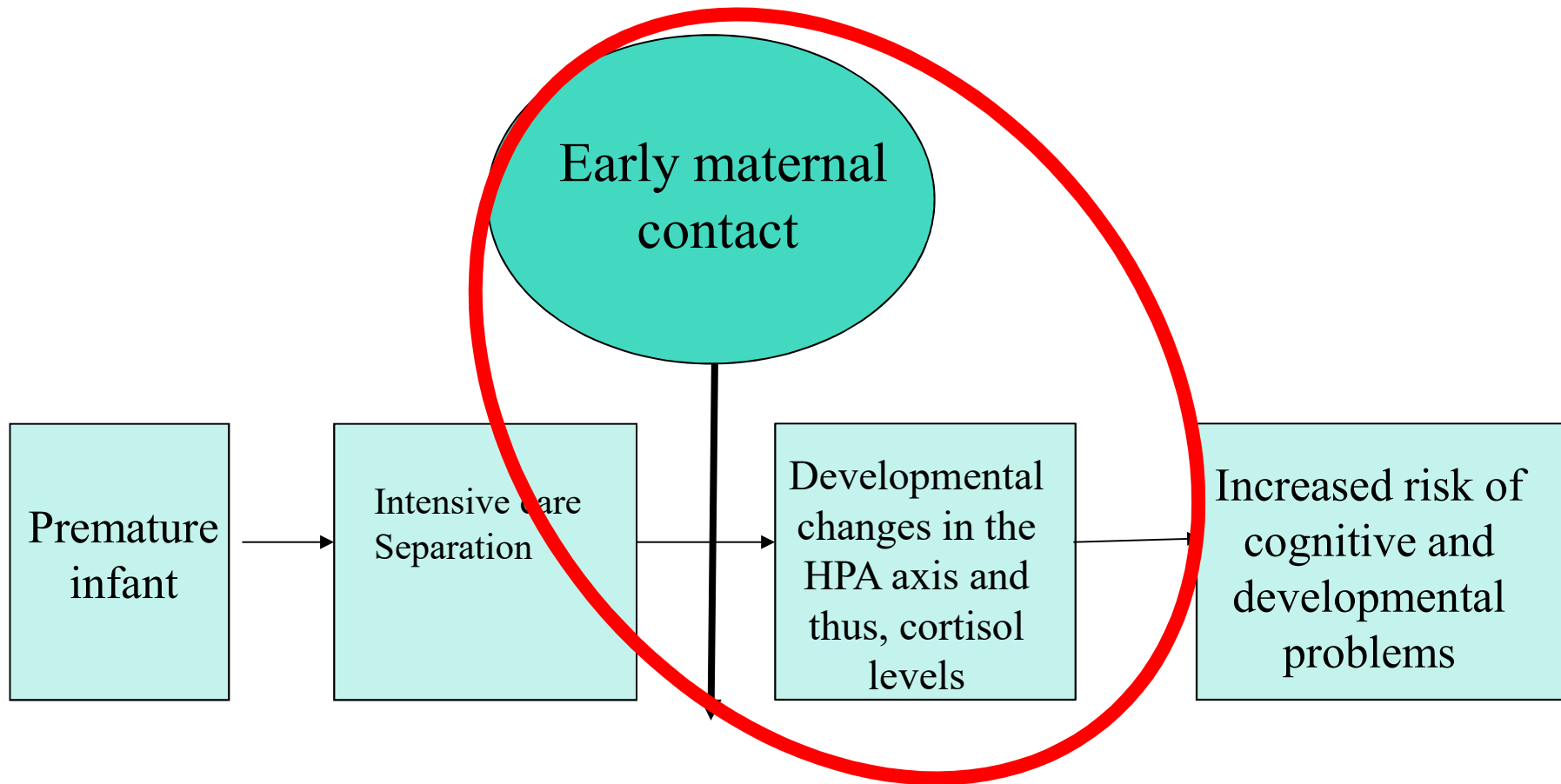


Neonatal and parental stress: effect of Kangaroo Mother Care

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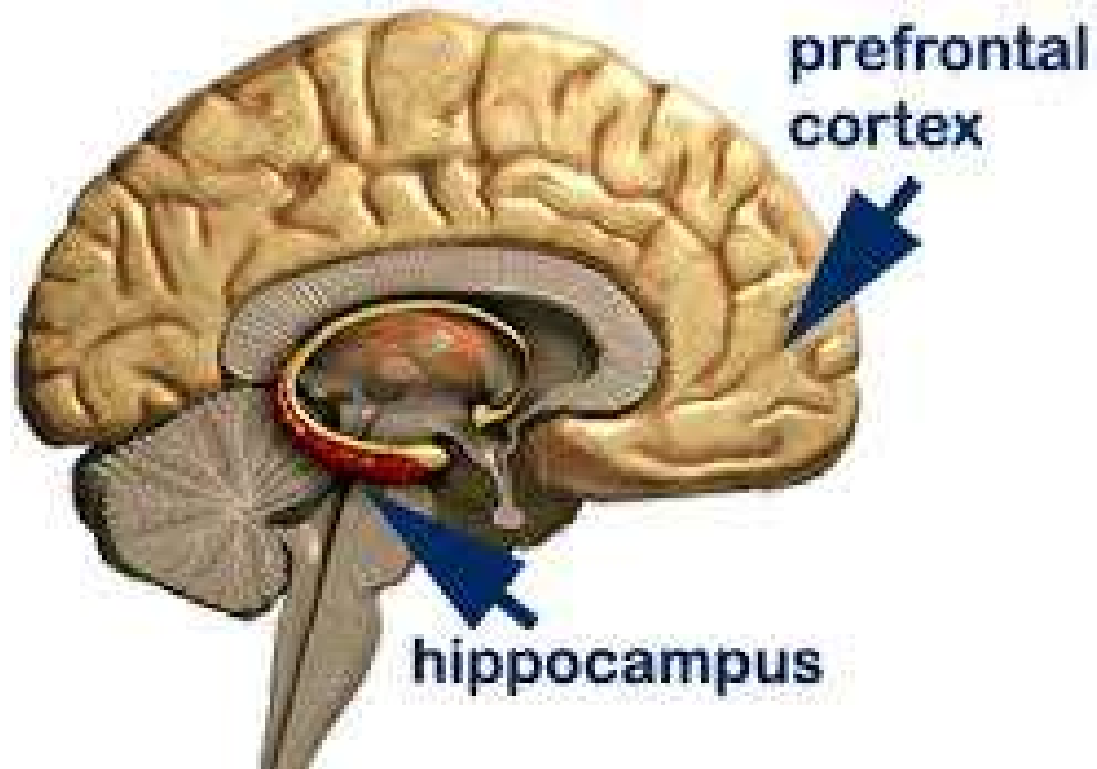




Neonatal intensive care may cause stress



Stress affects the brains



Brain development

Week 40

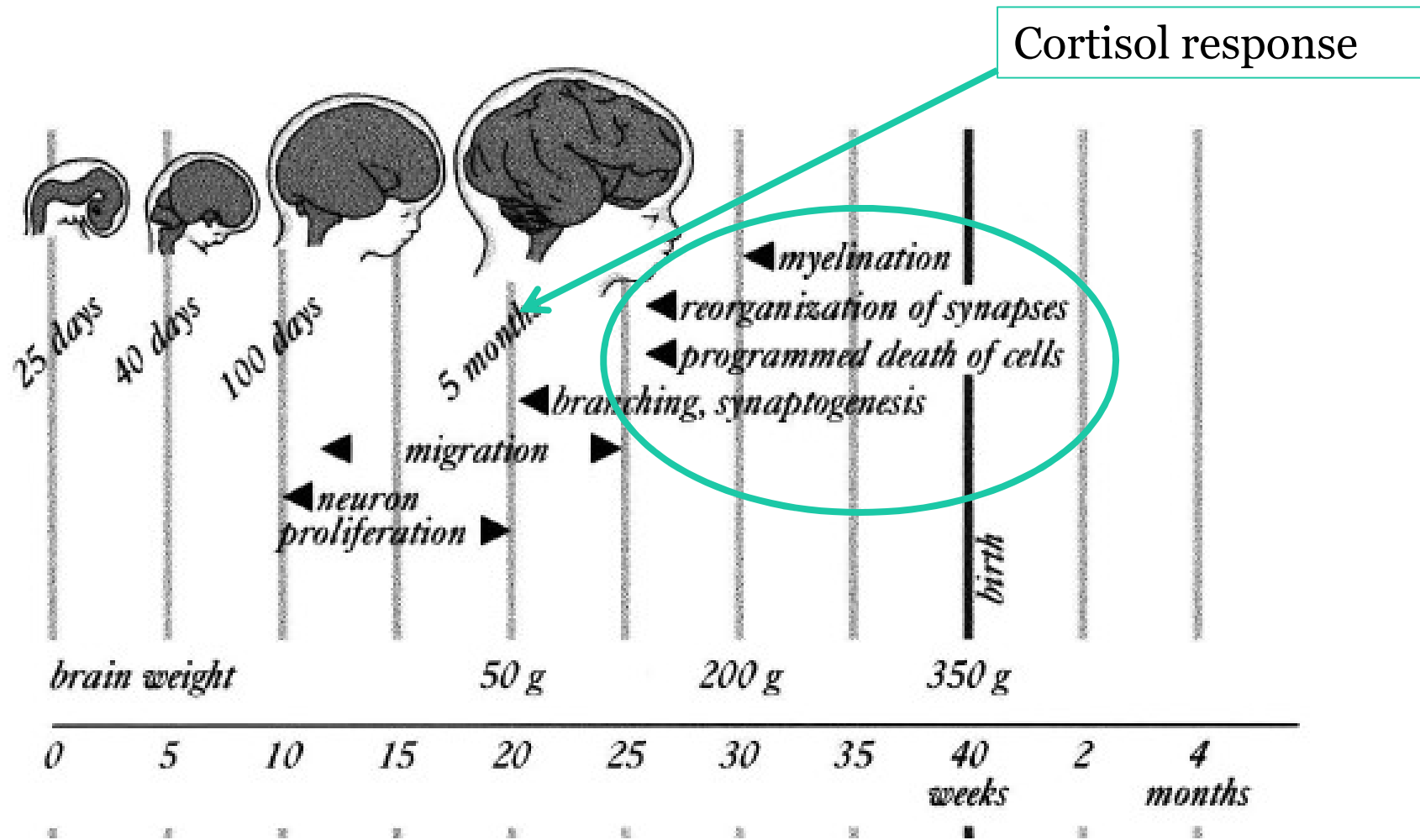


Week 25



Neonatal Research Group
Hammersmith Hospital, London

Brain development



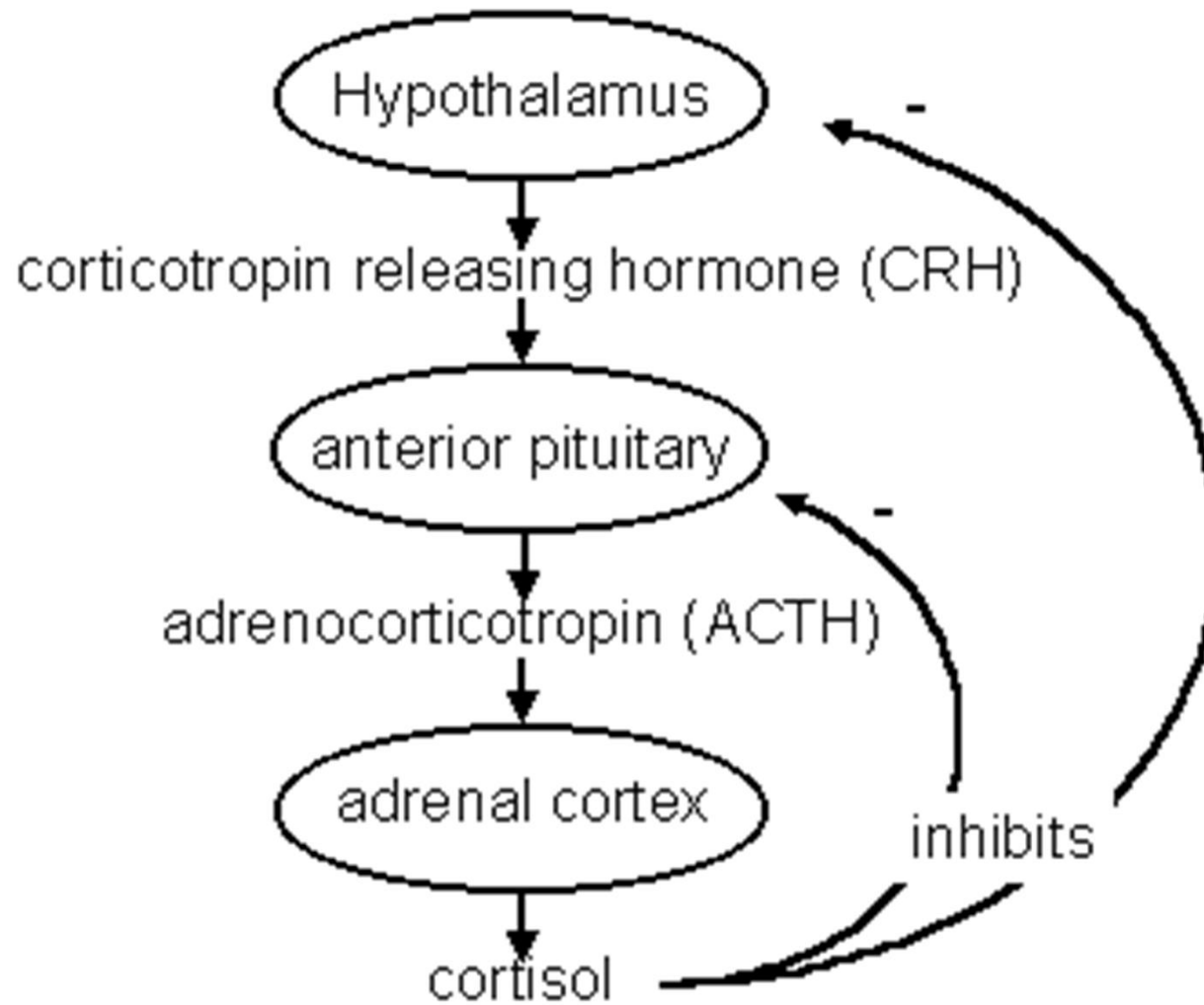
Cortisol response

The stress system

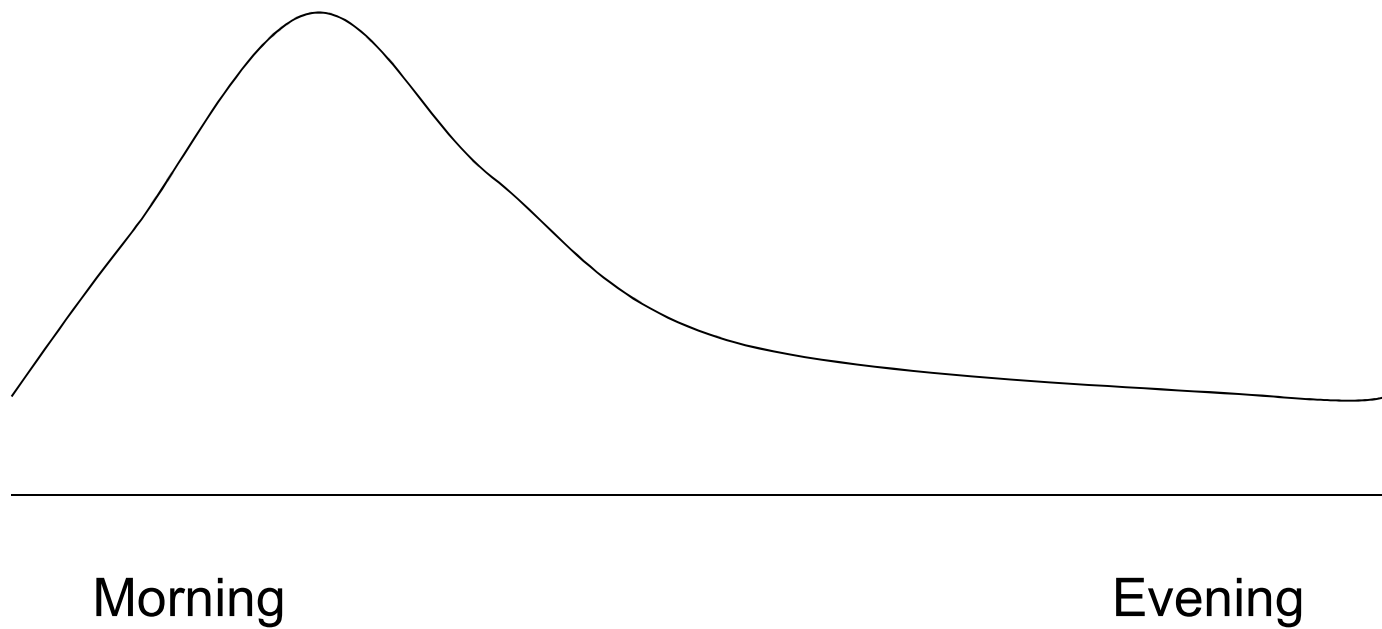
Earlier studies show that:

- Preterm infants in neonatal intensive care have significantly higher levels of the stress hormone cortisol as compared to healthy full-term infants.
- They also have elevated salivary cortisol levels during their first years of life.
- Higher cortisol levels is correlated to higher pain exposure in the NICU.
- Longstanding high levels of cortisol may increase the risk of cognitive and behavioral problems.

HPA-axis



Circadian rhythm of cortisol



Salivary cortisol circadian rhythm

- ... is established at one month in healthy full-term infants and reference intervals are now available for the first year.
- It is a correlation between salivary cortisol levels in mothers and infants if the mother stays in the NICU 24/7 ($\rho=0.31$, $p=0.001$) but not if the mother has to sleep at home ($\rho=0.14$, $p=0.14$).

Ivars, Nelson, Theodorsson, Theodorsson,
Ström, Mörelius. *PLoS One* 2015

Mörelius et al *EHD* 2012

The stress system

The stress system organizes in early infancy in response to the environment.

Early maternal contact can protect the infants' brains from harmful effects of stress.

While deprivation increase the stress level and lead to increased sensitivity for stress.



However, preterm infants are often separated from their parents



Separation may be stressful for parents

Edell-Gustafsson et al 2014

Quotes:

- *“...he has actually slept two nights in another room...it was actually really hard. Because the first night it felt as if...you didn't have a child” (P7)*
- *“It feels safer now that I have him [the baby] in the room. I hear his breathing and that calms me down because I can hear that he's calm, so that actually feels safer” (P6)*
- *“When you hold them in your arms you sometimes fall asleep, it's very nice and peaceful...a lovely part of the day” (P12)*

Animal studies have shown

- Repeated separations from the mother cause higher baseline cortisol levels among rhesus monkeys.
- Rat puppies separated from their dams for 3 hours show more behavioral problems when exposed to stressors later in life compared to puppies not separated.

Research questions

Can continuous skin-to-skin contact between the parent and the late preterm infant from birth until discharge

1. buffer the infants' stress response?
2. increase the salivary cortisol co-regulation between mother and infant?
3. affect parental stress?

A randomized trial

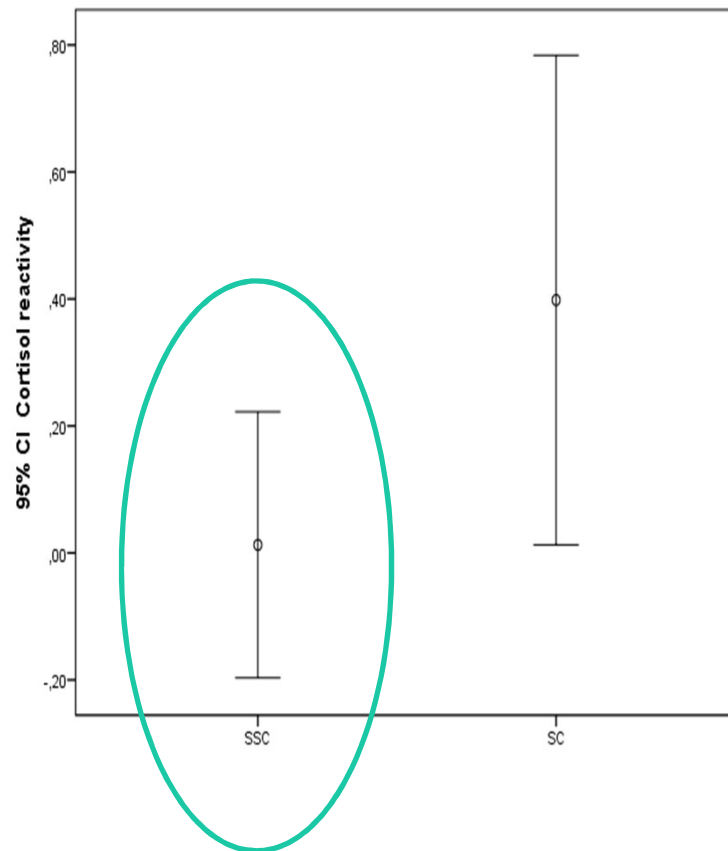
- Skin-to-skin contact (n=18) *vs* standard care (n=19)
- Intervention: Skin-to-skin contact from delivery to discharge, 24/7
- Age at inclusion: 32–36 weeks gestational age

Method 1

- Salivary cortisol was measured at one month corrected age before and 30 minutes after a diaper change (mild stressor)

Results 1:

Cortisol reactivity at 1 month

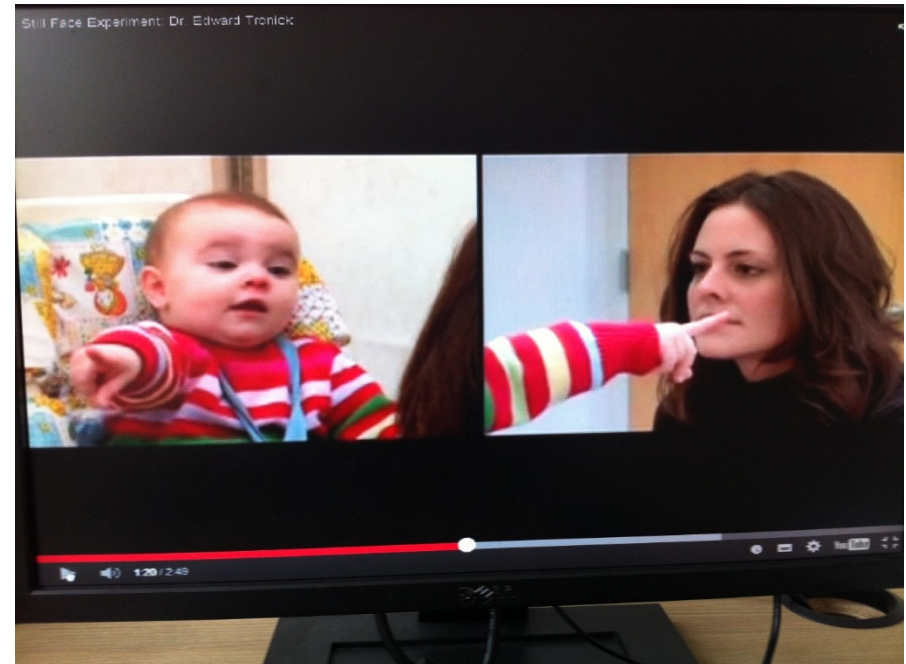
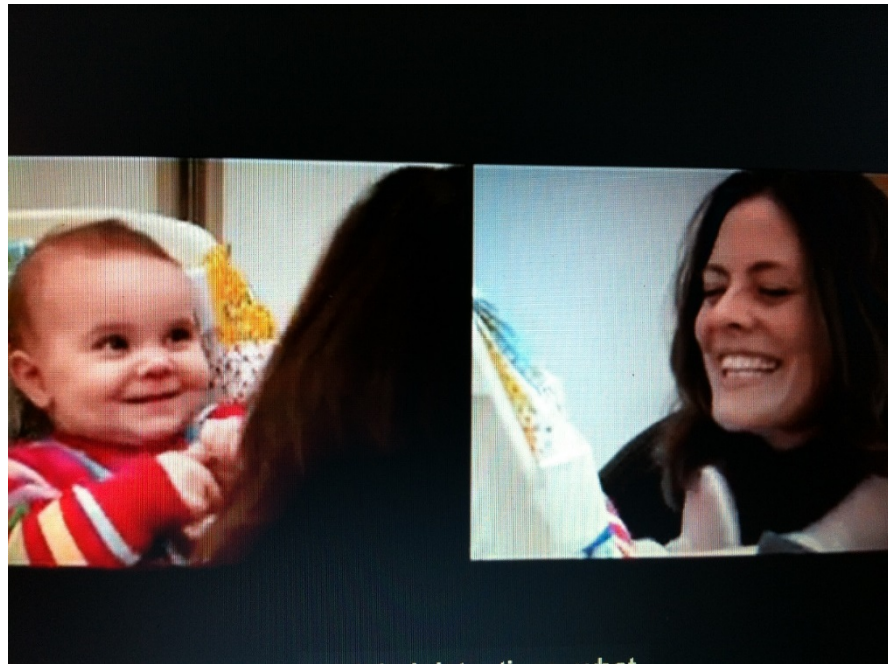


Lower stress reactivity at one month corrected age if practicing skin-to-skin contact in the NICU ($p=0.01$)

Method 2

- Salivary cortisol was measured at one month corrected age before and 30 minutes after a diaper change (handling stress)
- Salivary cortisol was measured at four months corrected age before and 30 minutes after a still-face situation (stressor that provoke negative emotions)

Parent-infant interaction and still-face



Edward Tronick

Results 2:

Mother-infant cortisol correlation at 4 months

- Correlation in salivary cortisol levels between mother and infant at four months corrected age if practicing skin-to-skin contact in the NICU ($\rho=0.65$, $p=0.005$)

Method 3

- Salivary cortisol was measured at one month corrected age before and 30 minutes after a diaper change (handling stress)
- Salivary cortisol was measured at four months corrected age before and 30 minutes after a still-face situation (stressor that provoke negative emotions)
- **Swedish Parenthood Stress Questionnaire, SPSQ for mothers and fathers**

Results 3:

Fathers in the intervention group experienced less spouse relationship problems when the child was 4 months corrected age ($p < 0.05$)



Mörelus et al 2015

Other results from the same study

- No significant difference in demographic variables or other characteristics between groups
- No significant difference in breastfeeding rates between groups
- No significant difference in postpartum depression scores between groups

Conclusions

- The stress system organizes in early infancy in response to the environment.
- Skin-to-skin contact can dampen the infants' stress reactivity, and
- increase the co-regulation between mother and child
- The results are in agreement with the theory that early maternal contact has an impact on the preterm infants' brain systems that manage stress

Acknowledgement

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