The Maturation Pattern of Hematogones

Hematogones are the normal bone marrow precursors of mature B-lymphocytes with morphologic and immunophenotypic properties that overlap those of lymphoblasts.

Hematogones may be particularly prominent in the regeneration phase following chemotherapy.

Hematogones have a characteristic profile of CD38++, CD10+, CD19+, CD20- or dim, and a cluster often found dimmer and smaller on the CD45/log side scatter display.

Flow cytometric analyses of bone marrow will demonstrate a spectrum of cells . The earliest precursors will express CD34 in combination with CD38, CE19, high levels of CD10(bright), low levels of CD22 and lacking CD20.

These cells progress to the next stages by down regulating CD34 completely and CD10 partially, prior to up-regulation of CD20. CD22 levels are also increased slightly as CD20 is up-regulated.

Finally, CD10 is down-regulated completely, CD38 partially, and CD22 up-graded to high intensity.

The last stage, in which CD10 is completely down-regulated is considered a mature stage of B-cell.



Reproducible expression patterns of examined antigens on hematogones and mature B-cells shown on nine different 2-dimensional dotplots. Gray fields marked with letters A–C represent spaces where normally these cells do not occur (so called empty spaces). The arrows show the direction of maturation pathway.

Type 1 hematogones (pre-B-I cells, H1) express high level of TdT, CD34, CD38, and also very high level of CD10.

The expression levels of CD45 and CD22 are low (dim) and CD20 is very low.

In the next stage of type 2 hematogones (pre-B-II cells and H2), the expression of TdT and CD34 extinguishes, the expression of CD10 and CD22 slightly decreases and the levels of CD20, CD45, and CD38 increase.

In the next stage of maturation, in type 3 hematogones (immature/transitional B-cells, H3) further increase of expression of CD20, CD45, and CD38 is observed, whereas the expression of CD10 decreases. In the last phase of mature B-cell, CD10 antigen disappears, CD38 significantly decreases,CD20 slightly decreases, while CD22 increases.

(3,4,13–17,19,23,24,27). (Reproduced from Ref. 4). [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]330 SE˛DEK ET AL.