Hematopoietic Progenitor Cell (HPC) Analysis – Literature Review –

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The most primitive of all blood cells is the hematopoietic progenitor cell (HPC) that is capable of dividing and differentiating into the specific blood cell type required by the body. Researchers since the 1970s have been working on methods to collect, isolate, concentrate and store enough circulating peripheral blood stem cells (PBSCs) for restoring hematopoietic function following bone marrow ablative therapy (chemotherapy or radiation). Hematopoietic progenitor cells can be harvested from bone marrow as well as umbilical cord blood and G-CSF mobilized peripheral blood. In order to obtain an adequate amount of cells, it is necessary to approximate the number of peripheral blood stem cells harvested after mobilization utilizing results obtained from peripheral blood specimens. It is also important to determine whether umbilical cord bloods have sufficient progenitor cells before proceeding with an expensive banking process. Several methods have been used to determine cord blood progenitor content as well as the optimal time of harvest. These laboratory methods include CD34$^+$ cell counts based on the flow cytometric method, colony-forming units (CFU), and total nucleated cell count (TNC). As early as 1995, it was reported that the IMI channel on the SE instrument could be used to approximate the number of these HPC. Since then, several investigators have examined the use of the HPC parameter on the SE for assessing HPC potential in a product. At this time, the HPC parameter on the Sysmex instrument is for investigational use only and is not cleared by the FDA for market in the United States of America.

This brief report should give a review of the application of HPC analysis, by the different methods. A selection of publications from international scientific journals have been collected and listed according to method and relevant key words. Please find these key words and respective reference numbers in ***Table 1*** below.

Table 1 *HPC Analysis by key words*

Key Words	Article reference numbers
Sysmex HPC Method	13, 14, 15, 16, 22, 25, 27, 34, 40, 41, 42, 44, 46, 47, 50, 51, 52, 53, 57, 68, 69, 70, 74, 75, 76, 78, 79, 80, 82, 84, 85
CD34$^+$ Method	2, 4, 6, 7, 10,12, 23, 24, 31, 49, 58, 59, 60, 62, 63, 64, 66, 67, 71, 77
CD34 Negative	1, 11, 35, 54, 65, 83
Total Nucleated Count (TNC)	5, 27, 33, 39, 71, 84, 85
Colony-Forming Unit	8, 28, 32, 48, 56, 61, 64, 71
Hematopoietic Stem Cell – General Information	30, 43, 55, 65, 73, 81
Regulatory Guidelines	9, 17, 18, 19, 20, 21, 36, 37, 38
R-Series Instrument Method	27, 45
Bone Marrow Transplant	3, 72
Umbilical Cord Engraftment/Transplant	26, 29

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