Unrestricted somatic stem cells support HSC proliferation in vitro and engraftment in vivo and possess no tumorigenic potential

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Hematopoietic stem cell (HSC) transplantation is a therapeutic option in the treatment of inherited diseases and leukemias. In many cases HSC transplantation is associated with complications including engraftment failure or long-term pancytopenia [1]. Mesenchymal stem cells have been identified as playing an important role in the support of HSC engraftment in animal models and patients due to their cytokine production [2, 3]. Recently, a new multipotent population of umbilical cord blood cells, unrestricted somatic stem cells (USSC), was identified which possesses intrinsic potential to develop into mesodermal, endodermal, and ectodermal tissue. It was shown that USSC produce various cytokines. [4]. Co-cultivation of HSC and USSC in feeder layer assays resulted in an amplification of the amount of CD34⁺ HSC demonstrating that USSC support proliferation of HSC in vitro [5].

Here, we investigated the effect of USSC on the engraftment of cotransplanted human HSC in the NOD/SCID mouse model. After 4 weeks, homing and engraftment of human cells to the bone marrow was significantly increased in mice cotransplanted with HSC and USSC (30.9%), as compared to the control group (HSC only) (5.9%, p=0.004). After 8 weeks, the median proportions of human cells detected in bone marrow were 24.2% in the cotransplanted group and 11.3% in the control group. The percentage of human cells maintaining their CD34 expression in the bone marrow was unaffected by cotransplantation of USSC. Apart from short-term entrapment in the lungs, USSC themselves could not be detected in the bone marrow or other organs. According to migration assay results and to expression of genes known to mediate HSC homing and migration, USSC showed no potential to migrate towards bone marrow. An in vivo tumorigenicity assay in nu/nu mice showed no tumorigenic potential of USSC which is a very important finding in regard to a possible use of these cells for regenerative medicine.