SUMMARY AND CONCLUSION

Stem cells are unspecialized cells that develop into the specialized cells that make up the different types of tissue in the human body. They are vital to the development, growth, maintenance, and repair of our brains, bones, muscles, nerves, blood, skin, and other organs. In the laboratory, researchers are learning how to coax stem cells to differentiate into specialized kinds of cells, and to create the conditions under which stem cells will replicate themselves for extended periods of time. If these unique properties can be understood and harnessed, stem cells hold great potential as tools for medical research and as therapeutic agents ***(The Century Foundation Press, 2006).***

Osteonecrosis of the femoral head, also known as avascular necrosis or aseptic necrosis is now recognized as a major musculo-skeletal problem mostly affecting the young people in their productive years of life. It is often characterized by relentless progression despite treatment ***(Babhulkar, 2003).***

Many studies have suggested that the likely outcome of osteonecrosis of the femoral head (and, more particularly, the evolution to collapse) is influenced by the size of the lesion, the extent to which the weight-bearing portion of the femoral head is involved, the stage of the osteonecrosis, and the cause of the osteonecrosis. However, the most important factor in predicting the outcome of stage-I or II osteonecrosis of the hip is probably the size of the necrotic lesion ***(Gangji et al, 2004).***

Recent advances in the understanding of the pathophysiology of osteonecrosis suggest that a decrease in the MSC pool of the proximal aspect

of the femur might not provide enough osteoblasts to meet the needs of bone-remodeling in the early stage of the disease. An insufficiency of osteogenic cells could explain the inadequate repair mechanism that, it is postulated, leads to femoral head collapse ***(Gangji et al, 2004).***

In osteonecrosis the success of interventions that forestall or prevent femoral head collapse and maintain hip function would represent a substantial achievement in the treatment of this disease. A review of recent literature regarding bisphosphonate, anticoagulant, and vasodilators and biophysical modalities have demonstrated efficacy in reducing pain and delaying disease progression in early stage osteonecrosis. Though it has been considered still insufficient, to support their routine use in the treatment or prevention of osteonecrosis of the hip. Core decompression with modification of technique is still one of the safest and most commonly employed procedures with evidence based success in the pre-collapse stage of AVN of femoral head. The additional use of bone morphogenic protein, and bone marrow stem cells may provide the opportunity to enhance the results of core decompression. At present, the use of large vascularised cortical grafts, the other surgical procedure with high success rate is still not common due to technical difficulty in surgery. Likewise osteotomies are also not getting common as arthroplasty is getting more acceptable, so is awaited without any intermediate big surgical interventions ***(Sen, 2009).***

Implantation of autologous BMCs appears to be a safe and effective treatment for early stages of ONFH. Although the findings of this study are promising, their interpretation is limited because of the small number of patients and the short duration of follow-up. Further study is needed to confirm the results ***(Gangji & Hauzeur, 2005).***

The study of *Gangji et al., (2004)* shows that implantation of BMCs in the osteonecrotic zone appears to be an effective treatment for early stages of ONFH. Implantation of bone marrow cells decreased the pain and other joint symptoms caused by the osteonecrosis and delayed the progression of the disease to the point of subchondral fracture (stage III) during the twenty four month follow-up period ***(Gangji et al, 2004).***

Daltro et al., (2008) results' point out to a reduction of pain severity and other joint symptoms associated to early stages of ONFH with this treatment, and, at least for the eight-month follow-up period disease progression remained stable ***(Daltro et al., 2008).***

Osteogenic and angio/vasculogenic properties of the BMC fraction are well established. The BMC fraction enhances vascularization and the oxygen flow to ischemic tissues, in addition to accelerate fractures healing in chronic arthritis. A single injection of mononuclear cells into bone's necrotic area is expected to result in a process of bone neoformation and repair, which sometimes occurs spontaneously. In theory, hemangioblastic and osteogenic bone marrow stem cells can repopulate segments of necrotic bone with viable and active cells ***(Daltro et al., 2008).***

The most important success factor for cell therapy on ONFH is to eliminate or delay femoral collapse and the need for further surgical procedures, particularly arthroplasty. The results of this method of treatment are promising, although its interpretation is limited by the small number of patients and by the brief follow-up time. X-ray evidences of the femoral bone tissue regeneration are expected from the 12th postoperative month on, and the bone structure stabilization must be followed up over many years ***(Daltro et al., 2008).***