hind limb occlusion beginning 24 hours after delivery, occurring daily. A cycle was defined as 4 minutes of cuff inflation above systolic pressure with a 2-minute recovery. A-NIRS and vitals were monitored continuously. NEC was determined using validated histologic NEC scores.

RESULTS: Of the 15 piglets randomized, 9 underwent daily RIC. Overall incidence of NEC was 40% (6 of 15). There was no difference in weight, vitals, or A-NIRS between groups within the first 24 hours. Twelve hours after undergoing RIC, a sustained increase in A-NIRS was noted (Fig. 1). Although not significant, the incidence of NEC was lower in RIC piglets (22%) compared with controls (67%; \( p = 0.136 \)), and this translated to a significant increase in survival (chi-square \( \chi^2 = 5.570; p = 0.018 \)) on the Kaplan-Meier curve.

CONCLUSION: In premature piglets, daily RIC is feasible, and has the potential to attenuate the incidence and severity of NEC by increasing splanchnic perfusion. Remote ischemic conditioning deserves further investigation as a preventive modality in neonates at risk of NEC.

Fig 1. Graph of continuous NIRS of RIC vs control group animals for the 96-hour duration of the study. NIRS = Near Infrared Spectroscopy, \( \text{StO}_2 \) = splanchnic tissue oximetry, RIC = Remote Ischemic Conditioning.

Risk for Synchronous Inguinal Hernias in Pediatric Patients with Umbilical Hernia

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INTRODUCTION: The incidence of inguinal hernias in male and female children younger than 15 years is 6.62% and 0.74%, respectively. This study evaluates the utility of diagnostic laparoscopy (DL) during open umbilical hernia repair (OHR) for the diagnosis and treatment of synchronous inguinal hernias (SIH).

METHODS: A retrospective chart review was performed from January 2012 to December 2018 in children younger than 18 years undergoing an OHR repair with DL. Laparoscopy was performed to diagnose and treat SIH. Data collection included age, ethnicity, sex, laterality, and type of repair; exclusion criteria was a previously diagnosed inguinal hernia.

RESULTS: Two hundred and eleven children underwent umbilical hernia repair and 17% (\( n = 37 \)) were found to have an SIH. The incidence of SIH decreased with age and was statistically significant for older than 10 years (\( p < 0.05 \); Fig.). In the setting of an umbilical hernia, the incidence of inguinal hernias in both sexes was significantly higher than historic controls in each age group younger than 10 years (Fig.). Isolated right inguinal hernias (64.8%, \( n = 24 \) of 37) were more common than either left (13.5%, \( n = 5 \) of 37) or bilateral (21.6%, \( n = 8 \) of 37) although the incidence of bilateral inguinal hernia was higher in girls. All SIH identified were repaired at the time of OHR, and 57% of SIH were repaired laparoscopically.

CONCLUSION: In children younger than 10 years, diagnostic laparoscopy should be considered during OHR to diagnose and facilitate treatment of concurrent inguinal hernias. This approach can potentially eliminate subsequent inguinal hernia operations.

Figure

Rock1 Inhibition Strengthens Barrier Function in a Human Enteroid Model of Neonatal Intestine

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INTRODUCTION: Neonates, especially those born premature, are susceptible to diseases affecting the intestinal barrier. One such example is necrotizing enterocolitis (NEC). We have previously shown that increased tight junction permeability plays a key role in the pathogenesis of NEC. ROCK1 is a rho-associated kinase that enhances tight junction protein degradation and subsequent increase in barrier permeability. We hypothesize that ROCK1 inhibition (RI) will decrease intestinal permeability via stabilization of the intestinal barrier in neonatally derived enteroids.

METHODS: After IRB approval (11610-11611), discarded intestinal tissue was collected from human neonates undergoing surgical resection. Intestinal stem cells were collected via crypt isolation to grow small organoids known as enteroids. Enteroids were grown to maturity and either not treated (control) or treated with 10 \( \mu \)M RI for 24 hours. Intestinal permeability was assessed using lucifer yellow assay. Enteroids were also grown in monolayers and permeability was evaluated via transepithelial electrical resistance measurements. Tight junction proteins were analyzed by Western blot.

RESULTS: Enteroids treated with RI had significantly decreased permeability compared with control enteroids as demonstrated by
both lucifer yellow assay (p = 0.005) and transepithelial electrical resistance (p = 0.004). Western blot showed increased expression of tight junction proteins occludin in RI treated enteroids compared with controls (p = 0.009). Claudin-1 and 4 were increased in RI treated enteroids although this did not reach significance (p > 0.05).

CONCLUSION: RI treated enteroids showed significantly decreased permeability and increased tight junction protein expression compared with control enteroids. Therefore, RI might be a novel therapeutic or preventative strategy against NEC.

**Schwann Cell Precursors in the Aganglionic Segment of Hirschsprung Disease Have a Capacity to Generate Neurons in the Gut**

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**INTRODUCTION:** Cell therapy offers the potential to replace missing neurons in the distal bowel of Hirschsprung disease (HSCR) by transplanting neural progenitor cells to restore gut function. Schwann cell precursors (SCPs) have recently been shown to possess a capacity to generate neurons in the intestine. However, it is unknown whether SCPs can be isolated from the aganglionic segment of HSCR and whether they can be used for cell-based therapy.

**METHODS:** Aganglionic bowel was obtained from human HSCR and Endrb−/− mice. SCPs were isolated from the hypertrophic nerve bundles in the aganglionic segment. SCPs were transplanted into the aganglionic mouse colon ex vivo and in vivo. Immunohistochemistry was used to demonstrate engraftment, survival, and neurogial differentiation of SCPs after transplantation. Live cell imaging was used to determine neuronal calcium activity.

**RESULTS:** Hypertrophic nerve bundle-derived SCPs are capable of forming neurospheres in culture and possess neurogenic potential. In differentiation conditions, SCPs give rise to Tuj1 expressing neurons that exhibit spontaneous and electrically stimulated calcium activity. After transplantation into aganglionic mouse colon, SCPs engraft, migrate extensively, and differentiate into enteric neurons and glia.

**CONCLUSION:** SCPs from the aganglionic segment of HSCR demonstrate the capacity to regenerate functioning neurons in vitro. They can be transplanted into the aganglionic colon where they survive, migrate, and differentiate into appropriate phenotypes. SCPs, therefore, represent a potential autologous source of neural progenitor cells. Current studies are aimed at determining whether these cells restore colorectal function as a viable treatment for HSCR.

**Serine-Threonine Kinase Receptor Associated Protein Confers Aggressive Phenotype in Neuroblastoma Via Regulation of Focal Adhesion Kinase Signaling**

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**INTRODUCTION:** Serine-threonine kinase receptor associated protein (STRAP) is a scaffolding protein implicated in tumorigenicity, and we have demonstrated that the knockout (KO) of STRAP decreased while the overexpression (OE) of STRAP increased the neuroblastoma malignant phenotype. Focal adhesion kinase (FAK) prevents anoikis and supports neuroblastoma tumorigenesis. Because FAK activation in cancer has been found to be regulated by other scaffolding proteins, we hypothesized that STRAP can affect FAK activation in neuroblastoma.

**METHODS:** SK-N-AS neuroblastoma cell line was used. CRISPR-Cas9 technology was used to establish STRAP KO cells, and STRAP OE was accomplished with stable plasmid transfection. Wild-type (WT) and empty vector (EV) transfected cells served as controls for KO and OE cells, respectively. Immunoblotting detected protein expression. PamChip kinomic peptide microarray was used to determine the mean kinase statistics (KSTAT) and phosphorylation curves to evaluate the effects of STRAP OE on the kinome.

**RESULTS:** There was a decrease in phosphorylated FAK (Y397) in STRAP KO cells compared with WT, indicating that STRAP can function to regulate FAK phosphorylation. In kinome assays, FAK1 (KSTAT of -0.473) and FAK2 (KSTAT of -0.475) were increased in OE vs EV cells with downstream FAK targets also demonstrating higher phosphorylation activity in OE vs EV cells.

**CONCLUSION:** STRAP KO led to decreased FAK phosphorylation while STRAP OE resulted in increased kinase activity of FAK and its downstream targets. These findings suggest a potential pathway that allows STRAP to confer a more malignant phenotype in neuroblastoma and warrants further investigation as a potential therapeutic target.

**Spontaneous Portosystemic Shunt Ligation During Pediatric Liver Transplantation**

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**INTRODUCTION:** The aim of this study was to describe the incidence and outcome of intraoperative ligation of spontaneous portosystemic shunts (SPSS) during pediatric liver transplants.

**METHODS:** Liver transplants performed at our pediatric hospital between January 1, 2017 and December 31, 2020 were retrospectively reviewed. Recipients were categorized as no SPSS present or