

SPECIAL ISSUE:
“**FOCUS ON PEDIATRIC CARDIOLOGY**”

This special issue provides a rich blend of news, reviews and clinical studies on many aspects of the understanding, management and prevention of cardiovascular disease in childhood. Primary care in pediatric cardiology, principally, must concern with prevention of heart disease and early detection of existing illness. In addition, pediatricians must be able to maintain the vigilance of “healthy” children in order to prevent cardiovascular risk in adulthood. With these goals, the themes presented in this “mosaic” of topics include

- Cardiovascular involvement in genetic syndromes, SIDS and infectious, endocrine, kidney, storage or autoimmune diseases.
- Pulmonary hypertension and patent ductus arteriosus in premature infants.
- Cardiovascular risk in obese or hypertensive children.
- Bicuspid aortic valve and aortic dysfunction
- Covid 19 and heart disease in childhood

I thank the Researchers and Professors of Catanzaro, Palermo, Pavia, Brescia, Taormina and Messina University for their interesting and up-to-date scientific contributions, and I hope the information gathered in this issue will be useful to the reader.

Prof. Maria Pia Calabrò
Associate Professor of Pediatrics
Head of Pediatric Cardiology Unit
Department of Human Pathology of Adulthood and Childhood
University of Messina. Italy



Hypertension in childhood

G. Ceravolo^{1*}, M Fusco^{1*}, C. Salpietro¹, D. Concolino², R. De Sarro², T. La Macchia³, A. Ceravolo⁴, L. Oreto⁵, L. Colavita¹, R. Chimenz⁶, M. Sturiale¹, E. Gitto⁷, M.P. Calabrò⁸ and C. Cuppari¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ²Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy; ³Department of Clinical and Experimental Medicine, Unit of Cardiology, University of 5 Messina, “G. Martino” Policlinic, Messina, Italy; ⁴Pediatrician, Cinquefrondi (RC), Italy; ⁵Mediterranean Pediatric Cardiology Center, San Vincenzo Hospital, Taormina, Italy; ⁶Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology, and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ⁷Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ⁸Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

The first two authors contributed equally to this work.

Hypertension is a growing health problem in children, and it is an important parameter of cardiovascular risk for adults. It is classified as primary (influenced by obesity, sedentary lifestyles and poor-quality food) or secondary to underlying causes. The AAP 2017 guidelines recommend measuring blood pressure every year from the age of three and in children under the age of three only if they have known risk factors. The measurement of infantile hypertension is relatively complicated and instable and, for this reason, ambulatory blood pressure monitoring (ABPM) and multiple office BP measurement (mOBPM), especially in infants who are not collaborating are indicated. High blood pressure may have an adverse effect on the heart, the vessels, the kidney, and the central nervous system so it is important recognize it and act promptly. Hypertension is initially treated with lifestyle changes such as weight loss, a healthy diet, and regular exercise, but, if non-pharmacological interventions have failed, a pharmacological treatment with angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, thiazide diuretics and/or beta blocker may be indicated.

Cardiovascular risk factors in childhood obesity

M. Amatruda^{1*}, M.D. Ceravolo^{1*}, G. Ceravolo¹, C. Cuppari¹, L. Oreto², B. Piraino¹,
F. Xerra¹, G. Nicocia³, C. Salpietro¹ and M.P. Calabrò⁴

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ²Mediterranean Pediatric Cardiology Center, San Vincenzo Hospital, Taormina, Italy; ³Department of clinical and Experimental medicine, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy.

*The first two authors contributed equally to this work.

Childhood obesity is the “disease of the century”. This article reviews the early cardiovascular risk factors and the recommendations to prevent them in the overweight and obese children. A comprehensive search of published literature was carried out to identify all articles published on this topic in English and Italian from 1999 to 2020.

Genetics and cardiovascular disease

I. Loddo¹, F. Barbera², G. Di Gesaro³, M. C. Cutrupi⁴, M.P. Calabrò⁵, G. Ceravolo⁴,
C. Salpietro⁴, S.M.C. Gramaglia⁴, A. Ceravolo⁶, D. Concolino⁷, R. De Sarro⁷, C. Cuppari⁴, E. Gitto⁸,
F. Clemenza³ and D. Di Carlo¹

¹*Diagnostic and Therapeutic Services Department - Clinical Pathology, Microbiology and Virology Laboratory - Medical Genetics Unit. IRCCS - ISMETT (Mediterranean Institute for Transplantation and Advanced Specialized Therapies) Palermo, Italy;* ²*Research Department. IRCCS - ISMETT (Mediterranean Institute for Transplantation and Advanced Specialized Therapies) Palermo, Italy;* ³*Department for Care and Study of Cardiothoracic Pathologies and Cardiothoracic Transplants - Cardiology Unit. IRCCS - ISMETT (Mediterranean Institute for Transplantation and Advanced Specialized Therapies) Palermo, Italy;* ⁴*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy;* ⁵*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy;* ⁶*Pediatrician, Cinquefrondi (RC), Italy;* ⁷*Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy;* ⁸*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, University of Messina, Messina, Italy, Neonatal and Pediatric Intensive Care Unit*

Cardiac defects in RASopathies: a review of genotype- phenotype correlations

L. Loddo¹, M. C. Cutrupi², D. Concolino³, R. De Sarro³, A. Barbalace², A. Salpietro⁴,
D. Busceti², M.D. Ceravolo², M.P. Calabrò⁵, G. Ceravolo², A. Gambadauro² and C. Cuppari²

¹Diagnostic and Therapeutic Services Department - Clinical Pathology, Microbiology and Virology Laboratory - Medical Genetics Unit. IRCCS - ISMETT (Mediterranean Institute for Transplantation and Advanced Specialized Therapies) Palermo, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ³Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy; ⁴Pediatric Clinic, ASST-Spedali Civili of Brescia, University of Brescia, Brescia, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

Congenital heart disease in Down syndrome

S.M.C. Gramaglia¹, C. Cuppari¹, C. Salpietro¹, A. Ceravolo², M.C. Cutrupi¹,
D. Concolino³, R. De Sarro³, M. Amatruda¹, P. Mondello⁴, G. Ceravolo¹, M.P. Calabrò⁵,
E. Gitto⁶ and S. Sestito²

¹*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy;* ²*Pediatrician, Cinquefrondi (RC), Italy;* ³*Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy;* ⁴*Division of Hematology, Department of Human Pathology in Adulthood and Childhood “Gaetano Barresi, University of Messina, 98125 Messina, Italy;* ⁵*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy;* ⁶*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy*

Myocarditis in children - from infection to autoimmunity

C. Cuppari¹, M Amatruda¹, G. Ceravolo¹, M.D. Ceravolo¹, L. Oretto², L Colavita¹,
A. Barbalace¹, M.P. Calabrò³ and C. Salpietro¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ²Mediterranean Pediatric Cardiology Center, San Vincenzo Hospital, Taormina, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy.

The aetiology of myocarditis in children remains often unknown. Myocarditis is an inflammatory disease of the myocardium (inflammatory cardiomyopathy) classified among the acquired primary cardiomyopathies. It is caused primarily by numerous infectious agents, but it may also accompany autoimmune disease, hypersensitivity reactions and toxins. This special issue aims to provide an overview of aetiology and pathophysiology with main target pharmacological properties of myocarditis in children. A comprehensive search of published literature using the PubMed (<http://www.ncbi.nlm.nih.gov/pubmed/>) database was carried out to identify all articles published in English from 2000 to January 2019, using the following key terms: Myocarditis, Infection, Autoimmunity and Children.

Myocarditis, according to the World Health Organization/International Society and Federation of Cardiology (WHO/ISFC) definition, is an inflammatory disease of the myocardium associated to myocyte necrosis or degeneration of non-ischaemic event (1, 2). It is uncommon in childhood and it may be isolated or part of systemic diseases. The incidence of myocarditis is approximately 2 in 100,000 patient-years, with a male predominance in children older than 6 years, but the true incidence is underestimated because the disease can be subclinical (3).

Clinical presentation of this inflammatory disease includes a very wide symptomatology ranging from dyspnoea, palpitation, chest pain to forms of acute or chronic congestive heart failure, sudden cardiac death or fulminant cardiogenic shock (4). Many cases of myocarditis are, however, asymptomatic (5).

The diagnosis is established by histological, immunological and immunohistochemical criteria (6). The first diagnostic criteria (“Dallas Criteria”) were proposed in 1986 (2). The diagnosis is, however, difficult and often placed in case of acute myocardial dysfunction. The clinical history, the physical examination, chest X-ray, electrocardiogram (ECG) and echocardiogram associated with an elevation of cardiac enzymes such as creatinine phosphokinase MB fraction (CK-MB) and cardiac troponin I, can lead to diagnosis (6). Cardiac magnetic resonance imaging (MRI) maybe helpful imaging tool, but the gold standard remains the myocardial biopsy (5).

Over the last decade, cardiac magnetic resonance imaging (MRI) has become the gold standard for myocardial tissue analysis in several cardiac diseases (7). Patients with myocarditis displayed increased level of High mobility group box 1 (HMGB1), and, the evaluation of concentrations of HMGB1 could explain how an initial inflammation can trigger the condition of meta-inflammation (8). HMGB1 can be

Cardiovascular complications in children with chronic kidney injury

F. Meo¹, A. Salpietro², G. Ceravolo¹, D. Concolino³, R. De Sarro³, E. Gitto⁴, I. Viola¹, S. Sestito³, U. Cucinotta¹, N. Giannitto¹, C. Cuppari¹, M. Corso¹, M.D. Ceravolo¹, M.P. Calabrò⁵ and R. Chimenz⁶

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ²Pediatric Clinic, ASST-Spedali Civili of Brescia, University of Brescia, Brescia, Italy; ³Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy; ⁶Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology, and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy

Kawasaki disease and cardiac involvement: an update on the state of the art

G. Conti¹, N. Giannitto², F.L. De Luca³, A. Salpietro⁴, L. Oreto⁵, I. Viola²,
A. Ceravolo⁶, G. Nicocia⁷, A. Sio², M. Romeo², G. Ceravolo², C. Cuppari²,
M.P. Calabrò³ and R. Chimenz¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, , “G. Martino” Policlinic, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, , “G. Martino” Policlinic, Italy; ⁴Pediatric Clinic, ASST-Spedali Civili of Brescia, University of Brescia, Brescia, Italy; ⁵Mediterranean Pediatric Cardiology Center, San Vincenzo Hospital, Taormina, Italy; ⁶Pediatrician, Cinquefrondi (RC), Italy; ⁷Department of clinical and Experimental medicine, University of Messina, “G. Martino” Policlinic, Italy

Kawasaki disease (KD) is an acute systemic vasculitis of unknown etiology. It has a self-limiting course and so far, represents the most common cause of coronary heart disease acquired in children aged between 6 months and 5 years. The inflammatory process can involve the coronary arteries with the formation of aneurysms and thrombotic occlusions with the risk of sudden death, especially in infants. Myocardial inflammation and abnormalities of cardiac contractility can occur acutely or many years after the disease onset. Therapy must be started within 10 days after the onset of symptoms to reduce the risk of heart complications. Immunoglobulin and aspirin treatment are effective in reducing heart complications. Recent studies have shown new therapeutic strategies (corticosteroids, immunosuppressive and biological drugs) in case of ineffectiveness of treatment with immunoglobulins.

Genetic cardiac channelopathies and SIDS

L. Bruno¹, G. Ceravolo², M.D. Ceravolo², A. Salpietro³, D. Concolino⁴, R. De Sarro⁴, L. Oreto⁵,
A. Tropeano², I. Viola², R. Chimenz⁶, C. Cuppari² and M.P. Calabrò¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ³Pediatric Clinic, ASST-Spedali Civili of Brescia, University of Brescia, Brescia, Italy; ⁴Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy; ⁵Mediterranean Pediatric Cardiology Center, San Vincenzo Hospital, Taormina, Italy; ⁶Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy

Group A beta-hemolytic Streptococcus and heart in children

L. Colavita¹, U. Cucinotta¹, F. Galletta¹, R. Chimenz², G. Nicocia³, N. Giannitto¹, G. Ceravolo¹,
M. Sturiale¹, A. Ceravolo⁴, C. Salpietro¹ and C. Cuppari¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology, University of Messina, “G. Martino” Policlinic, Italy; ³Department of clinical and Experimental medicine, University of Messina, “G. Martino” Policlinic, Italy; ⁴Pediatrician, Cinquefrondi (RC), Italy

The heart in Anderson-Fabry disease

S. Sestito¹, K. Roppa¹, F. Parisi¹, M. T. Moricca¹, L. Pensabene¹, R. Chimenz², M.D. Ceravolo³,
U. Cucinotta³, G. Ceravolo³, M.P. Calabrò⁴, C. Cuppari³, P. Mondello⁵, D. Musolino¹,
V. Tallarico¹ and D. Concolino¹

¹*Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy;* ²*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology, University of Messina, “G. Martino” Policlinic, Italy;* ³*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, Policlinico “G. Martino” Messina, Italy;* ⁴*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy;* ⁵*Division of Hematology, Department of Human Pathology in Adulthood and Childhood “Gaetano Barresi”, University of Messina, 98125 Messina, Italy*

Dilated cardiomyopathy in mucopolidosis type 2

E. Carboni^{1*}, S. Sestito^{1*}, M. Lucente², A. Morrone³, L. Zampini⁴, R. Chimenz⁵, M.D. Ceravolo⁶, R. De Sarro¹, G. Ceravolo⁶, M.P. Calabrò⁷, F. Parisi¹, M. T. Moricca¹, L. Pensabene¹, D. Musolino¹ and D. Concolino¹

¹*Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy;* ²*Neonatology and Neonatal Intensive Care Unit, “Pugliese-Ciaccio” Hospital, Catanzaro, Italy;* ³*Paediatric Neurology Unit and Laboratories, Neuroscience Department, A. Meyer Children’s Hospital, Florence, Italy;* ⁴*Department of Clinical Sciences, Polytechnic University of the Marche, Ancona, Italy;* ⁵*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology, University of Messina, “G. Martino” Policlinic, Italy;* ⁶*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy;* ⁶*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, Policlinico “G. Martino” Messina, Italy;* ⁷*Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy.*

*The first 2 authors contributed equally to this work.

Mucopolidosis II and III are lysosomal storage diseases caused by pathogenetic mutations in *GNPTAB* and *GNPTG* genes which cause an impaired activity of the lysosomal hydrolase N-acetylglucosamine-1-phosphotransferase, a key enzyme in the synthesis of the mannose-6-phosphate targeting signals on lysosomal enzymes. Patients with MLII alpha/beta present coarse facial features, cessation of statural growth, important skeletal manifestations, impaired neuromotor development and cardiorespiratory involvement. All children appear to have cardiac involvement, but severe dilated cardiomyopathy is uncommon. In this report we describe the case of an 11-month-old girl who is affected by a MLII. Analysis of the *GNPTAB* gene identified at a heterozygous level the previously described gene variants c. 2693delA p(Lys898Serfs*13) and c. 2956C>T p(Arg986Cys). Her main clinical features were coarse face with gingival hypertrophy, dysostosis multiplex, recurrent respiratory infection and an early onset of dilated cardiomyopathy, an uncommon feature for MLII. To our knowledge, dilated cardiomyopathy has been previously described in literature in only two cases of MLII and in one patient affected by MLIII.

PPHN and oxidative stress: a review of literature

R. Chimenz¹, L. Cannavò², A. Gasbarro², F. Nascimben³, S. Sestito⁴, L. Rizzuti², G. Ceravolo⁵, M.D. Ceravolo⁵, M.P. Calabrò⁶, C. Romeo³ and E. Gitto²

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Pediatric Surgery Unit, University of Messina, Messina, Italy; ⁴Department of Science of Health, University Magna Graecia of Catanzaro, Pediatric Unit, University of Catanzaro, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, “G. Martino” Policlinic, Messina, Italy; ⁶Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

Persistent pulmonary hypertension of the neonate is a multifactorial condition characterized by maladaptive pulmonary vascular remodeling and abnormal contractile reactivity. This review evaluates the role of oxidative stress and antioxidant treatment on the persistent pulmonary hypertension of the neonate.

Role of oxidative stress in the pathogenesis of congenital cardiopathies

F. Nascimben¹, F.M. Peri¹, P. Impellizzeri¹, R. Chimenz², L. Cannavò³,
D. Pellegrino⁴, G. Ceravolo⁴, M.P. Calabrò⁵, E. Gitto³ and C. Romeo¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Pediatric Surgery Unit, University of Messina, Messina, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, , “G. Martino” Policlinic, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino”

Cardiac malformations in children with congenital hypothyroidism

M. Scavone¹, V. Tallarico¹, E. Stefanelli¹, F. Parisi¹, R. De Sarro¹, C Salpietro², G. Ceravolo², S. Sestito¹, L Pensabene¹, R. Chimenz³, M.P. Calabrò⁴, E. Gitto⁵, L Giancotti¹ and D. Concolino¹

¹Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, “G. Martino” Policlinic, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy

Congenital hypothyroidism (CH) is the most common endocrine disease in children, according to literature, infants with CH have an increased risk of associated congenital malformations (CM), especially cardiac defects (CD), compared to the general population. We retrospectively analyzed medical records of 255 patients with a positive screening result for CH in the period 1991-2016 followed at our Center. At the time of enrollment, the clinical examination included looking for the presence of heart murmurs and dysmorphic features. In all patients an echocardiography with cardiological evaluation were performed. Of all patients, 191 were included in the final analysis. Of these, 51.3% (98/191) presented an eutopic normally sized thyroid gland while 48.7% (93/191) showed a thyroid dysgenesis. Among the studied infants, 13.6% (26/191) presented CD. The most frequent cardiac anomaly was atrial septal defect (ASD) which was found in 65.4% (17/26) of patients with CD. Other defects were ventricular septal defect (VSD), patent ductus arteriosus (PDA), pulmonary valve stenosis (PvS), transposition of the great vessels (TGV), aortic valve stenosis (AvS). Six patients had multiple defects. In the analysed group, there was no significant relation with sex, type of CH, median blood-TSH (b-TSH) and serum-TSH (s-TSH) values and frequency of CD. There is a high prevalence of CD in CH, indicating the need of routine echocardiography in these patients to achieve an early diagnosis and management of CD.

Prevalence of elevated pulmonary artery systolic pressure in Down Syndrome young patients with and without congenital heart disease

A. Nicoletti¹, M. Vatrano², S. Sestito¹, R. Apa¹, S. Patroniti³, G. Ceravolo³, M.P. Calabrò⁴, F. Parisi¹, K. Roppa¹, R. De Sarro¹, E. Gitto⁵, L. Pensabene¹ and D. Concolino¹

¹*Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy;* ²*UTIC and Cardiology, Hospital "Pugliese-Ciaccio", Catanzaro, Italy;* ³*Department of Human Pathology in Adult and Developmental Age "Gaetano Barresi", Unit of Emergency Pediatrics, University of Messina, "G. Martino" Policlinic, Italy;* ⁴*Department of Human Pathology in Adult and Developmental Age "Gaetano Barresi", Unit of Pediatric Cardiology, University of Messina, "G. Martino" Policlinic, Italy;* ⁵*Department of Human Pathology in Adult and Developmental Age "Gaetano Barresi", University of Messina, Messina, Italy, Neonatal and Pediatric Intensive Care Unit*

This study examined the prevalence and distribution of elevated systolic pulmonary arterial pressure, measured by echocardiography, in young patients with down syndrome associated or not with congenital heart disease and surgical correction during childhood. Pulmonary artery systolic pressure, computed by regurgitant tricuspid flow velocity evaluation, is the most frequently used parameter for the screening of pulmonary hypertension. Down syndrome and congenital heart disease often coexist and the probability to detect elevated systolic pulmonary arterial pressure in this setting is high. However, little is known about the evaluation of pulmonary arterial pressure during growth of patients with down syndrome with or without congenital heart disease. We enrolled 47 young patients (55% of male sex; mean age: 18.4 ± 6.0 years), 40 with congenital heart disease and 7 without a cardiac defect. Systolic pulmonary arterial pressure was assessed by echocardiography. No difference was found in the population dichotomized by presence or absence of CHD. Only male sex ($p=0.000$), highly sensitive troponin-T ($P=0.027$), tricuspid annular plane systolic excursion (TAPSE, $p=0.045$) and sPAP ($p=0.004$) were elevated in surgical group. The ASD was found as, the most common structural abnormality in our patients (50%), followed by VSD (27.5%) and complex CHD (such as complete atrioventricular canal defect, CAVC = 25% and Fallot disease = 15%). Furthermore, about 45% of patients had the combined defect. Only 37.5% of patients underwent to corrective surgery during the first months of life. We observed a significantly increase of sPAP values in patients with complex CHD, such as CAVC ($p=0.019$) and Fallot disease ($p=0.001$) but, in the following multivariate analysis performed in the patients with CHD, only Fallot disease remains as independent predictors of elevated values of sPAP ($p=0.022$). An elevated systolic pulmonary arterial pressure may represent the key screening tool in the diagnostic assessment of suspect pulmonary arterial hypertension in high risk population with down syndrome regardless the presence of congenital heart disease.

Cardiac involvement in Lysosomal Storage Diseases

S. Sestito¹, F. Parisi¹, V. Tallarico¹, F. Tarsitano¹, K. Roppa¹, L. Pensabene¹, R. Chimenz², G. Ceravolo³, M.P. Calabrò⁴, R. De Sarro¹, M.T. Moricca¹, G. Bonapace¹ and D. Concolino¹

¹Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy; ²Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

Lysosomal storage diseases (LSDs) include a heterogeneous group of rare, inborn, metabolic diseases characterized by deficiency of lysosomal enzymes or of other proteins involved in lysosomal function, leading to multi organ system substrates accumulation, with consequent multi systemic clinical presentation. Cardiac disease is particularly important in some group of LSDs as glycogen storage diseases (Pompe), mucopolysaccharidoses and in glycosphingolipidoses (Anderson-Fabry disease and less frequently Gaucher disease). Various cardiac manifestations may be observed including hypertrophic and dilated cardiomyopathy, coronary artery disease and valvular disease. The availability of enzyme replacement therapy (ERT) has changed the natural history of some LSDs such as Pompe disease, thanks to the significant effects on cardiological involvement. In other LSDs such as MPSs or Fabry disease, ERT has been shown to stabilize or slow the progression of heart damage. This imposes the need for a timely diagnosis that allows a rapid onset of ERT.

Covid-19 and cardiac involvement in childhood: state of the art

C. Cuppari¹, G. Ceravolo¹, M.D. Ceravolo¹, S. Sestito², G. Nicocia³, R. Chimenz⁴, C. Salpietro¹
and M.P. Calabrò⁵

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatrics, University of Messina, “G. Martino” Policlinic, Italy; ²Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy; ³Department of clinical and Experimental medicine, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Nephrology and Rheumatology with Dialysis, University of Messina, “G. Martino” Policlinic, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first described in a cluster of patients in Wuhan, China, in December of 2019. Over the past few months, COVID-19 has rapidly spread worldwide becoming the first pandemic of the 21st century. COVID-19 results in mild symptoms in most infected children but can cause acute cardiac injury and death. In comparison to younger children, teenagers and infants are at higher risk for morbidity and mortality, with particular risk factors including pre-existing conditions like cardiovascular disease. Since this is an emerging infectious disease, there are limited data about the effects of this infection on patients especially in the pediatric population. We summarize here with the data on cardiovascular involvement in children and adolescents.

Bicuspid aortic valve in children: importance of aortic shape, role of follow up and risk of aortic dilatation

A.C. Codazzi¹, A. Turchetti², A. Apicella², R. Ippolito², G. Ceravolo³, E. Gitto⁴, M.P. Calabrò⁵,
C. Novara², G. Casari² and G.L. Marseglia²

¹Department of Clinical, Surgical, Diagnostic and Pediatric Sciences, U.O.S. Pediatric Cardiology, “IRCCS Policlinico S. Matteo” Pavia, Italy; ²Department of Clinical, Surgical, Diagnostic and Pediatric Sciences, University of Pavia, “IRCCS Policlinico S. Matteo” Pavia, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy

Preterm Patent Ductus Arteriosus: Controversies Overview

A. Warm¹, A. Gasbarro¹, D. Concolino², A. Sio³, G. Ceravolo³, G. Nicocia⁴,
C. Ferrarolo³, U. Cucinotta³, S. Sestito², M.P. Calabrò⁵, E. Gitto¹ and S Cordaro¹

¹Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Neonatal and Pediatric Intensive Care Unit, University of Messina, Messina, Italy; ²Pediatric Unit, Department of Science of Health, University Magna Graecia of Catanzaro, Catanzaro, Italy; ³Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Emergency Pediatric, University of Messina, “G. Martino” Policlinic, Italy; ⁴Department of clinical and Experimental medicine, University of Messina, “G. Martino” Policlinic, Italy; ⁵Department of Human Pathology in Adult and Developmental Age “Gaetano Barresi”, Unit of Pediatric Cardiology, University of Messina, “G. Martino” Policlinic, Italy