Effect of butaphosphane and cyanocobalamin on regeneration of muscle fibres in pigs

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Abstract

The aim of the study was to monitor the effect of butaphosphane (1-(n-butylamino)-1-methylphosphorous acid) and cyanocobalamin (Catosal preparation, Bayer AG) on regeneration of the longissimus lumborum muscle (musculus longissimus lumborum) in pigs. Experiments were conducted on 34 piglets of Polish Large White breed with a mean body weight of 20 kg that were divided into two groups. Piglets of group I (control) received an intramuscular injection of 10 cm³ of 0.5% bupivacaine hydrochloride at both side of the spine. Piglets of group II were injected with bupivacaine, as in group I, and additionally received intramuscular injections of 5 ml of Catosal for 5 subsequent days. The animals were euthanized 6, 12, and 24 hours as well as 2, 3, 4, 5, 7, 10 and 14 days after muscle injury. Preparations obtained from muscle specimens were stained with HE, PAS method acc. to McManus, HBFP, Feulgen, and Unna methods. Ultrastructural preparations (TEM) were prepared following a standard procedure. The presence of vimentin, desmin and PCNA was detected immunohistochemically in sections prepared with a paraffin method. Necrosis of muscle fibres was observed in all animals after bupivacaine injection. The administration of Catosal accelerated the regeneration of damaged skeletal muscles in pigs through the facilitation of phagocytosis and enhancement of myogenic cells proliferation. No effect of Catosal was found on differentiation of myoblasts or maturation of newly-formed muscle fibres.

Key words: butaphosphane, cyanocobalamin, muscle regeneration, bupivacaine, pigs

Introduction

Regeneration of damaged muscle fibres may be affected by chemical compounds that enhance the metabolic activity of cells. One of such compounds is a Catosal produced by Bayer AG that contains butaphosphane (1-(n-butylamino)-1-methylphosphorous acid) and cyanocobalamin. The strong impact of Catosal on the regeneration process of skeletal muscles is linked with butaphosphane, which is a source of phosphorus and stimulates the synthesis of protein, ATP and other energetic compounds in cells. In addition, it affects chemotaxis and phagocytosis by granulocytes as well as accelerates the removal of dead sections of muscle fibres. On the other hand, cyanocobalamin participates in the metabolic pathway of folic acid and its derivatives, thus accelerating the synthesis of nucleic acids and erythropoesis, as well as enhances the production of methionine which prevents, among others, damage to muscle fibres.

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