

2nd World Congress on **CARDIOLOGY**

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39th Annual Congress on

MICROBIOLOGY AND MICROBIAL INFECTION

July 23 - 24, 2018 | Rome, Italy

Christopher F Tirota, Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C1-002

**ROTEM AND HUMAN FIBRINOGEN
CONCENTRATE USE IN PEDIATRIC CARDIAC
SURGERY**

Christopher F Tirota

Nicklaus Children's Hospital, USA

Human Fibrinogen Concentrate (HFC or RiaSTAP) is a purified fibrinogen concentrate derived from the plasma of healthy donors that undergoes virus inactivation and removal for safety purposes. HFC is indicated for the treatment of acute bleeding in patients with congenital fibrinogen deficiency (CFD), including afibrinogenemia and hypofibrinogenemia. Treatment with fibrinogen is also used for acquired fibrinogen deficiency caused by placental abruption, massive transfusion, liver failure, disseminated intravascular coagulation, and cardiac surgery. The ROTEM (Tem International GmbH, Munich, Germany) is an enhanced modification of thromboelastography (TEG), first described in 1948. Both are point-of care (POC) coagulation monitoring instruments that test the viscoelastic properties of whole blood. Use of the ROTEM has been shown to reduce the need and amount of transfused blood products in pediatric cardiac surgery patients. Tirota et al. demonstrated that administering HFC at a dose of 70 mg/kg to neonates and infants undergoing cardiac surgery reduced the need for fresh frozen plasma (FFP) and cryoprecipitate. HFC can also be dosed depending on the actual and target fibrinogen levels using the formula:

$$\text{Dose (mg/kg body weight)} = \frac{\text{target level (mg/dL)} - \text{measured level (mg/dL)}}{1.7 \text{ (mg/dL per mg/kg body weight)}}$$

Tirota et al also demonstrated the Maximum Clot Firmness (MCF) of the ROTEM FIBTEM can be used as a surrogate of the fibrinogen level to dose the HFC via the formula: predicted fibrinogen=78.61+12.38 MCF. This formula suggests that a 1 mm of increase in MCF will correspond to a 12.38 increase in fibrinogen level. Using this formula and the POC ROTEM device, practitioners can tailor the transfusion therapy to reduce transfusion volume and donor exposure. CPB induced profound perturbations in ROTEM values. The administration of platelet pheresis (25 cc/kg) while on CPB improved the HEPTTEM from 48 to 73 and the FIBTEM MCF from 4.8 mm to 8.3 mm; plasma fibrinogen levels increased from 105 mg/dL to 175 mg/dL. The administration of HFC (55 mg/kg) after termination of CPB improved the FIBTEM MCF from 7.9 mm to 10.3 mm and the plasma fibrinogen level from 175 mg/dL to 240 mg/dL.



Note:

BIOGRAPHY

Christopher F Tirota has been an active member of Miami Children's Hospital medical staff since 1991, practicing with the Department of Anesthesiology; he has served as the Director of Cardiac Anesthesia since 2002. He has served as Chief of the Department of Anesthesia since July 2017. He also has a clinical appointment with the Department of Anesthesiology at The University of Miami School of Medicine. He received his BA from Cornell University in 1982 and his MD from New York University School of Medicine in 1986. He also received an MBA degree from Columbia University in 1999. He completed his internship in Internal Medicine at SUNY at Stony Brook in 1987. He completed his residency training in Anesthesiology at the University of Miami/Jackson Memorial Hospital in 1990; he sub-specialized in pediatric and cardiovascular anesthesia, including heart transplantation.

christirota@att.net