

THE USE OF STEM CELL THERAPY IN THE TREATMENT OF BONE MARROW APLASIA IMPROVES BLOOD BIOCHEMICAL PARAMETERS IN A DOG

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INTRODUCTION

Animals suffering from bone marrow aplasia (BMA) exhibit clinical signs such as lower tissue oxygenation, decreased production or destruction of red blood cells and blood cells loss due to hemorrhage. As a result, it is observed pallor of mucosal membranes, lethargy, reduced exercise tolerance, dyspnea, increased heart rate and puffs induced by increased turbulence of blood. Nowadays is not yet described an effective treatment to cure BMA.

We studied a female dog, Pekingese breed, with 4-year-old showed symptoms of apathy and lack of estrous cycle. The clinical examination showed severe pale mucosal membranes. The dog also presented reticulocytosis insufficient for the recovery of erythroid values, normocytic/normochromic red cells characteristic of anemic non-regenerative processes. Blood count indicated severe anemia and hematocrit value of 4%. The myelogram showed the presence of myeloid anemia. The dog was treated with transfusions, as well as, standard protocols for the control of hemolytic anemia. No improvement was observed with this treatment.

OBJECTIVE

To investigate the blood biochemical parameters of a dog with BMA treated with stem cell therapy.

METHODS AND RESULTS

Stem cells from canine dental pulp (DPSCs) were isolated (Fig. 1). It was also assessed their ability to differentiate into osteogenic, chondrogenic or adipogenic (Fig. 2). The dog was treated with five applications of 4×10^6 alogenic DPSCs. The first 4 applications were conducted via the cephalic vein and the last by intramedullary route (Tab. 1). The applications of DPSCs resulted in stability of the bone marrow response and increased percentage of the hematocrit. Six months after the last injection of DPSCs it was initiated the gradual reduction of the conventional medication. The applications of ADSCs resulted in stability of hematocrit (Fig. 3).

Date of Application	Local Application	Hematocrit %
November 22	Cephalic Vein	23
February 1	Cephalic Vein	27
March 23	Cephalic Vein	25
June 10	Cephalic Vein	14
August 17	Intramedullary Route	21

Table 1. Details of applications of alogenic feline adipose stem cells (4×10^6 adipose stem cells) and hematocrit values obtained after treatment in the dog. The first 4 applications were conducted via the cephalic vein and the last by intramedullary route.

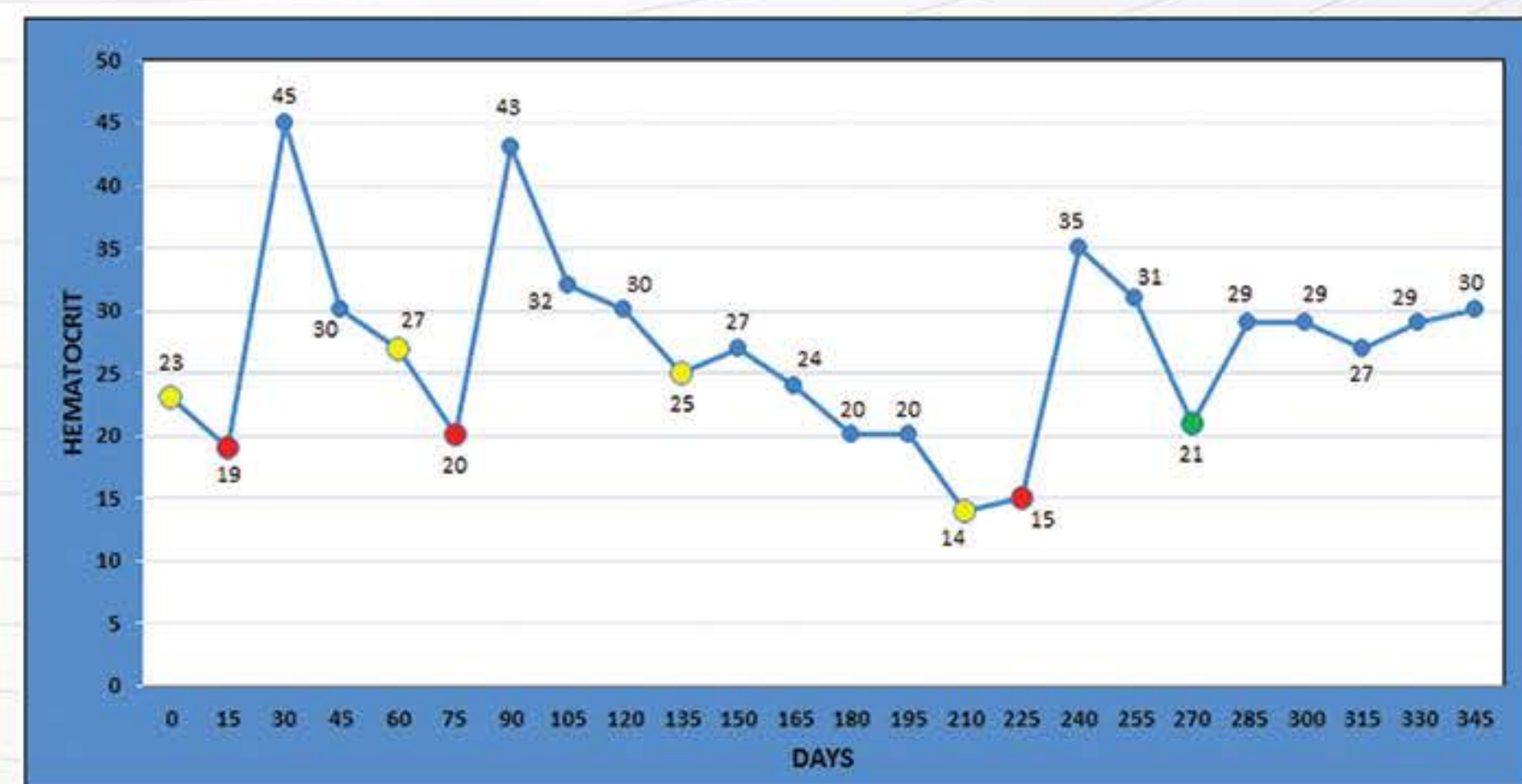


Figure 3. Representative graphic showing the variation in hematocrit levels after the beginning of therapy with stem cells. The hematocrit was measured biweekly. There were five applications of stem cells being four systemic (●), one intramedullary (●) and three blood transfusions (●).

CONCLUSION

Our findings reveal that stem cell therapy combined with conventional treatment can improve the dog's condition, as well as, increase her life expectancy in the case of myeloid aplasia. Currently, the female dog maintains the hematological values close to the reference values, presenting mucosal membranes with normal color, feeding normally and performing normal physical activities.

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Figure 1. Canine dental pulp stem cells adhered to plastic and showed fibroblast-like morphology. Objective (4x).

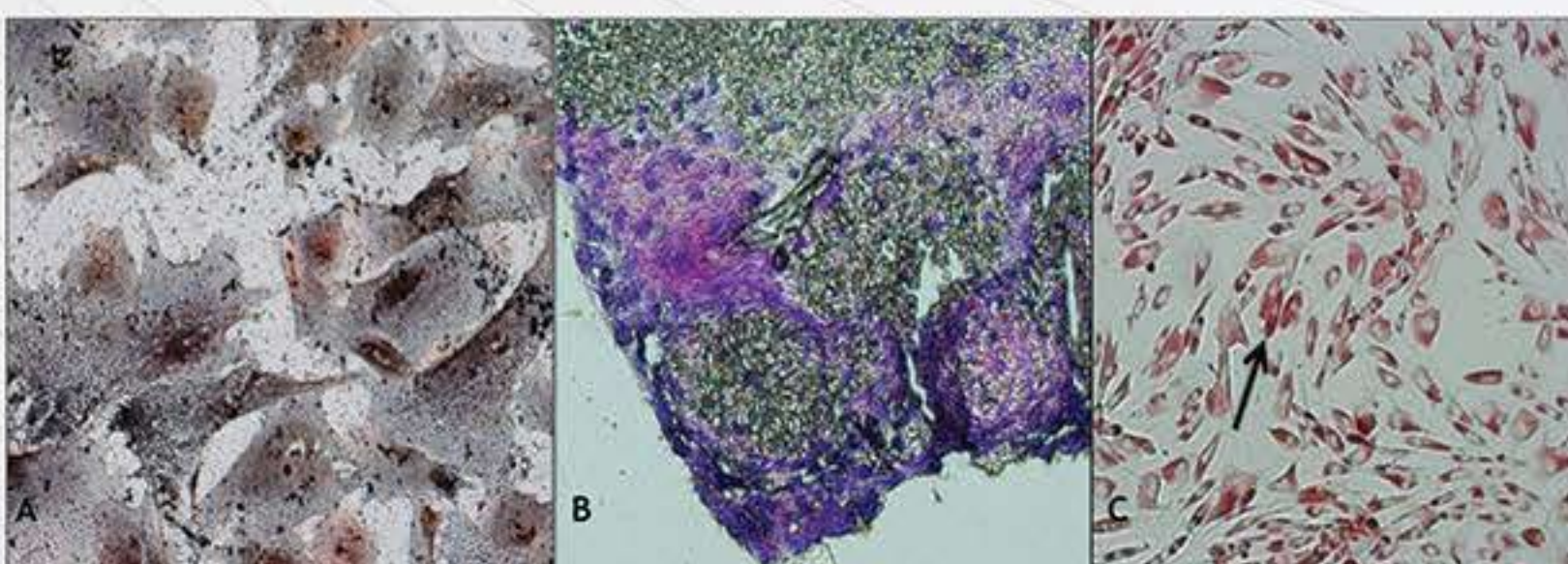


Figure 2. Canine dental pulp stem cells showed Osteogenic (A), Chondrogenic (B) and Adipogenic (C) differentiation. Objective 20 x (A,B) and 4x (C).