NEC severity and the influence of enteral nutrition in a Cauca-
sian population compared to a historic control group.

Material and methods Since 2010, VLBW infants born

Results 230 infants were included (mean gestational age: 27±2,
birth weight: 900g) and compared with 233 controls (28±5,
980g). After implementation of Infloran® NEC decreased by
32% (10.3% before vs. 7% after implementation of probiotics, p
= 0.092 – corrected for confounding variables birth weight and
gestational age). Probiotics had no influence on NEC severity. A
NEC reduction was shown in breast fed infants only and not in
formula fed infants.

Discussion The effect of Infloran® was less effective in our Cau-
savian population than expected. Interestingly, NEC incidence
was not reduced in exclusively formula fed infants. The ineffi-
cacy in this subgroup is alarming. Therefore, the impact of
enteral nutrition on probiotic effects should be explored in fur-
ther prospective randomised controlled trials.

PS-182 EFFECT OF COMBINED USAGE OF PREBIOTIC
OLIGOSACCHARIDES ON THE GROWTH OF
BIFIDOBACTERIUM BREVE


Non-digestive oligosaccharides are often added to infant formula to help formula-fed infants develop an intestinal microbiota com-
pposed predominantly of Bifidobacterium, similar to that of breast-
fed infants. Because various types of oligosaccharides exhibit spe-
cific microbial metabolism, the combined usage of oligosacchar-
ides is considered to provide additive or synergistic effects for
Bifidobacteria growth in the intestinal microbiota. The aim of this
study was to evaluate the combined effect of lactulose, raffinose,
and galacto-oligosaccharide (GOS) on the growth of Bifidobacte-
rium breve, one of the major Bifidobacteria found in infant intesti-
nal microbiota, using an in vitro mixed culture model. Seven
ypical bacterial species found in infant intestinal microbiota,
cluding B. breve, were selected and then co-cultured under anaer-
oc conditions to mimic the infant intestinal environment. Each
oligosaccharide was added to the medium, alone or in combina-
ton with other oligosacharides. At all times, the total amount of
added oligosaccharides composed 1% of the medium. Cells were
harvested after several hours of incubation, and bacterial genomic
data was extracted. Bacterial cell numbers were determined using
quantitative realtime-PCR, with specific primers targeting the 16s
rRNA genes of different bacterial groups. The combination of lac-
tulose, raffinose, and GOS promoted the growth of Bifidobacte-
rium breve compared to any single oligosaccharide or the
combination of lactulose and raffinose. The combined usage of
lactulose, raffinose, and GOS may provide the benefit of promot-
ing a Bifidobacteria-predominant intestinal microbiota in formula-
fed infants.

PS-184 INTESTINAL PERMEABILITY PRECEDING
NECROTIZING ENTEROCOLITIS AND SEPSIS
IN PRETERM INFANTS

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Introduction Increased intestinal permeability may precede the
onset of several important diseases in preterm infants including
necrotising enterocolitis (NEC) and Gram negative septicaemias.
Hypothesis that increased intestinal permeability is evident at
2 weeks of age and may precede the onset of NEC or Gram neg-
ative septicaemias.

Methods Infants <31 weeks gestation were enrolled. Intestinal
permeability was assessed by the sugar absorption test (SAT)
using lactulose and mannitol and gut leakage by stool alpha-1-
antitrypsin (A1AT). Clinical data were prospectively collected.

Results Thirty-six infants were enrolled. The median (range)
baseline was 27 weeks (24–30) and median birth weight was
900g (585–1460). Nine infants (25%) developed suspected or
proven NEC (any NEC) of whom 5 (14%) developed ≥Bells
Stage II NEC. Four infants (11%) developed Gram negative sep-
ticaemias. Results are compared between infants with either
NEC or sepsis and those with neither.

The median (range) lactulose:mannitol ratio (L:M) for all
infants was 0.38 (0.01–5.46) and median A1AT was 128 (41–
1518) mg/L. There was no statistically significant difference by
L:M in infants who developed any NEC (p = 0.75); ≥Bells

Background Transfusion practices are highly variable between
hospitals and previous studies have suggested that blood trans-
usions may increase the risk of necrotizing enterocolitis (NEC).

Aim To explore the association between blood transfusions and
incidence of NEC in extremely preterm infants.

Methods We used data from a Swedish population-based study
including extremely preterm infants (<27 weeks) born between
2004–2007, (n = 602). All data on blood transfusions and hae-
moglobin (Hb) concentrations up to 28 days of age was col-
lected for survivors. We performed a nested case-control study
where two controls were chosen for each case of NEC (n = 21).

Results During the first 28 days of life, infants received a
median (25th-75th percentile) of 6 (3–9) blood transfusions
resulting in 75 (44–120) ml/kg of blood. Predictors for receiving
a higher volume of blood transfusions were days on respira-
tory support (R = 0.345, p < 0.001), hospital (R = 0.339, p <
0.001), low birth weight (R = -0.236, p < 0.001) and total ster-
oid dose (R = 0.209, p < 0.001). Hb was not a significant
predictor.

Overall NEC incidence was 5.8%. There was no significant
difference between NEC cases and controls in number of blood
transfusions (p = 0.420), volume of blood transfused from birth
to NEC diagnosis (p = 0.274), or during the 48 h preceding
NEC diagnosis (p = 0.459).

Conclusions Blood transfusions were given liberally in Sweden
compared to other studied populations. Morbidity related varia-
bles, especially those related to respiratory illness, were signifi-
cant predictors of blood transfusion. NEC incidence was
comparable with other populations but no significant association
was found between blood transfusions and NEC among these
extremely preterm infants.
Stage II NEC (p = 0.82) or sepsis (p = 0.21) nor of stool alpha-1-antitrypsin in those with any NEC (p = 0.70); ≥Bell's Stage II NEC (p = 0.87) or sepsis (p = 0.81).

Discussion In this cohort, the SAT by lactulose:mannitol ratios and stool A1AT did not show evidence of increased intestinal permeability at 2 weeks of age in infants who subsequently developed NEC or sepsis.

**PS-185**

**INTESTINAL OXYGEN EXTRACTION STRONGLY CORRELATES WITH I-FABP LEVELS, A MARKER FOR INTESTINAL DAMAGE**

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**Background and aim** It remains unknown whether near-infrared spectroscopy (NIRS) can be used to assess intestinal perfusion. Intestinal fatty acid binding proteins in plasma (I-FABPp) and urine (I-FABPu) are a direct measure of intestinal epithelial cell damage that may occur after intestinal hypoperfusion. We measured splanchic fractional tissue oxygen extraction (FTOE) and correlated these FTOE values with I-FABP levels in preterm infants in the first 16 h after onset of necrotizing enterocolitis (NEC).

**Methods** Preterm infants born between October 2010 and November 2012 were prospectively included when NEC was diagnosed (Bell stage ≥2). Regional tissue oxygen saturation of the liver (rlivSO2) and infra-umbilical (rintSO2) region were measured continuously by NIRS. Mean 8-hour FTOE values were calculated: FTOE = (SpO2-rSO2)/SpO2. Plasma and urine samples collected in the first 16 h after onset of symptoms were used for analysis. Spearman’s correlation test was used to calculate correlation coefficients.

**Results** Twenty-one preterm infants were included (median [range] gestational age 28 [25–36] weeks, birth weight 1290 [740–2400] grams). Median [range] liver FTOE (livFTOE) was 0.33 [0.07–0.81], infra-umbilical FTOE (intFTOE) 0.48 [0.13–0.82], I-FABPp 16.3 [0.54–3748] ng/mL, and I-FABPu 89.9 [3.2–23,336] ng/mL. Table 1 shows strong positive correlations between FTOE and I-FABP.

**Conclusion** High intFTOE values, suggestive of an impaired intestinal blood flow, correlated strongly with I-FABP, i.e. with the extent of intestinal epithelial cell damage. These results indicate that intestinal NIRS monitoring can be used to assess intestinal perfusion in preterm infants with an impaired intestinal blood flow such as occurs in NEC.

**PS-186**

**BLOOD LACTATE AS A PREDICTIVE MARKER FOR NEONATAL NECROTISING ENTEROCOLITIS (NEC) SEVERITY AND OPERATIVE OUTCOMES**

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**Background and aims** Lactate as a marker for tissue perfusion and hypoxia is increasingly used in routine point-of-care monitoring in critical care. We investigated the association of pre-operative lactate (PreL) with operative outcomes and mortality in neonatal surgical NEC.

**Methods** 25 infants with NEC confirmed on laparotomy at a tertiary surgical centre were retrospectively evaluated. Maximal PreL was categorised as normal (<2 mmol/L), moderate (2–5 mmol/L) or severe (>5 mmol/L), and correlated to extent of NEC involvement and mortality.

**Results** Median birth gestation and weight were 27 weeks (range 23–33) and 1035g (555–2060). Median PreL was 5.1 (range 0.6–16.2) mmol/L. Elevated PreL correlated with NEC severity, with predominance of pan-intestinal and multifocal involvement in severe hyperlactaeina (Table 1). Infants with isolated NEC were observed to have normal or moderate-PreL. Moderate to severe PreL was also associated with increased mortality rate and need for further surgery.

**Conclusions** This preliminary study suggests that pre-operative hyperlactaeina and degree of elevation may be associated with a poor prognosis in infants with surgical NEC. Further larger studies may enable better evaluation of its use as an adjunctive monitoring or prognostic tool in guiding early neonatal NEC management.

Abstract PS-185 Table 1 Correlation coefficients between FTOE and I-FABP

<table>
<thead>
<tr>
<th></th>
<th>0-8 hours</th>
<th>8-16 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I-FABPp</td>
<td>I-FABPu</td>
</tr>
<tr>
<td>livFTOE</td>
<td>ρ = 0.600</td>
<td>ρ = 0.500</td>
</tr>
<tr>
<td></td>
<td>P = 0.285</td>
<td>P = 0.667</td>
</tr>
<tr>
<td>intFTOE</td>
<td>ρ = 0.900</td>
<td>ρ = 1.000</td>
</tr>
<tr>
<td></td>
<td>P = 0.037</td>
<td>P = 0.001</td>
</tr>
<tr>
<td></td>
<td>n=3</td>
<td>n=5</td>
</tr>
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</tbody>
</table>

Abstract PS-186 Table 1 Surgical outcomes and Preoperative lactate (PreL)

<table>
<thead>
<tr>
<th></th>
<th>Normal-PreL (n = 3)</th>
<th>Moderate-PreL (n = 9)</th>
<th>Severe-PreL (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan-NEC (n = 13)</td>
<td>0 (0%)</td>
<td>3 (33.3%)</td>
<td>10 (76.9%)</td>
</tr>
<tr>
<td>Multifocal-NEC (n = 6)</td>
<td>1 (33.3%)</td>
<td>2 (22.2%)</td>
<td>2 (33.3%)</td>
</tr>
<tr>
<td>Isolated-NEC (n = 6)</td>
<td>2 (66.7%)</td>
<td>4 (44.4%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Further surgery* (n = 7)</td>
<td>0 (0%)</td>
<td>2 (22.2%)</td>
<td>5 (38.5%)</td>
</tr>
<tr>
<td>Mortality (n = 6)</td>
<td>0 (0%)</td>
<td>2 (22.2%)</td>
<td>4 (30.8%)</td>
</tr>
</tbody>
</table>