Introduction
A new sorbent (Cytosorb, Cytosorbents USA), based on blood-compatible porous polymer-beads able to adsorb hydrophobic molecules, could be a valid artificial support in many conditions of organ failure removing cytokines and toxic molecules directly from blood. At present, extracorporeal systems are based on plasmaadsorption. We performed an in vitro study on bilirubin kinetics removal to verify the system's adsorption capacity and the ability to remove protein-bound solutes.

Methods
We performed 3 in vitro tests. Experiments 1&2 were done with equimolar solution of Albumin (albumin)-Bilirubin (albumin), with only Unconjugated bilirubin, strongly albumin-bound, to verify the removal of protein-bound solutes. In the test 3, 24h long, we tried to reproduce clinical conditions, with higher concentration of bilirubin and lower of albumin to study kinetics & mass balance. Solutions were recirculated in a circuit including a peristaltic pump and CytoSorb at a flow rate of 100 ml/min. Samples were collected pre and post cartridge at different times: 0, 15, 30 min and then every 30 min until the end.

Results
All of the experiments showed the adsorption capacity of the system concerning bilirubin (Table 1) with a minimal loss of albumin. Experiments 1&2 demonstrated the capacity to adsorb protein-bound solutes. In this condition the removal of bilirubin is possible only breaking the albumin-bilirubin complex. Test 3 showed a bilirubin adsorption of 2.499 mg, equivalent to the removal of blood bilirubin in a 70 kg patient with an initial concentration of 49,98 mg/dl. The major reduction was in the first 8h but the cartridge maintained an adsorption capacity until the end. We could not demonstrate any release of the adsorbed bilirubin in 24h.

Conclusions
This in vitro study shows the effectiveness in removing bilirubin, no significant loss of albumin, the resin ability to break the albumin-bilirubin complex and to adsorb irreversibly bilirubin. Cytosorb might represent a valid and simple aid in organ dysfunctions, without need of plasma separation. In vivo studies are ongoing to confirm the in vitro results.