Hematopoietic stem and progenitor cells In its natural environment, hematopoiesis resides in a microenvi- ronment characterized by local geometry (structure and vasculature), by accessory cells of mixed origin (stromal cells) and the extracellular matrix produced by them (Nielsen, 1999).The cell production system consists in a disposable cassette where cells are injected on top of a layer of stromal cells grown on a tissue culture plastic surface.Since the first in vitro reconstruction of the in vivo murine hematopoietic microenvironment to culture Hematopoietic Stem and Progenitor Cells (HSPCs) by Dexter et al.(1973), which was later adapted for human cells (Gartner and Kaplan, 1980), hematopoietic cell cultures have been typically performed in static conditions (Haylock et al., 1992; Lemoli et al., 1992).The short-term maintenance of both colony-forming cell (CFC) numbers and their precursors, detected as long-term culture initiating cells (LTC-IC), was initially demonstrated to be possible in stirred suspension (Zandstra et al., 1994).HSPCs are relatively shear-sensitive cells, and agitation is thought to affect surface marker expression (McDowell and Papoutsakis, 1998), thus low agitation rates (30-60 rpm) are necessary in these systems in order to avoid cell damage (Collins et al., 1998a; Sardonini and Wu, 1993; Zandstra et al., 1994).The multipass reactor was further extended for use with or without stroma by the introduction of multiple microgrooves at the chamber bottom, allowing rapid medium exchange with low shear stress (Horner et al., 1998; Sandstrom et al., 1995, 1996).Cultures of umbilical cord blood (UCB) mononuclear cells (MNCs), peripheral blood (PB) MNCs, and PB CD34+ cells were also performed in spinner flasks and in T-flasks, both in serum-containing and serum-free media (Collins et al., 1997).Later on, the same authors studied the parameters that possibly limit the cytokine- mediated expansion of primitive hematopoietic cells in stirred suspension cultures (Zandstra et al., 1997).The potential of stirred suspension cultures to support hemato- poiesis ex-vivo has been investigated since the 1990s.