In vitro *models for the study of human placenta growth and development*

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Introduction
Placentation in human pregnancy involves invasion of the blastocyst in maternal endometrium up to the spiral arteries. Hormonal stimuli lead the maternal tissues to the formation of the decidua at the end of each cycle. If fertilization has occurred, the blastocyst reaches the uterine epithelium and implantation starts. The correct signaling between the decidua and the fetal trophoblast is of paramount importance for blastocyst implantation and successful pregnancy. Thus, mother and embryo interact via specific tissues in a reciprocal exchange of molecules that act as communication signals.

Materials and Methods
Due to ethical reasons, many of the mechanisms that take place at the human feto-maternal interface remain poorly understood. Animal models remain a solid and important shield to study human pregnancy establishment and development, but unfortunately, they often fail to completely reproduce the complexity of human reproduction. Many efforts have been taken in order to shed light on the physiological, pathological and toxicological aspects of human pregnancy, and *in vitro* models represent a valid help for researches in this field.

Discussion and Conclusions
Our research study focused on setting up new *in vitro* models of human placenta. The goal was to reconstitute placental functions *ex vivo* by techniques that are referred to as three-dimensional (3D) culture, organotypic culture or organoid culture. Indeed, 2D cultures do not completely recapitulate the organization of cells and extracellular matrix within tissues and organs. Our study showed that the 3D model provides a better contribution in identifying molecules involved in trophoblast growth and differentiation.

Key words: *In vitro* models, Human placenta.

Omphalocele and gastroschisis: from diagnosis to treatment. 30 years of experience in a single center

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Background
Omphalocele and gastroschisis are congenital malformations due to a closure defect of the abdominal wall. The incidence ranging between 1/3200-10000 for omphalocele and 1/20-30,000 for gastroschisis. They can be isolated defects but more often are associated with more complex syndromes. We present our series of patients.

Materials and Methods
At the Division of Pediatric Surgery, Department of Medical Science, Surgery and Neuroscience at the University of Siena from 1980 to 2016 we retrospectively analyzed our series of 58 patients, including 12 with gastroschisis and 46 with omphalocele, of which 18 cases were with extracorporeal liver and 28 with intracorporeal liver. We analized these parameters: sex of the baby, timing of diagnosis, type of delivery, associated malformations, surgical treatment, feeding with NPT, assisted ventilation, complications, prognosis and mortality. They were found in total 66 malformations because some patients had multiple defects simultaneously. All patients with gastroschisis and major omphalocele showed an associated intestinal malrotation. Fisher's test was used for the presence of significant differences in the timing of the diagnosis, the use of NTP and the days of hospitalization.

Results
Patients were treated in the first days of life. Primary defect closure was performed in 6 cases, respectively, 1 gastroschisis and 5 major omphalocel. We used Schuster's silo for closure in more stages. NPT has been used in 13 cases of omphalocele and in 8 cases of gastroschisis. Hospitalization was in 14 cases with omphalocele and 7 cases with gastroschisis over 25 days. Fisher's test does not have significant differences in prenatal diagnosis (P=0.59) and in postoperative hospital stay (P=0.77); the only significant difference was found in the use of the NPT (P=0.02). Seven patients died for respiratory complications arose after surgery and for associated malformations. The short- and long-term follow-up is related to the presence of associated malformations is therefore closely linked to the individual patient.

Conclusions
Omphalocele and gastroschisis are still serious diseases. In recent decades it has achieved a significant improvement in morbidity and mortality due to prenatal diagnosis, the planned delivery at tertiary centers and improved surgical techniques.

Key words: Omphalocele, gastroschisis.

GLYCODELIN A EXPRESSION DURING THE MENSTRUAL CYCLE: A BIOMARKER OF THE IMPLANTATION WINDOW?

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Background
The endometrium, the mucosa covering the inner cavity of the uterus, represents a dynamic tissue extremely sensitive to hormones, which periodically undergoes significant structural and biochemical changes, essential for embryo implantation. The endometrial receptivity takes places over a very short time between day 20th-24th of a menstrual cycle, called *the implantation window*. Implantation is a process due to a coordinate series of events that allow the early interaction between the fetus and the mother, supporting the beginning and preservation of pregnancy.

Discussion and Conclusions
Endometrial receptivity is a prerequisite for successful implantation and Glycodelin A is one of the main products of endometrial secretion and its expression could be a marker for its development and maturation. We hereby demonstrated by two dimensional electrophoresis, immunoblotting and computer assisted semi-quantitative analysis, that GdA expression progressively decrease during the proliferative phase, completely disappeared at ovulation (late proliferative phase), and re-appeared after ovulation, reaching a peak during the implantation window with the expression of a new more acidic isoform. Among various activities, GdA has immunosuppressive and immunomodulatory properties, that seem to be involved in protecting the fetus from the maternal immune system, thus justifying the high concentration of this glycoprotein observed during the implantation window and early stages of pregnancy.

Key words: Glycodelin A, Implantation window.

PULSE OXIMETRY SCREENING WITHIN 24 HOURS OF LIFE: USEFULNESS FOR EARLY DETECTION OF CONGENITAL HEART DEFECTS

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Background and aim
Congenital heart defects (CHD) occur in 5-8 per 1000 live births. Since symptoms and signs may be subtle or lacking, CHD may be missed in the routine clinical examination of newborns. Pulse oximetry screening at 48 hours of life increases early detection of CHD and minimizes the risk of circulatory collapse before surgery. The aim of the work was to assess the usefulness of pulse oximetry performed within the first day of life as a screening test in early diagnosis of CHD.

Materials and Methods
The study was performed in all healthy newborns admitted to the Rooming-in of the University Hospital of Siena between February 16th 2016 and April 27th 2016. Pre-ductal (in right hand) and post-ductal (in either foot) oxygen saturation (SpO_2) was measured between the 2nd and the 24th hour of life. Screening cut-off values were: a) pre-ductal OR post-ductal SpO2 <90%; b) pre-ductal AND post-ductal SpO_2 90-94% on 3 repeated measurements; c) difference in SpO_2 between pre-ductal and post-ductal >3% on 3 repeated measurements. After the test was performed, each baby underwent a routine clinical evaluation. Newborns with positive screening test or with clinical suspicion for CHD were referred for echocardiogram before discharge.

Results
One hundred and forty-nine newborns were screened. 4 cases of congenital heart defect were detected: 1 case was detected by pulse oximetry screening alone (Partial Anomalous Pulmonary Venous Return), 1 case was detected by physical examination alone (Interatrial Defect), 2 cases showed both positive pulse oximetry test and physical evaluation (Coarctation of Aorta and Interventricular Defect). There were no false positive cases with pulse oximetry screening so far, while physical examination alone had 1 false positive result. Pulse oximetry screening alone showed a sensitivity of 66,6% and a specificity of 100%. The positive predictive value of the test was 100% and the negative predictive value was 99,3%. Combining physical examination with pulse oximetry screening had a sensitivity of 100%.

Conclusions
Pulse oximetry screening performed within 24 hours of life seems to be useful in supporting postnatal physical examination in the early detection of CHD. It is a safe, simple and feasible test acceptable to parents and staff. Although earlier testing may lead to higher false positive rates, it is important to consider the fact that critical CHD may present with clinical deterioration in the first hours of life. On the other hand, minor CHD, such as Interventricular and Interatrial Defects, if undiagnosed, may lead to heart failure within the first months of life. Pulse oximetry screening performed within 24 hours may help to identify CHD that would otherwise go undetected due to the increasing trend towards earlier discharge.

Key words: Congenital heart defects, Pulse oximetry screening.