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Neonatal pharmacology and clinical implications

Antonio Ruggiero

Universita' Cattolica Sacro Cuore, Italy

Abstract

In the neonatal period it is observed a physiological immaturity of organs and metabolic systems that influence the pharmacokinetics and pharmacodynamics of administered drugs, whose dosage should be constantly amended, taking into consideration the progressive increase in weight and the maturation of the metabolic pathways. A crucial objective in the pharmacological field is to define the correct pharmacological dose. Drug underdosage may result in a loss of efficacy, whereas an overdosage can cause toxicity. The rapid physiological changes in the neonatal period affect the safety and efficacy of the drug due to the various pharmacokinetic phases (absorption, distribution, metabolism and excretion), therefore the infant cannot be considered as a "small adult". In the newborn, the volume of distribution of hydrophilic drugs is greater with respect to adults: this is due to the presence of a greater relative volume of extracellular fluids and total body water, as well as to the lower relative amount of adipose tissue and muscular mass. In general, it is known that the drugs excretion mechanisms are reduced in all infants. However these processes cannot be generalized and the metabolism of each drug must be analysed on a case-by-case basis. The investigation and understanding of the pharmacological processes of the neonatal organism to the administered drugs is extremely useful to determine the correct dosage. However, many of the drugs for neonatal use remain poorly studied, and their dosage is often based on informations that are extrapolated from the use in adults or in older children, because conducting clinical trials during the neonatal period is limited for ethical and logistical reasons. In conclusion, the paediatric and adult population show significant differences with regard to the absorption, distribution, metabolism and excretion of different drugs. The understanding of the differences with respect to adulthood is fundamental to determine the correct dosage of drugs, in order to achieve the desired therapeutic effects and limit the toxic effects.

Biography

Antonio Ruggiero received his medical degree from the Catholic University in Rome in 1992. He holds Board of Pediatrics in 1996 and Board of Pediatric Haematology and Oncology in 1998 at the Catholic University of Rome Prof. Ruggiero is currently an associate professor in the Department of Pediatrics at the Catholic University of Rome where he is responsible for teaching Pediatrics and Pediatric Hematology and Oncology. Carrying a regular patient load as consultant in pediatric oncology allows him to maintain his clinical skills and to promote improvements in safety and quality of healthcare. Examples of activities include producing guidelines for prevention of healthcare associated treatments and improvements in basic safe medical practices. His research interests focus on pediatric clinical trials, clinical pharmacology of antineoplastic drugs, pain therapy and pediatric drugs.

Publications

1. Diffuse Intrinsic Pontine Glioma (DIPG): breakthrough and clinical perspective.
2. CN133, a Novel Brain-Penetrating Histone Deacetylase Inhibitor, Hampers Tumor Growth in Patient-Derived Pediatric Posterior Fossa Ependymoma Models.
3. Data acquired by wearable sensors for the evaluation of the flexion-relaxation phenomenon.
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