

PHARMACOLOGY

Sodium Nitroprusside

Sodium Nitroferricyanide

Nipride

Sodium Nitroprusside is a potent antihypertensive agent manufactured by Roche Laboratories. This agent is commonly utilized for the treatment of acute hypertension in the medical and surgical cardiac patient by intravenous administration.

This powerful vasodilator acts directly on the smooth muscle of blood vessels. It has no direct effect on the adrenergic receptors, vasomotor centers, or sympathetic nerves.¹ Nipride will decrease the systemic vascular resistance thus producing a fall in the arterial pressure and the central venous pressure. This action is temporary and dose dependent. Arterial blood pressure can be drastically decreased within two minutes and after discontinuing this agent the blood pressure will return to pretreatment levels in one to ten minutes. These effects are transient due to the rapid conversion in the body from Sodium Nitroprusside to thiocyanate.²

Moderate doses in the hypertensive patient will produce renal vasodilatation without an appreciable increase in renal blood flow or a significant decrease in the glomerular filtration rate. The drop in vascular resistance is probably more pronounced in the femoral and mesenteric vascular bed than in the renal bed.

Nipride has been utilized successfully to decrease afterload in the cardiac patient. By decreasing the total systemic vascular resistance in patients with coronary artery disease or congestive heart failure, the systolic blood pressure is decreased, the left ventricular end diastolic pressure decreased, and the cardiac index and cardiac output increased. Patients in congestive heart failure may show a decrease in heart rate in addition to a reduction of arrhythmias. Therefore, myocardial oxygen requirements and consumption are lowered. Nipride has also been shown to decrease pulmonary congestion and the intensity of pansystolic murmurs. In patients with mitral regurgitation, it will increase the forward cardiac index and the forward stroke volume index.³

Patients on other antihypertensive agents and elderly patients are more sensitive to Nipride and should initially be given lower doses. The safety of administration in children and pregnant women is not known at this time. Nipride should not be administered to patients with compensatory hypertension as is seen in coarctation of the aorta and arteriovenous shunts. In patients with hyponatremia or impaired renal function, thiocyanate may accumulate and inhibit both the uptake and binding of iodine thus producing symptoms of hypothyroidism. Therefore, caution should be exerted when administering Nipride to patients with impaired renal function, hypothyroidism, coarctation of the aorta, arteriovenous shunts, low Vitamin B₁₂ levels, hepatic impairment, and patients who are receiving antihypertensive agents.

Nipride has been shown to be a platelet inhibitor. It directly inhibits a platelet smooth muscle-like protein called thrombosthenin. This apparently is directly proportional to the amount infused.⁴

Nipride is rapidly metabolized by an interaction with sulfhydryl groups in the erythrocytes and tissues producing thiocyanate. The elimination half life of thiocyanate is seven days when renal function is normal. This time will be longer if the patient has impaired renal function or hyponatremia. Partial conversion of thiocyanate to cyanide may occur in the presence of a constituent of the erythrocyte.

Nipride is a reddish brown water soluble powder and is supplied in 50 mg. powder vials. The powder should be diluted with two to three milliliters of 5% Dextrose in Water and then transferred to a 500 ml. bottle of 5% Dextrose in Water. Solutions of this drug are very sensitive to light. If exposed to light, Nipride will deteriorate and turn to a bluish color. Therefore care must be taken to wrap the bottle in an opaque wrapper and if it is bluish in color it should be discarded. Other drugs and solutions should not be added to Nipride. Nipride is only good for four hours after reconstitution.

Nipride is administered by a slow intravenous microdrip. The patients blood pressure and the flow rate should be continuously monitored. The average adult dosage is 3mcg/kilogram/minute with a range of 0.5 mcg/kilogram/minute to 8 mcg./kilogram/minute. The maximum dose should not exceed 800 mcg/minute.

Although Nipride is a relatively new antihypertensive agent, it has quickly assumed an important role in the treatment of the medical and surgical cardiac patient. Sodium Nitroprusside administration has added a new dimension to the pharmacological therapy of the cardiac patient.

BIBLIOGRAPHY

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