoi les femmes enceintes doivent bouger

**Katarina Melzer, PhD
Prof. Bengt Kayser, MD, PhD**



Mai 2010

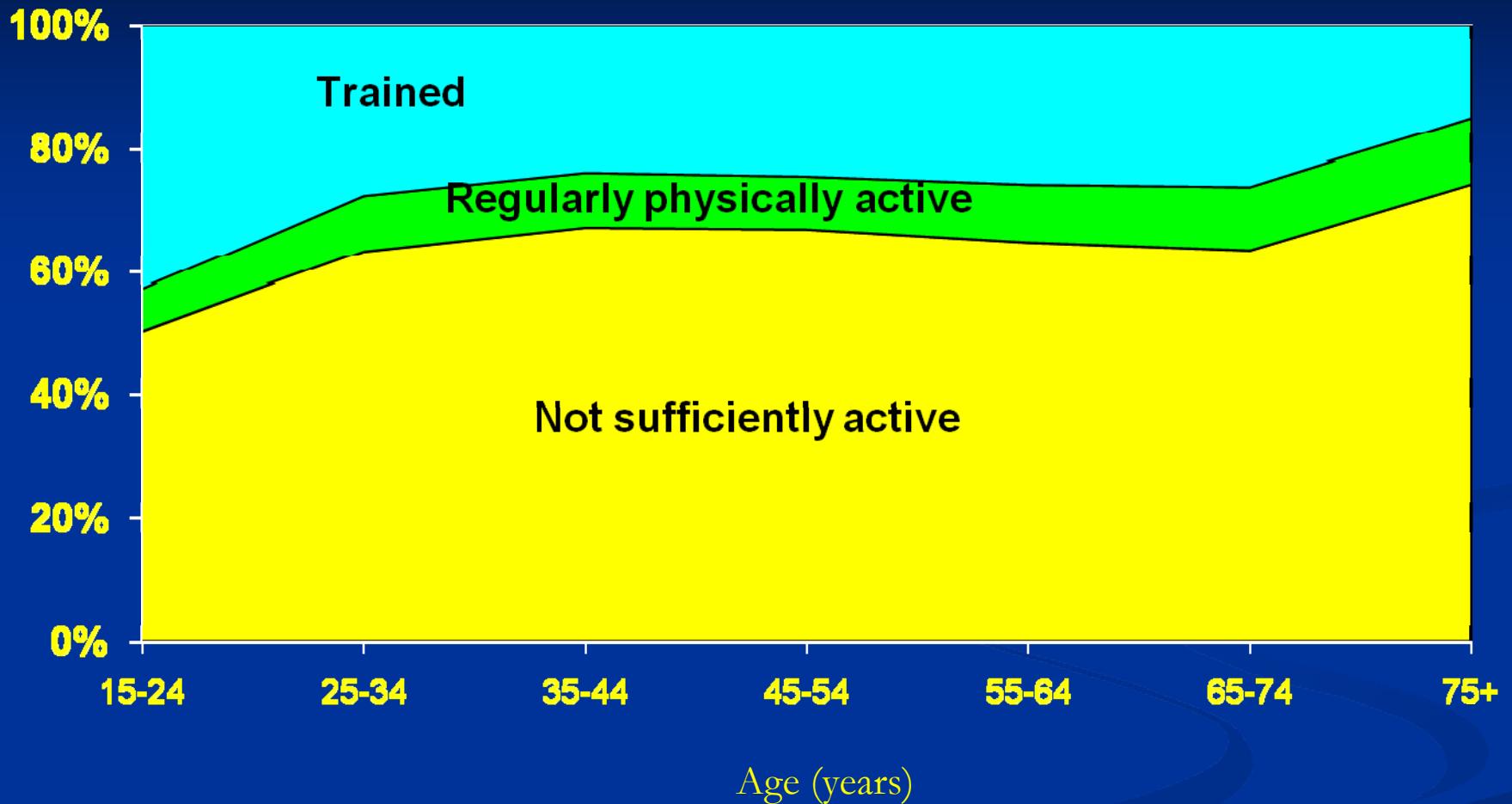
Fitness and health

- 1 MET ~ resting metabolism
- Maximum aerobic scope:
 - 15⁺ METs
 - <4 MET inactive and detrained
- For every 1 MET increase ~13% reduction in risk for all cause mortality

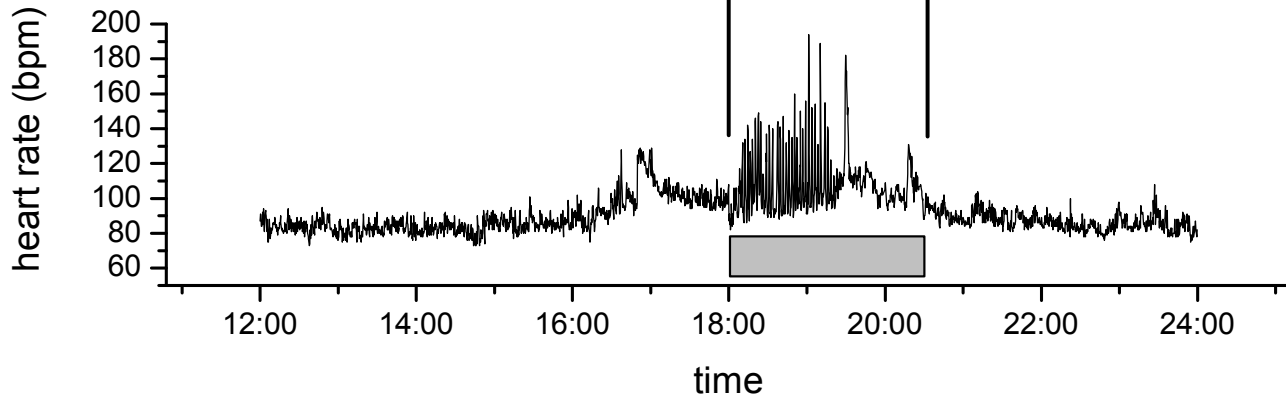
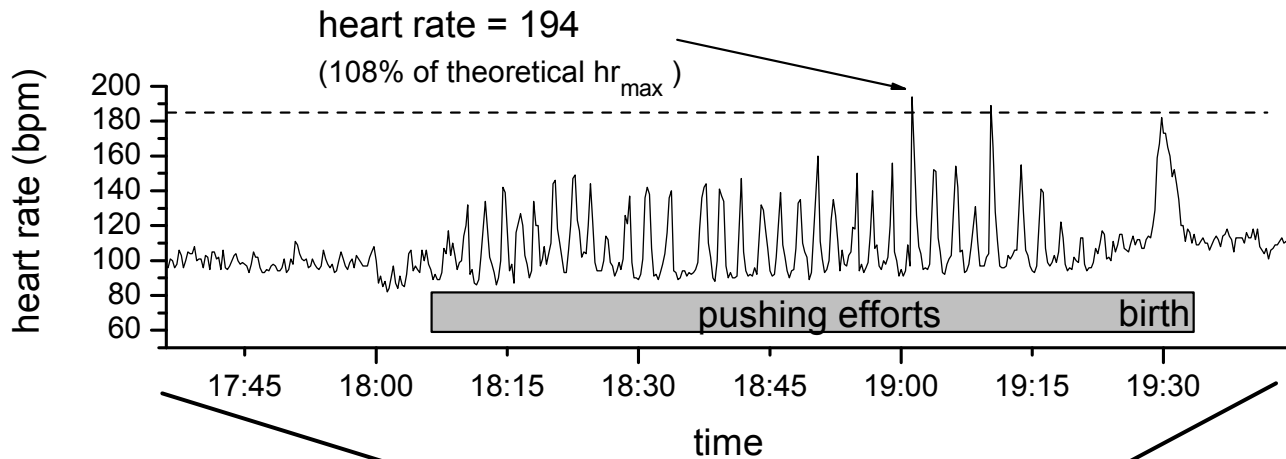


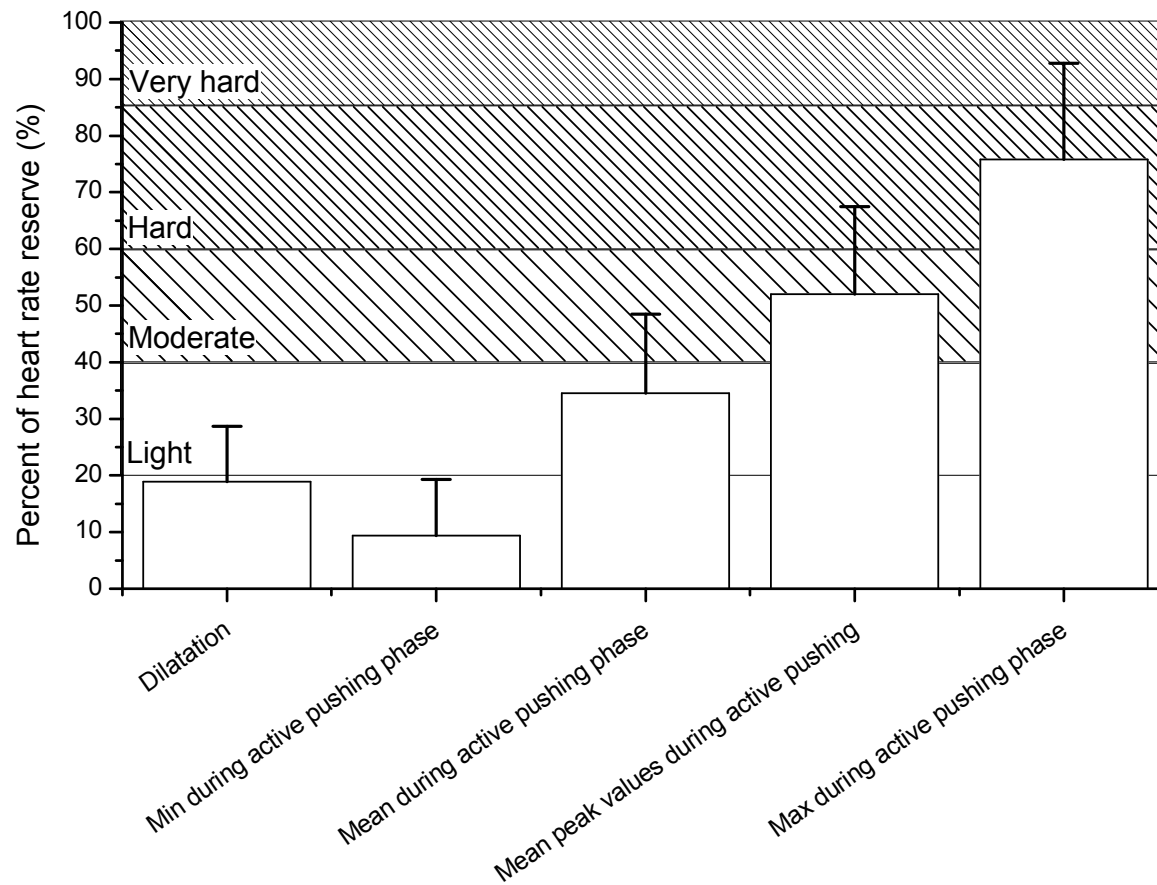


Physical activity levels in Switzerland



Giving birth to a child: hard work ...





Study I.

Effects of Recommended Levels of Physical Activity on Pregnancy Outcomes

Recommendation for physical activity (PA) during pregnancy:

- 1950:** no sports but continuous housework and 1 mile walk per day preferably divided into several short sessions.
- 1985:** ACOG* position: 15 min of exercise, heart rate <140 bmp
- 1994:** ACOG* revised position: 30 min or more of moderate exercise per day on most, if not all days of the week.

ACOG = The American College of Obstetricians and Gynecologists

Hypothesis

30 min or more of moderate PA (MPA) per day:

- has no negative effect on pregnant women and infants
- has positive effect on cardiovascular fitness and delivery outcome

Methods

Anthropometry

(Seca, Germany)

Step test



5 day PA

(Actiheart, Cambridge Neurotechnology Ltd, UK)



Calorimetry

(Deltatrac II, Finland)



Records

- Total weight gain
- Birthweight
- Labor duration
- APGAR scores
- **Episiotomy / perineal tear**
- Meconium
- Medication
- Delivery mode
- Postpartum hemorrhage

38.2 ± 1.5 weeks → + 5 days → Delivery

N=71

N=18 delivered; N=9 recording problem/records

N=44

Results

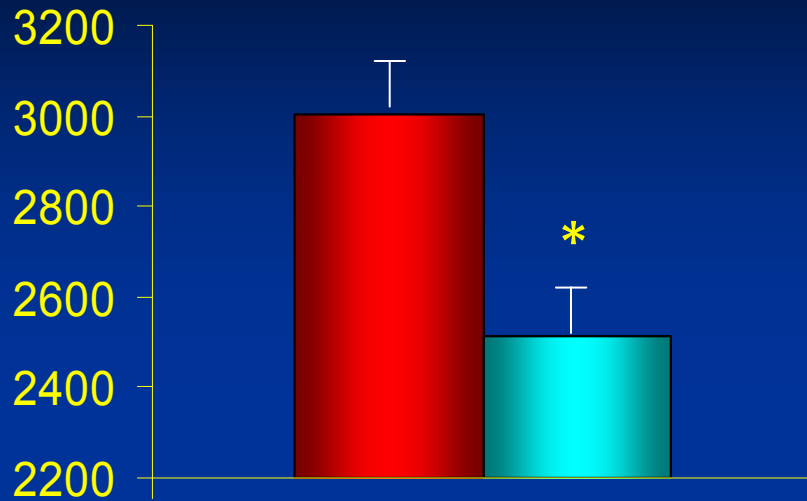
Table 1. General characteristics of the subjects

	Active women (n= 27)	Non-active women (n= 17)
	≥ 30 min MPA (METs=3-6)	< 30 min MPA (METs=3-6)
<i>General characteristics</i>		
Age (years)	31.5 ± 5.4	30.5 ± 5.8
Primiparous women (n (%))	19 (70.4%)	10 (58.8%)
Height (cm)	167.8 ± 6.4*	163.2 ± 5.2*
Prepregnancy weight (kg)	64.3 ± 13.1	60.8 ± 9.9
Prepregnancy BMI (kg/m²)	22.8 ± 4.2	22.8 ± 3.5
Weight (kg)	79.3 ± 13.4	75.1 ± 11.4
Duration of pregnancy (weeks)	40.6 ± 1.1	40.9 ± 1.0
Body weight gain (kg)	15.9 ± 3.8	15.1 ± 4.3

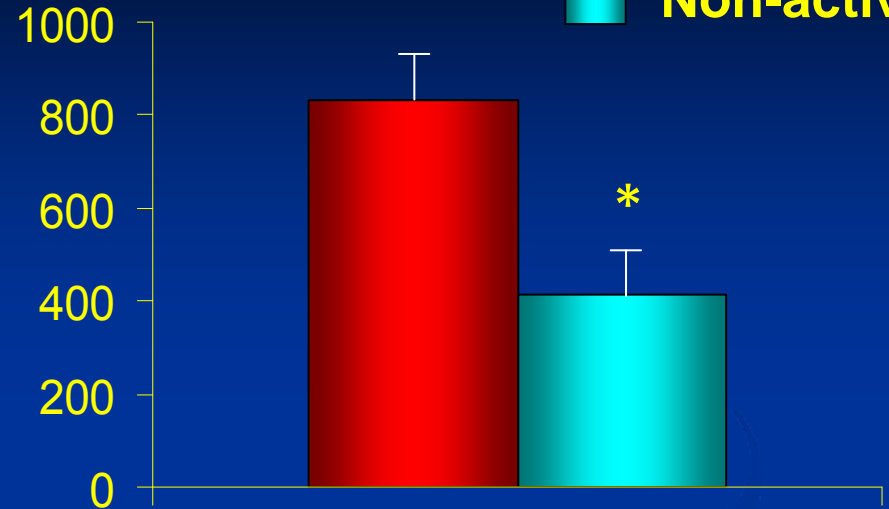
*p<0.05 between active and non-active women; MPA =moderate physical activity

Metabolic characteristics of the subjects

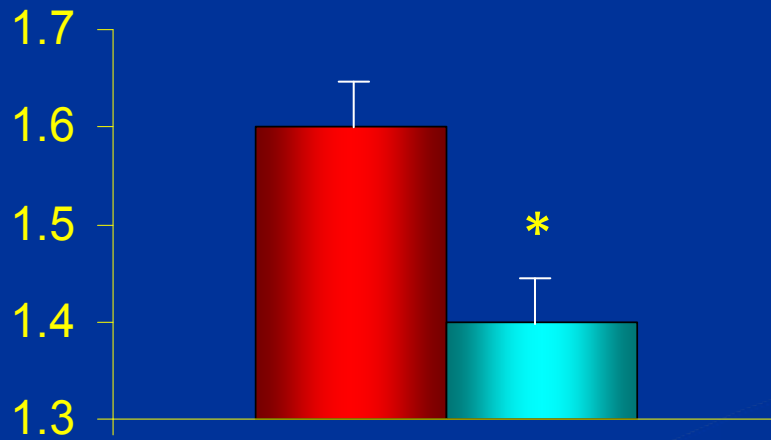
Active
Non-active



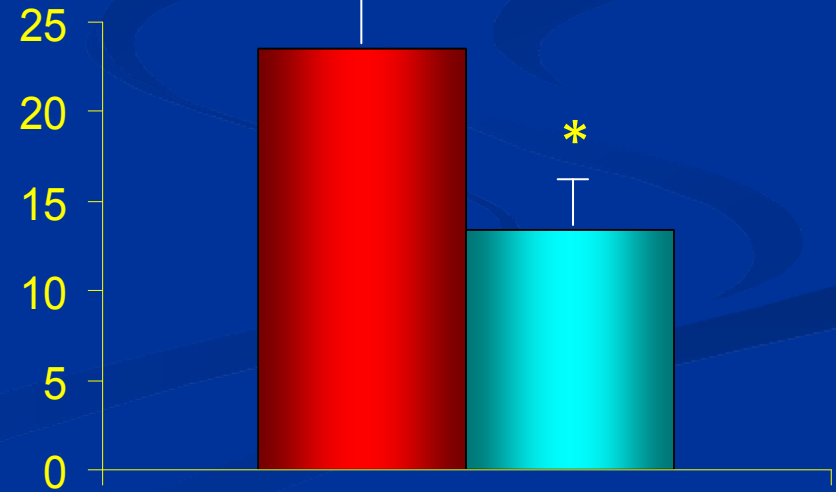
TEE (kcal/day)



AEE (kcal/day)

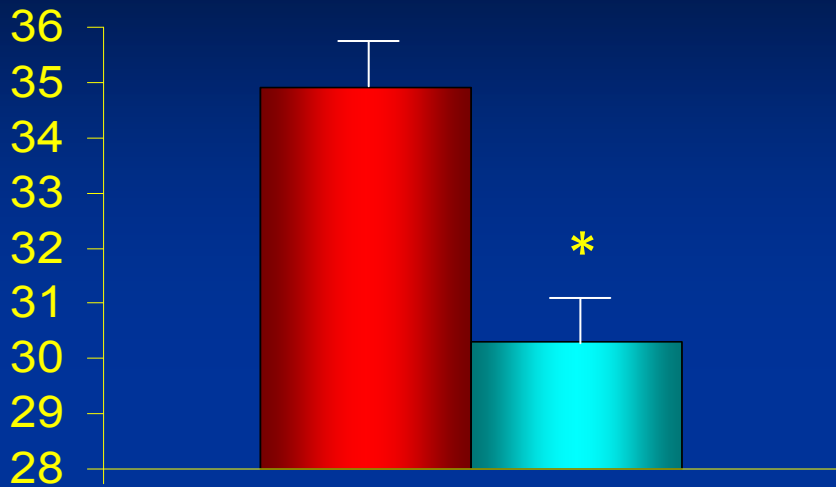


PAL

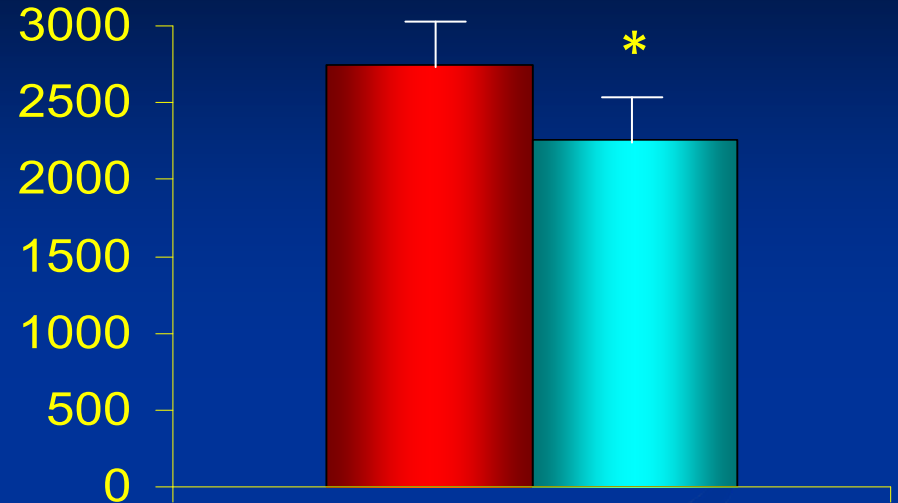


Activity (counts/min/day)

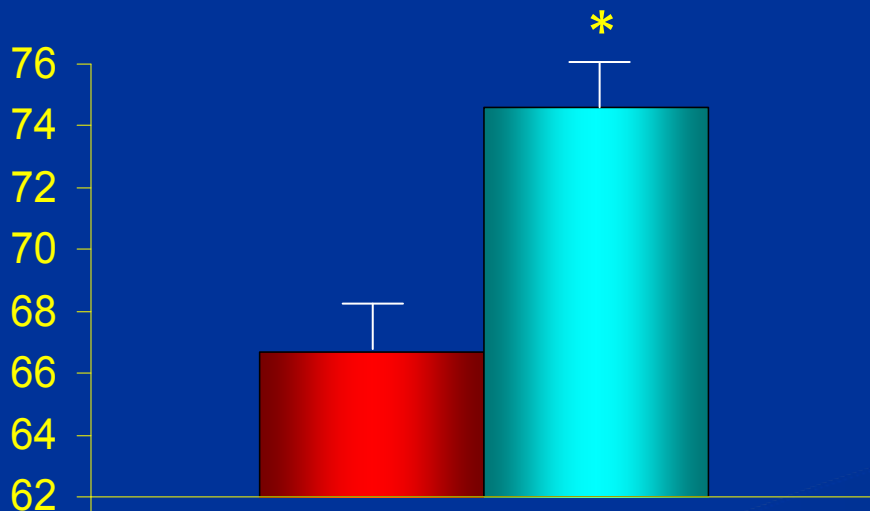
Metabolic characteristics of the subjects



VO2max (ml/min/kg)



VO2max (ml/min)



Sleeping HR (bpm)



Table 3a. Pregnancy outcomes of active and non active women

	Active (n= 27)	Non-active (n= 17)	<i>p</i> value
1 st stage of labor (min) ¹	301 (40-770)	304 (75-555)	0.87*
2 nd stage of labor (min) ²	88 (9-178)	146 (3-212)	0.05*
Pushing efforts (min) ²	50 (4-115)	83 (1-133)	0.14*
Anesthesia (Spinal/epidural)	20	15	0.45
Postpartum hemorrhage (≥ 500 ml)	6	7	0.32
Delivery (assisted)	9	11	0.06
Episiotomy/perineal tear	19	7	0.19

¹Active women (n=25) and inactive women (n=15) who started 1st stage of labor

²Active women (n=24) and inactive women (n=14) who started 2nd stage of labor

*Mean (range) estimated from survival curves (Kaplan-Meier)

Results

- Crude odds ratio (OR) for operative delivery was 3.7 times greater for the non-active compared to the active (95% CI=1.02-13.1; p=0.046)
- Adjusted OR = 7.6 (parity, maternal weight gain, infant weight)(95% CI = 1.27- 45.84; p=0.026)
- Adjusting for maternal BMI, height and age, in addition to the above factors, did not have any effect on the adjusted estimate.

Table 3b. Infant condition and outcome

	Active (n= 27)	Non-active (n= 17)	<i>p</i> value
Birthweight (g)	3448 ± 310	3518 ± 418	0.53
APGAR (<7 at 5min)	1	1	0.74
Meconium	12	6	0.77

Conclusions

1. For women with normal pregnancies, ≥ 30 min of MPA is accompanied by:
 - Better cardiovascular fitness
 - Lower incidence of operative delivery
 - Shorter 2nd stage of labor
2. The MPA does not negatively influence:
 - foetal condition (infant wt, APGAR scores, meconium), or
 - outcome of labor and delivery (duration of delivery, postpartum hemorrhage).
3. MPA of ≥ 30 min should be recommended in normal pregnancy

Study 2.

Energy Requirements of Pregnancy in Switzerland

Non – pregnancy		Pregnancy
TEE:		TEE (3rd trim.):
RMR ~60-75%	→	20% ↑
DIT ~10%	→	= ↓
PA ~25-30%	→	? ↓

Recommendations for increase in energy intake during 3rd trimester of pregnancy:

- 200 kcal/day (UK)
- 475 kcal/day (FAO/WHO/UNU)
- 450 kcal /day (DRI)

Objectives

1. To describe longitudinal changes in body weight, RMR, free-living PA and PA-intensity during pregnancy as compared to postpartum.
2. To establish energy requirements in late pregnancy for healthy women living in Switzerland.

Methods

- Anthropometry (wt, ht)
- Resting metabolic rate (RMR)
- Step test
- Total energy expenditure (TEE)
- Activity energy expenditure (AEE)
- Physical activity intensity (METs)

N=27



38.2 ± 1.5



t_{gest}

Delivery

N=27



40 ± 7.2



t_{post}

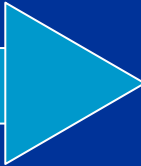


Table 1. Characteristics of subjects

	<i>Women (n=27)</i>
Age (years)	31.8 ± 5.3
Pre-pregnancy BMI (kg/m²)	21.8 ± 3.1
Total weight gain (kg)	14.6 ± 3.5
Infant birth weight (g)	3449 ± 334
Primiparous women (%)	66.7

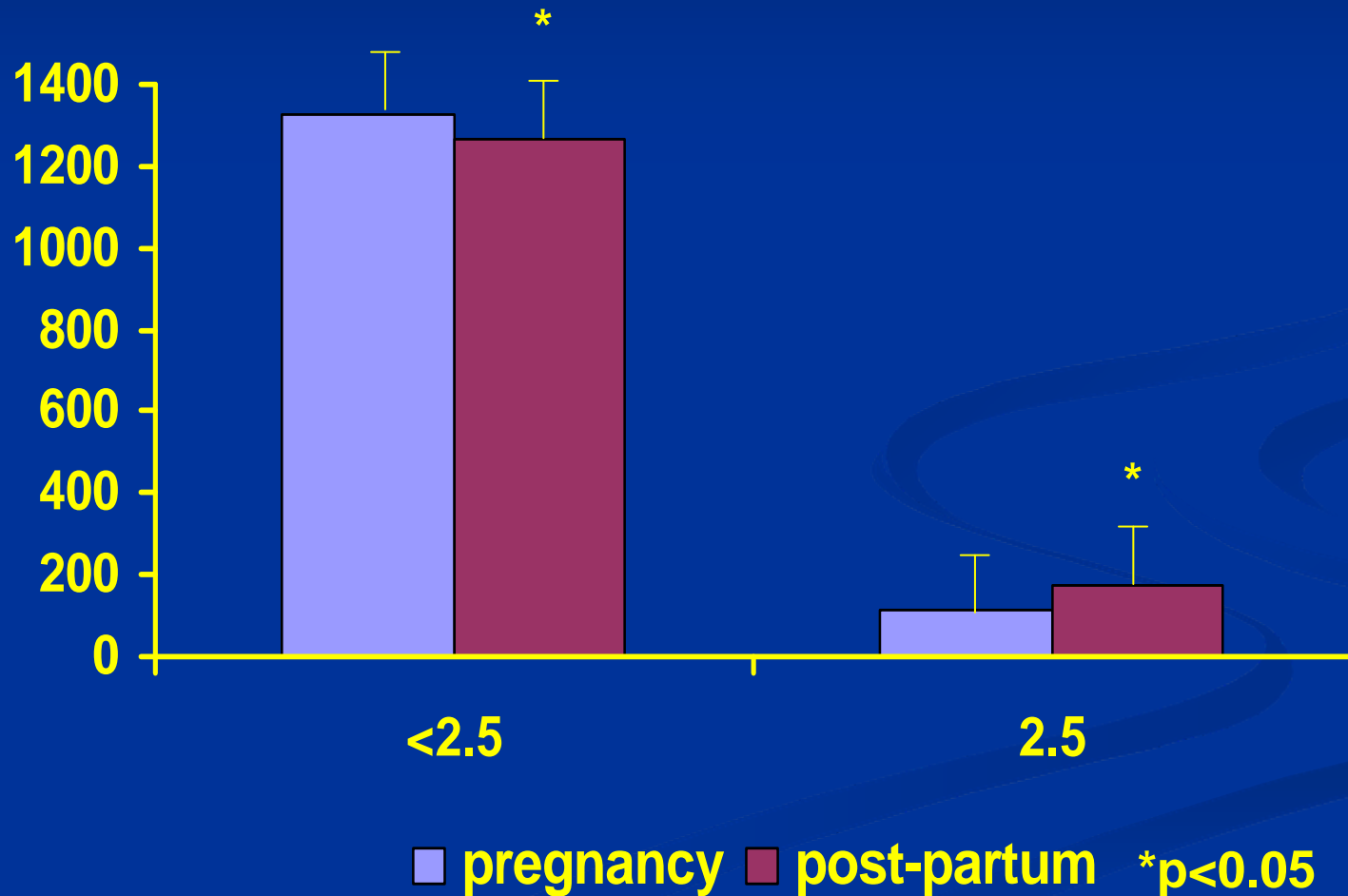
Table 2. Energy expenditure of women

	<i>Pregnant (n=27)</i>	<i>Non-pregnant (n=27)</i>	<i>p- value</i>
Weight (kg)	74 ± 11.9	62.3 ± 10.6	<0.0001
RMR (kcal/day)	1791 ± 266	1475 ± 180	<0.0001
RMR/kg	24.3 ± 2.1	23.9 ± 2.7	0.276
AEE (kcal/day)	698 ± 275	801 ± 473	0.163
AEE/kg	9.4 ± 3.1	12.5 ± 5.0	0.001
TEE (kcal/day)	2765 ± 546	2528 ± 684	0.006
TEE/kg	37.4 ± 4.8	40.4 ± 6.6	0.009
PAL	1.54 ± 0.13	1.70 ± 0.26	0.002
Activity (counts/min)	21.4 ± 10.0	52.6 ± 35.5	<0.0001

Table 3. Time spent at specific METs by 27 women

	<i>Pregnancy (min/24 hours)</i>	<i>Post-partum (min/24 hours)</i>	<i>p- value</i>
METs <1.5	1066.8 ± 106.4	997.7 ± 176.1	0.045
1.5 ≤ METs < 2.0	155.7 ± 46.2	154.6 ± 60.9	0.935
2.0 ≤ METs < 2.5	102.5 ± 38.9	114.7 ± 53.3	0.307
2.5 ≤ METs < 3.0	58.0 ± 30.5	82.5 ± 39.6	0.002
3.0 ≤ METs < 6.0	55.7 ± 34.3	84.6 ± 87.3	0.097
METs ≥ 6	1.3 ± 3.5	6.0 ± 10.1	0.014

Time spent at specific METs by 27 women



Conclusion

- Energy requirements of healthy pregnant women living in Switzerland are 200 kcal/day higher than those of non-pregnant women.
- The requirements are attributed to an increase in RMR, which is partially compensated by a decrease in AEE.

Conclusion – study 1

30 min or more of moderate PA per day:

- has no negative effect on pregnant women and infants.
- has positive effect on cardiovascular fitness, labor duration and incidence of operative delivery.

Conclusion – study 2

- *E* requirements of pregnancy: 200 kcal/day.
- The requirements are attributed to increase in RMR (300 kcal/day), compensated by a decrease in AEE (100 kcal/day).
- Decrease in AEE is achieved by selecting less demanding activities and should be taken into account when defining extra energy requirements for late pregnancy in Switzerland

Thank you!