Supplemental Methods

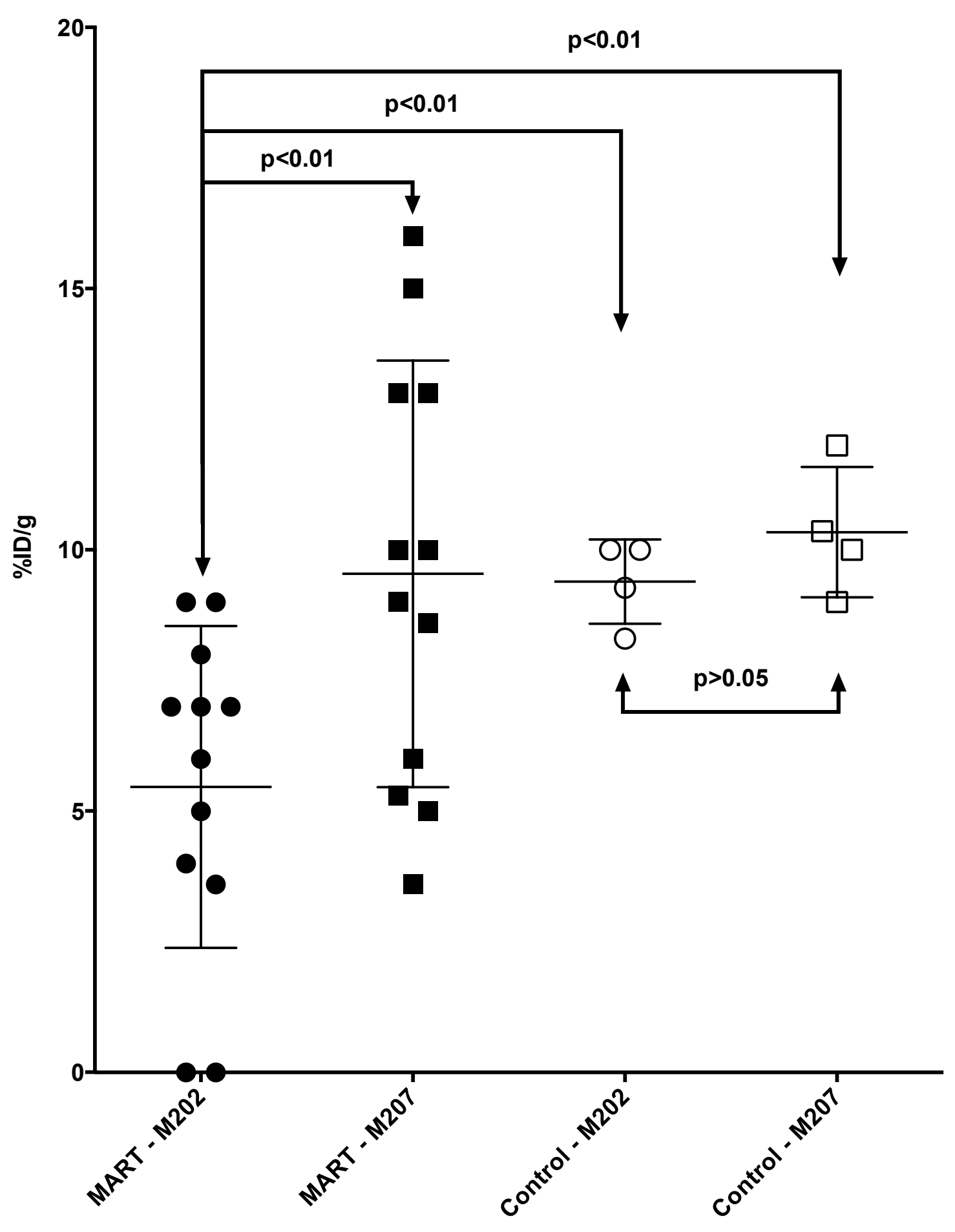
PET and CT Imaging. **Mice were fasted for 4-6 h before [^{18}F]FDG injection and placed on a heating pad (30°C) starting 30 min before [^{18}F]FDG injection. For tracer injection and imaging, mice were anesthetized with 2% isoflurane. Mice were imaged in a chamber that minimizes positioning errors between PET and CT to less than 1 mm. Imaging was started 60 min after an i.p. injection of 7.4MBq (80μCi) [^{18}F]FDG or [^{18}F]HBG via tail vein. Image acquisition time was 10 min. Images were reconstructed using a combination of OSEM3D (3D-Ordered Subset-Expectation Maximization) and MAP (Maximus A Priori). The number of OSEM subsets used was 16. The number of MAP iterations used was 18. Image counts per pixel per second were calibrated to activity concentrations (Bq/ml) by measuring a 3-cm cylinder phantom filled with a known concentration of [^{18}F]FDG. Immediately after the PET scan, the mice underwent a 8-min microCT scan using routine image acquisition variables (70kVP and 500 μA). For display, activity concentrations were expressed as percent of the decay-corrected injected activity per gram of tissue by using Osirix software. Spherical regions of interest (2-mm diameter) were placed in the area of the tumor with the highest [^{18}F]FDG or [^{18}F]HBG uptake. All image analysis was done using the OsiriX software.**

Supplemental Figure Legends

Figure S1. MART-1 specific CTLs limit growth of MART-1/HLA-A*0201 (M202) melanoma tumors. Tumor metabolic activity was measured by levels of FDG uptake using PET imaging. The squares (■) represent the growth of the M207 (HLA-A*0201$^-$MART$^+$) tumor while the circles (●) the M202 (HLA-A*0201$^+$MART$^+$). The M207 tumor was used as a negative control. The tumors were measured at the endpoint, week 6. Control mice are mice that received non-transduced hematopoietic stem cells. The unit %ID/g stands for injected dose per gram of body weight. Statistical significance for all the experiments (unless otherwise indicated) was determined by a paired Student's t-test with significant values set at $p<0.05$. There as no statistically significant differences in tumor metabolic activity between the two tumors in control mice as well as the M207 in the transgenic mice versus the tumors in their control counterparts.

Figures S2-6. Surface expression of the MART-1 specific TCR and other endogenous Vβ chains. In addition to the Vβ5.1, we assessed by flow cytometric analysis whether the MART-1 specific TCR was co-expressed with other endogenous chains on the transgenic CD8 T cell surface. We assayed for Vβ13.1 **(S3)**, Vβ9 **(S4)**, Vβ5.3 **(S5)**, Vβ23 **(S6)**, Vβ20 **(S7)**.

Figures S7-11. Intracellular expression of endogenous Vβ chains in transgenic CD8 T cells. In addition to the Vβ5.1, we assessed by intracellular flow cytometric analysis whether the other endogenous chains failed to assemble on the cell surface of transgenic CD8 T cells. We assays for Vβ20 **(S8)**, Vβ23 **(S9)**, Vβ5.3 **(S10)**, Vβ13.1 **(S11)**, Vβ9 **(S12)**.


20
15
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5
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%ID/g
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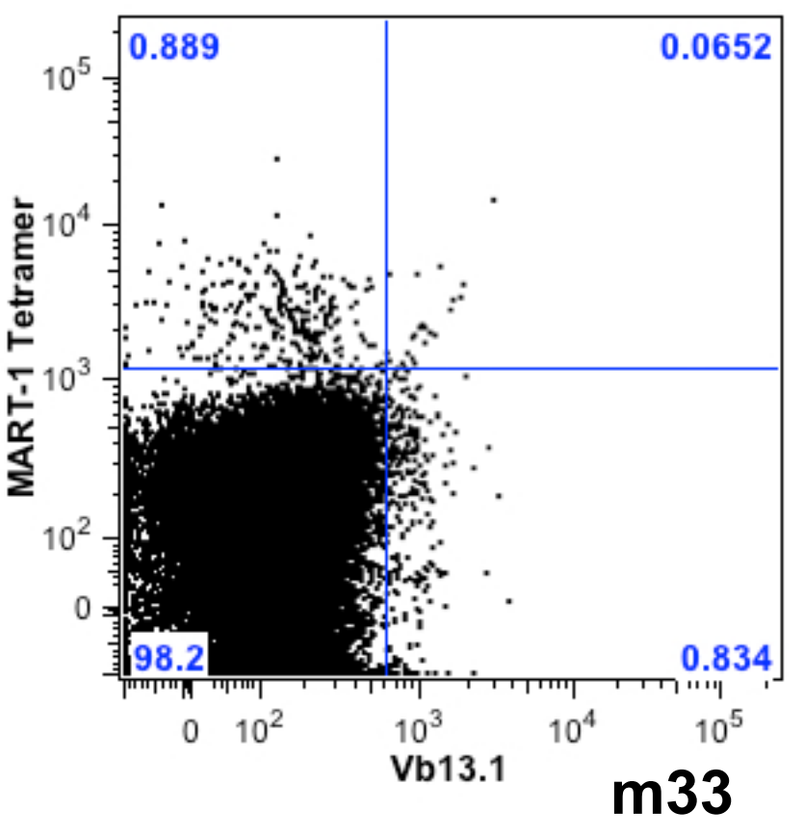
MART - M202
MART - M207
Control - M202
Control - M207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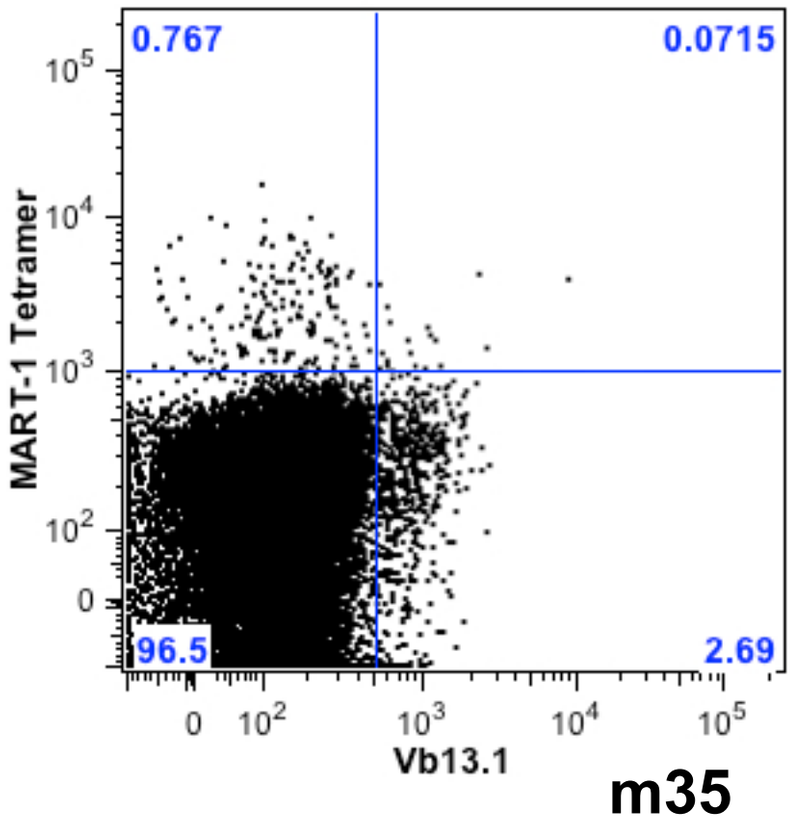
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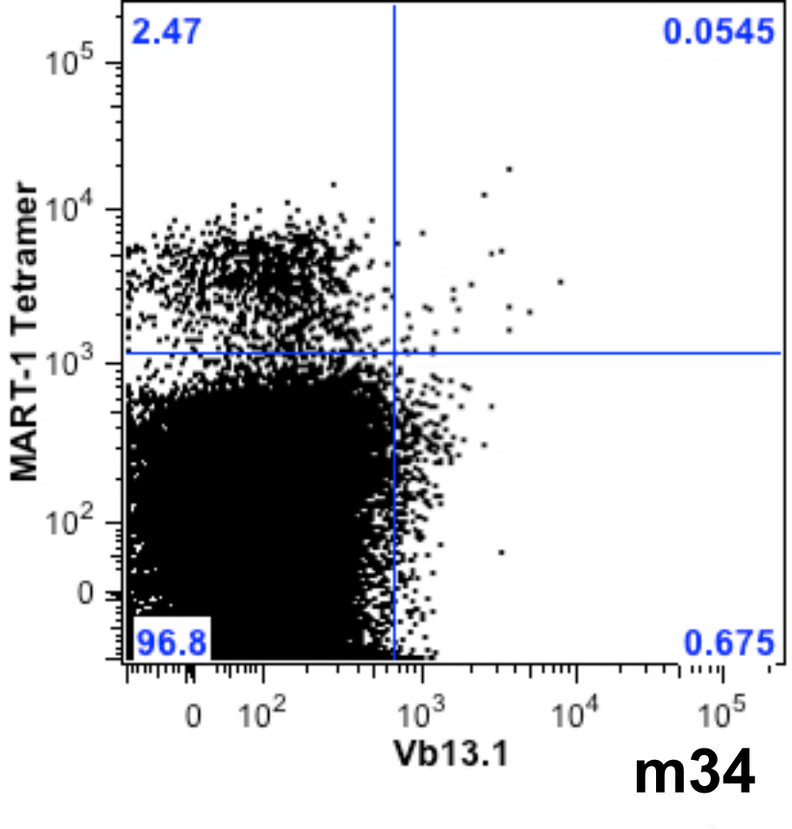
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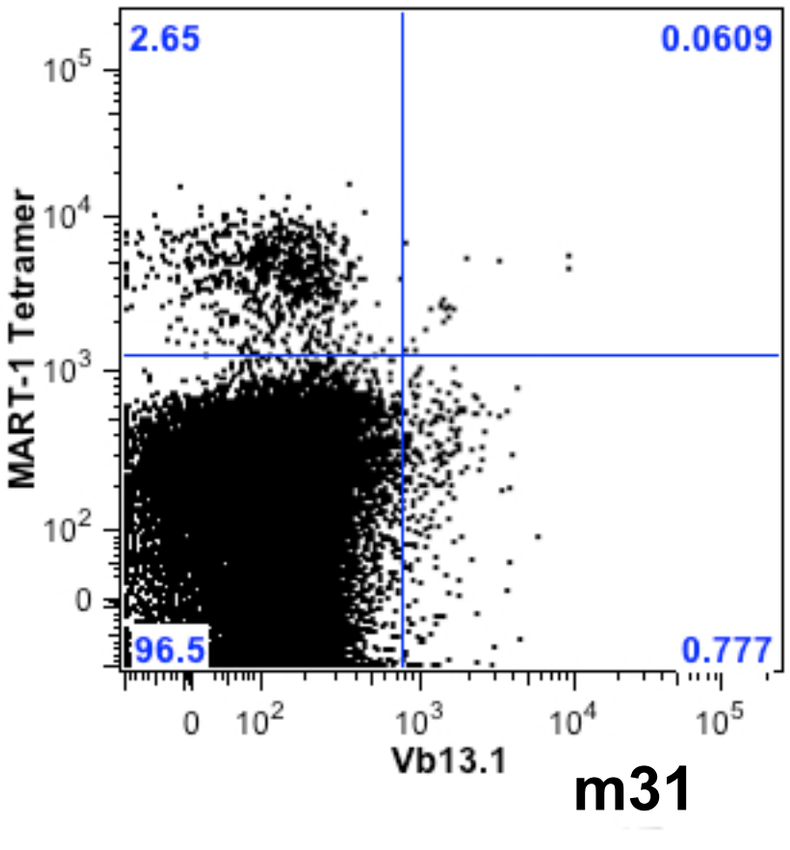
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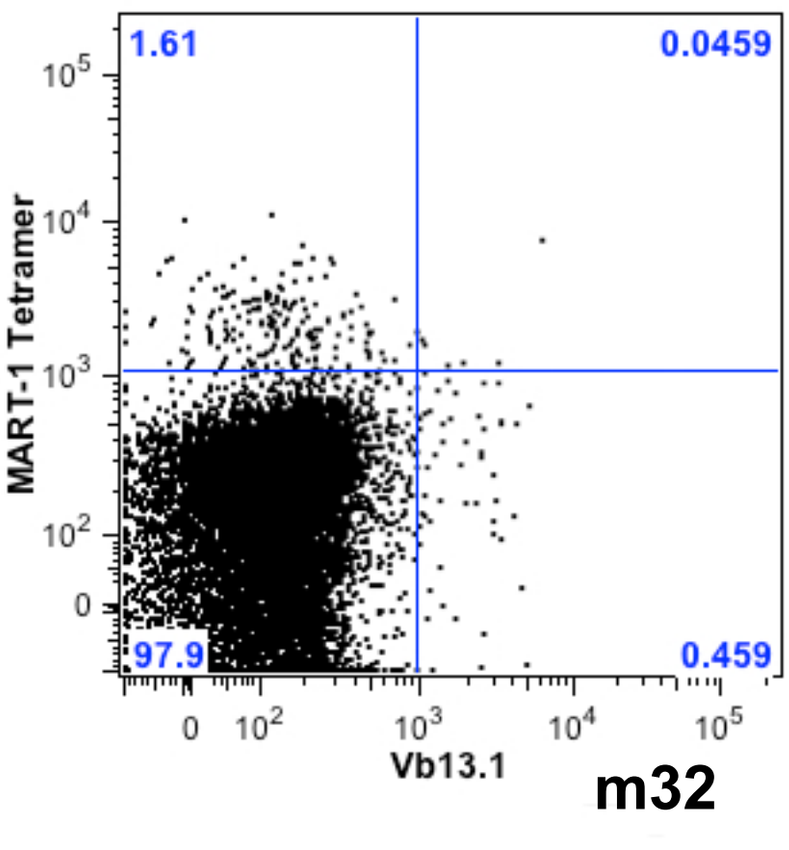
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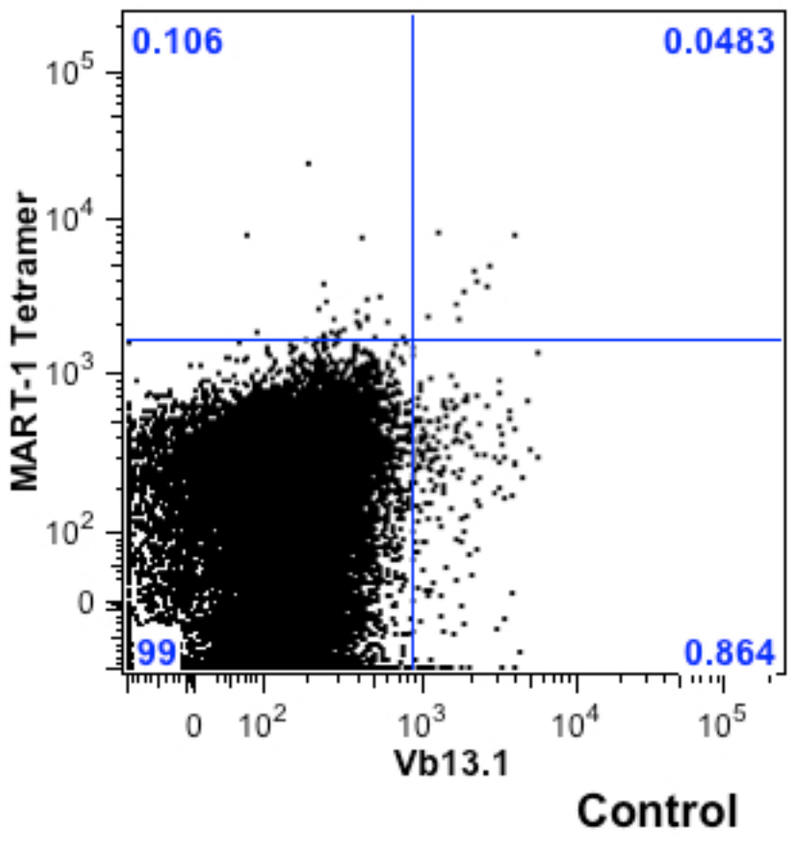
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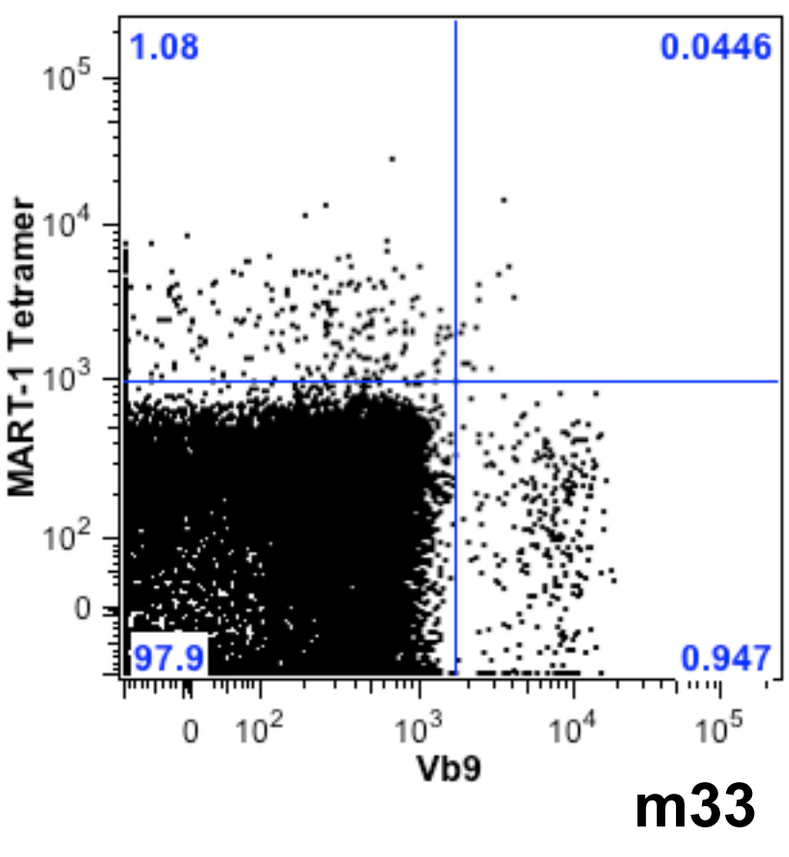
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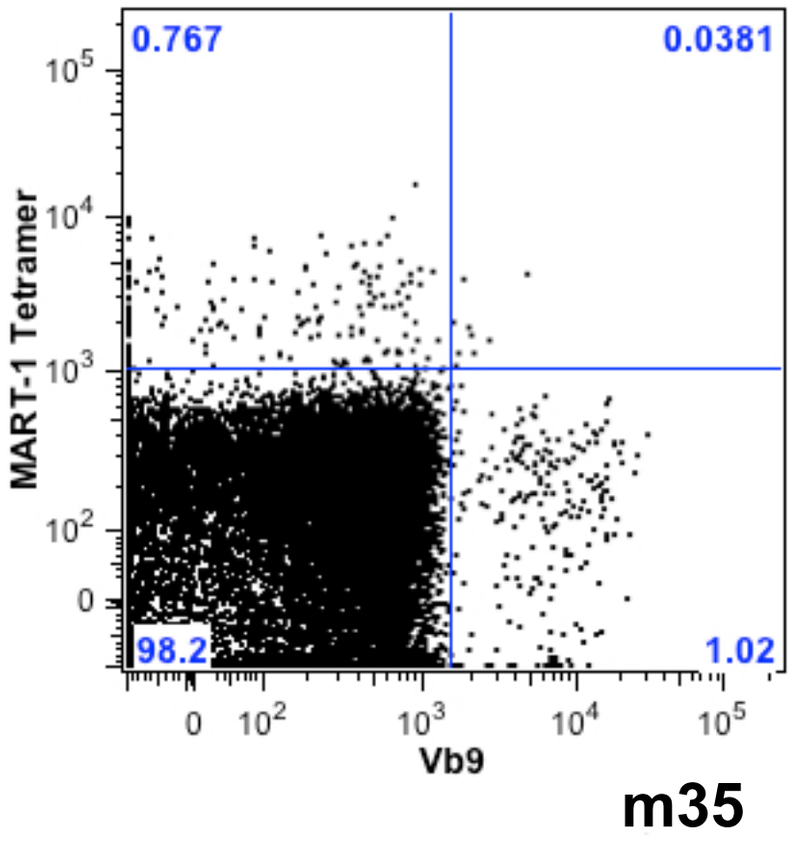
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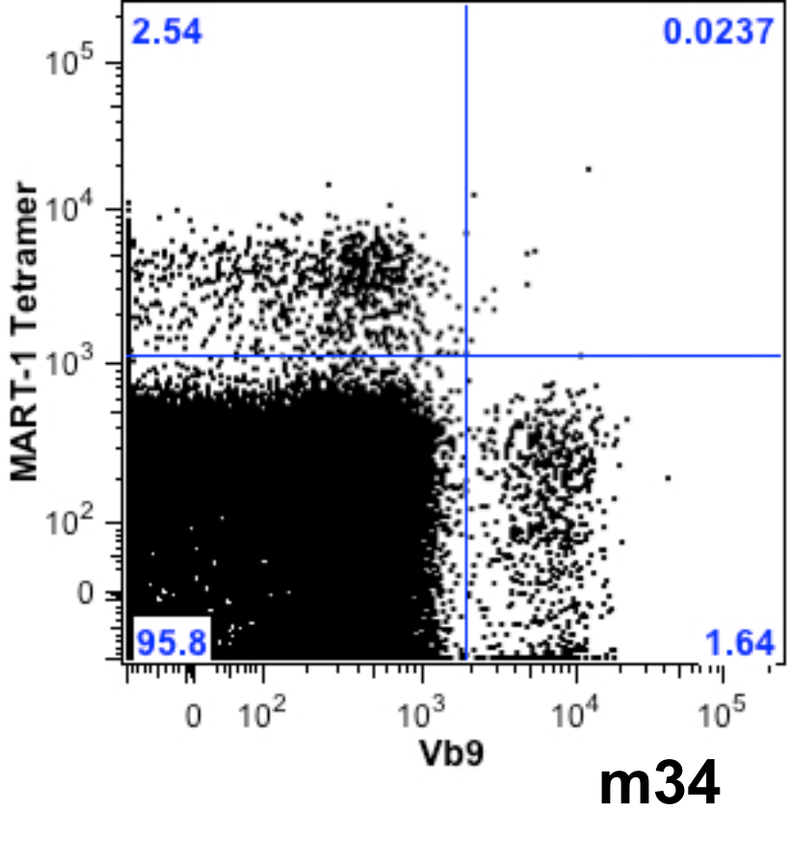
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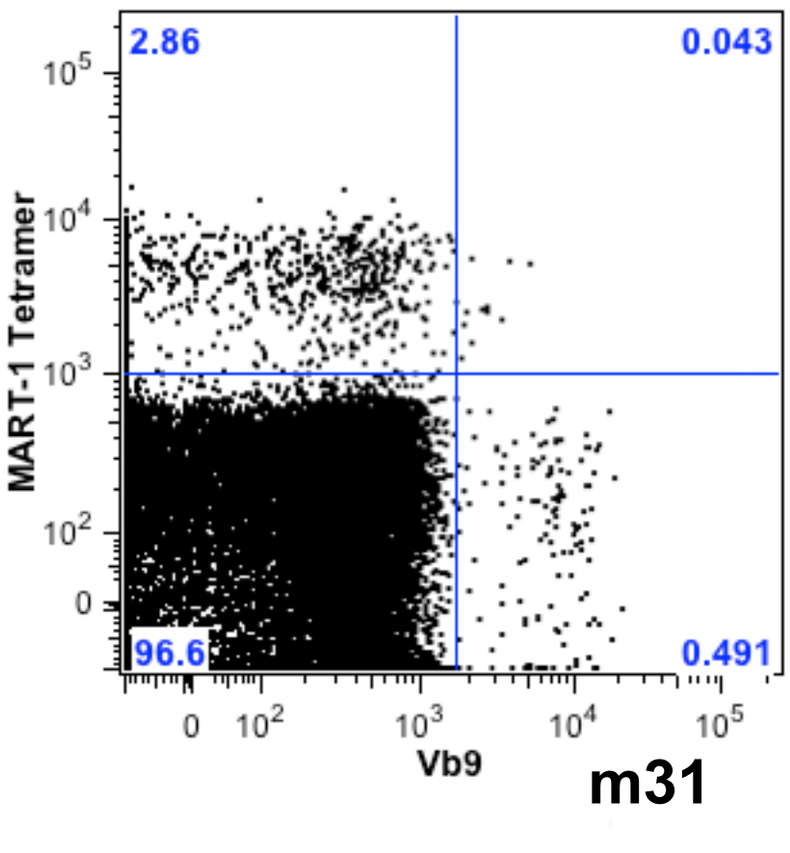
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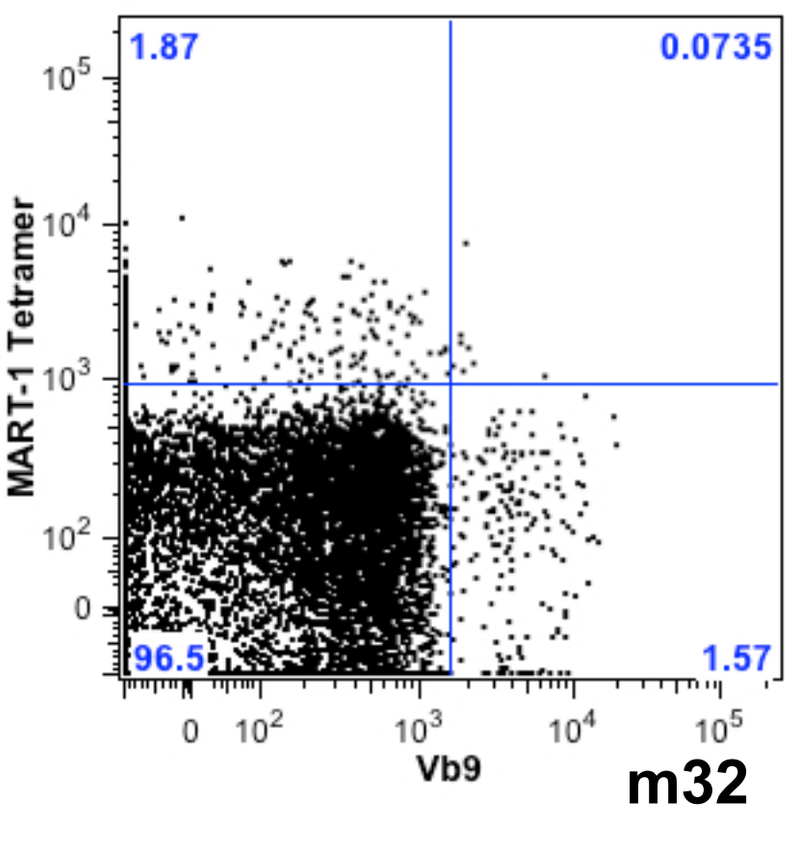
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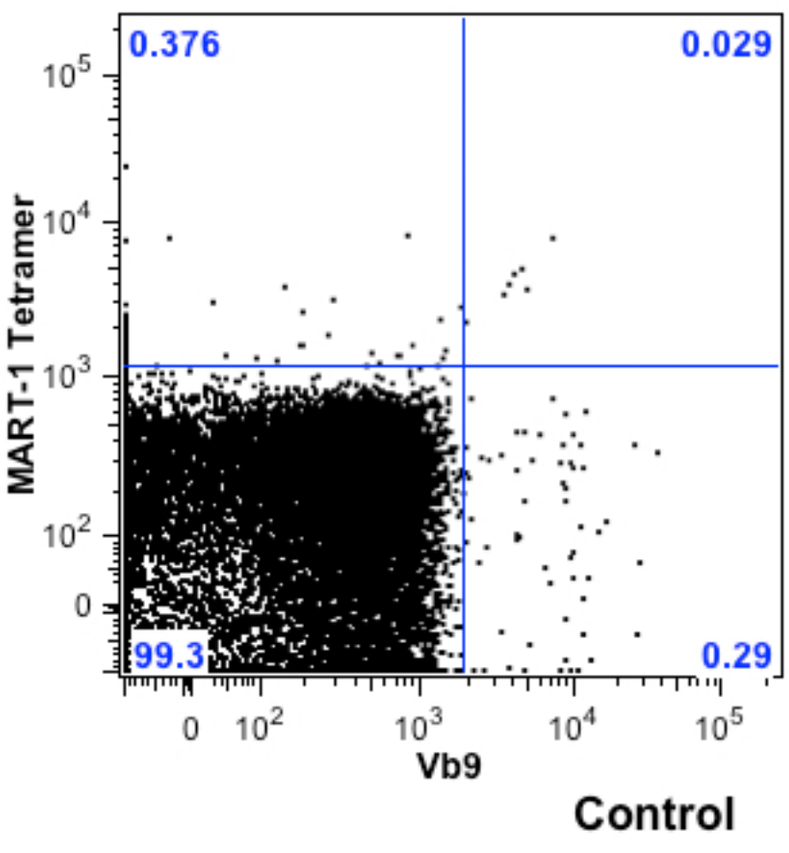
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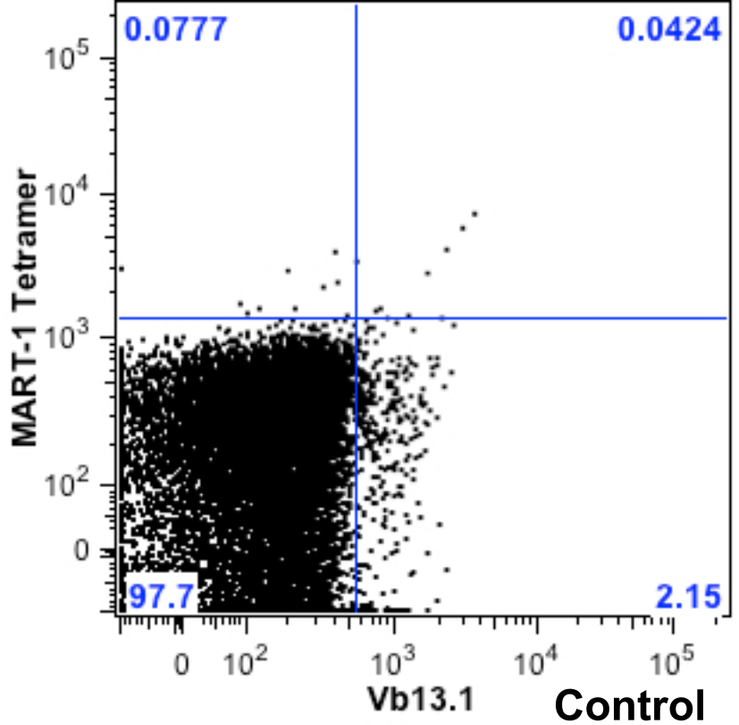
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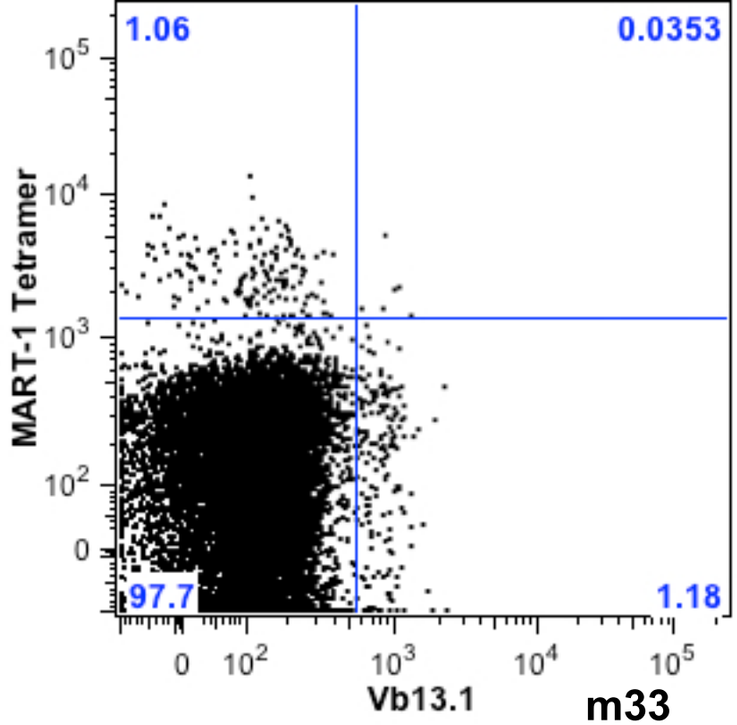
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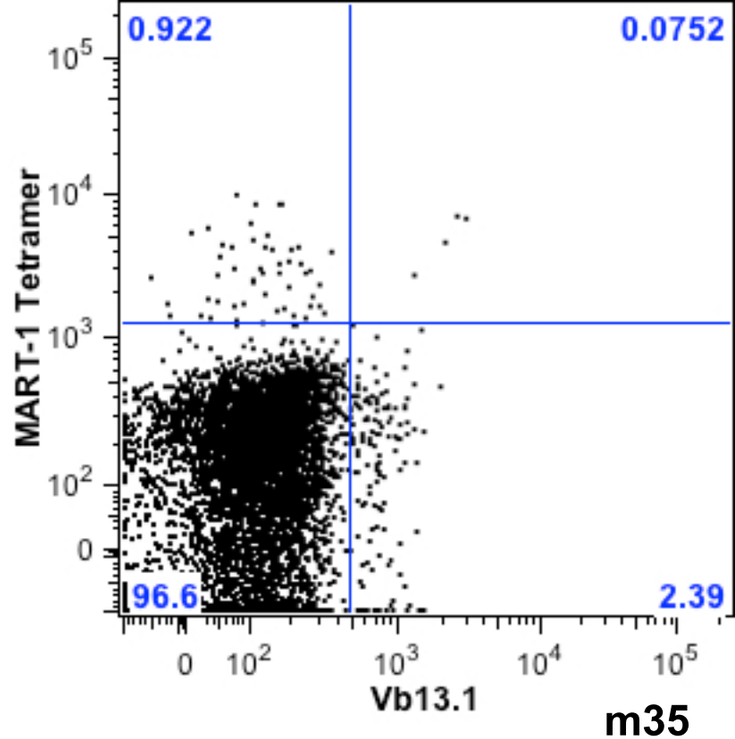
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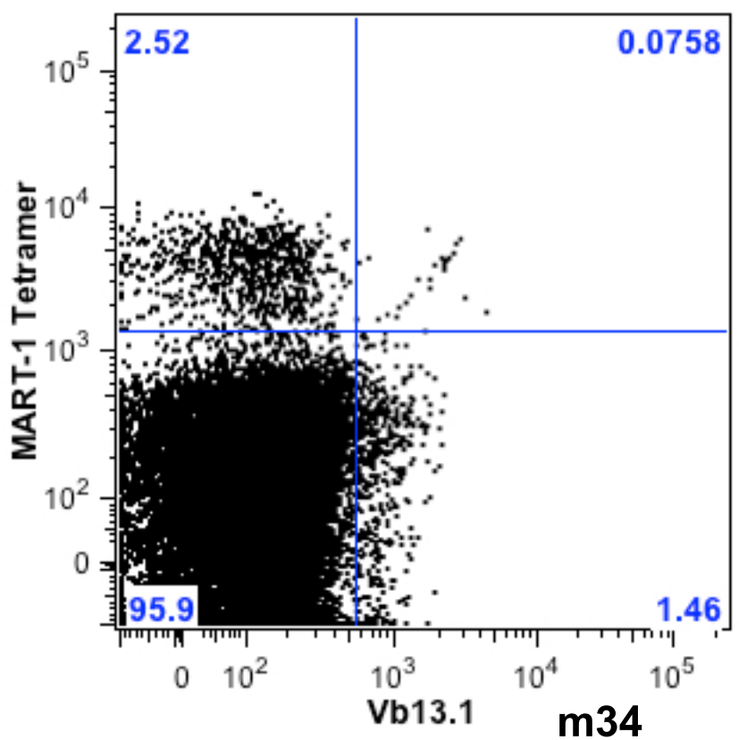
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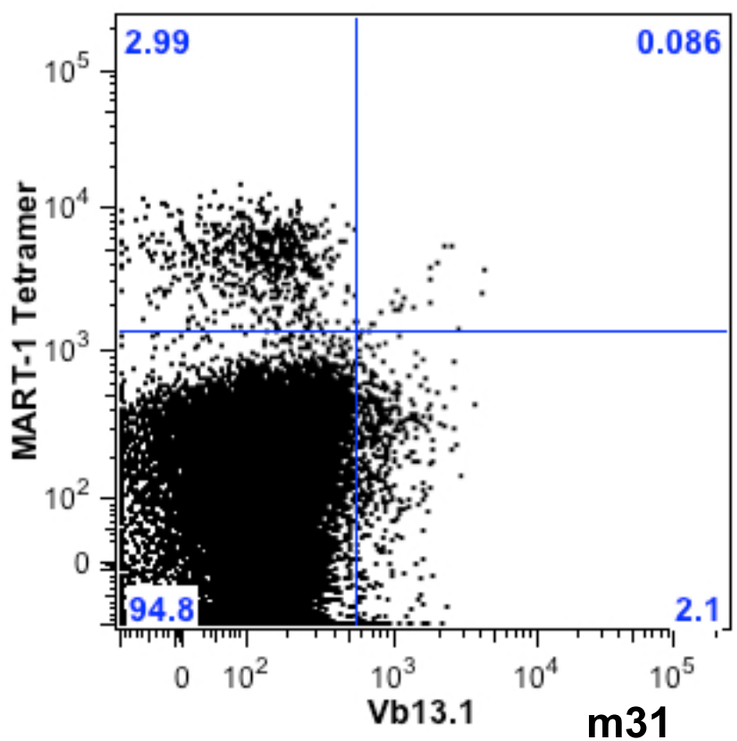
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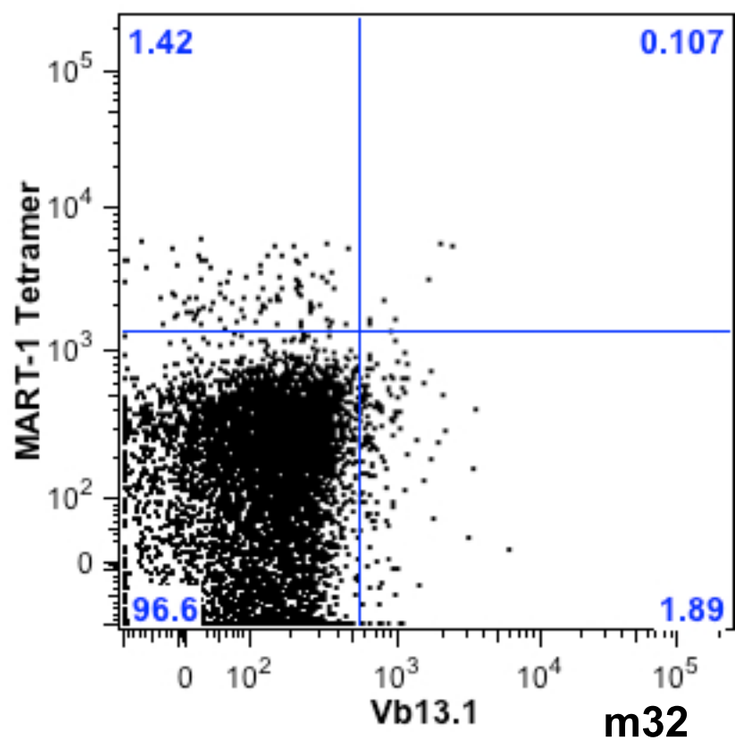
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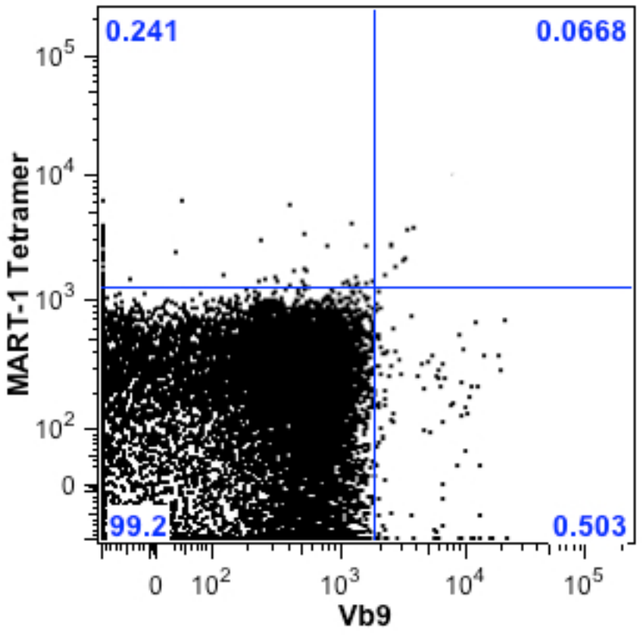

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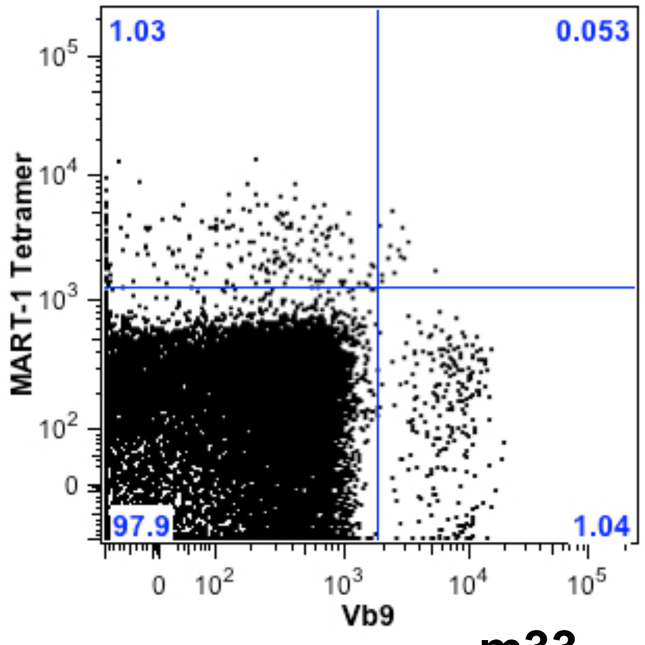

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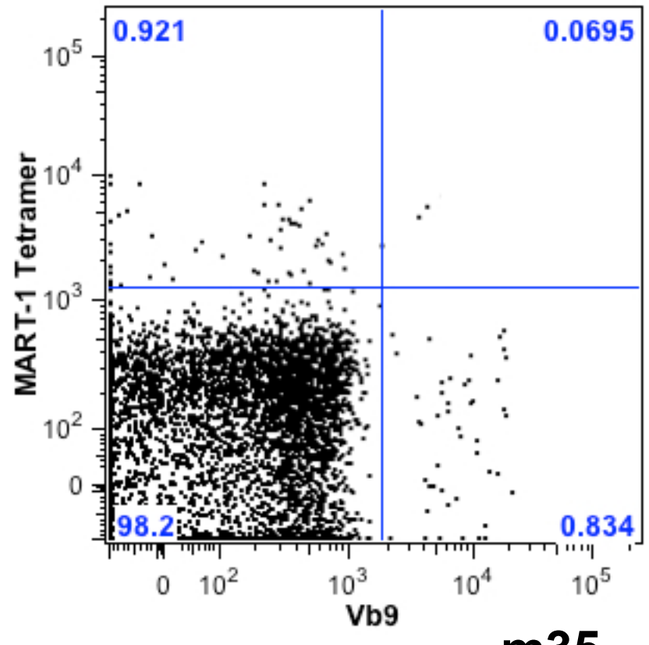

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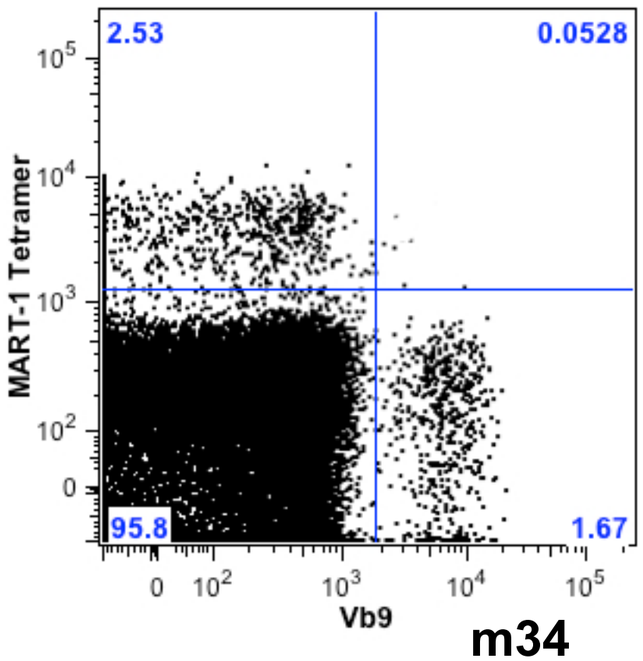

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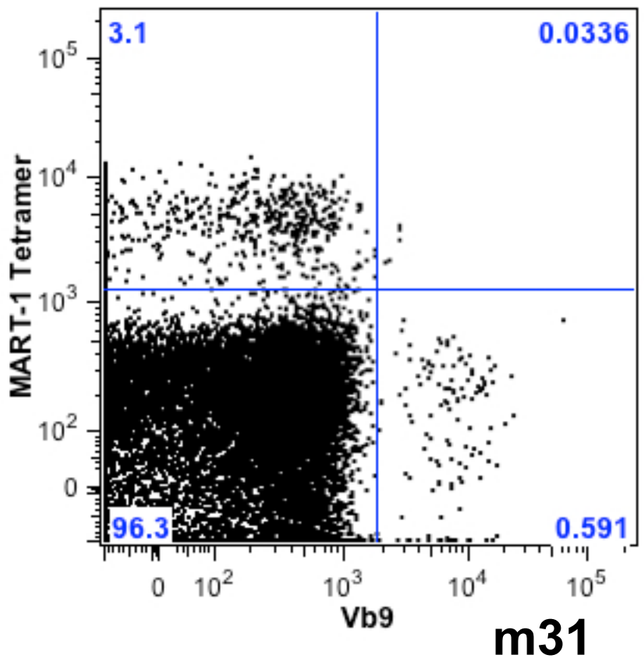

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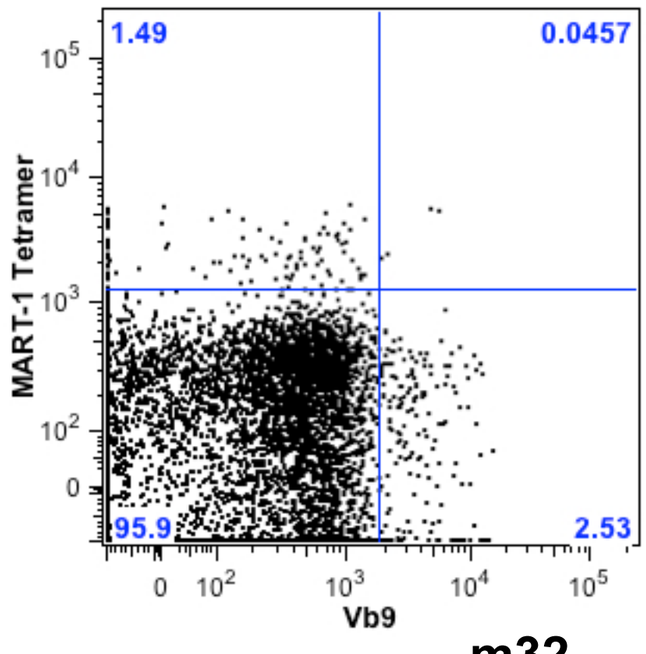

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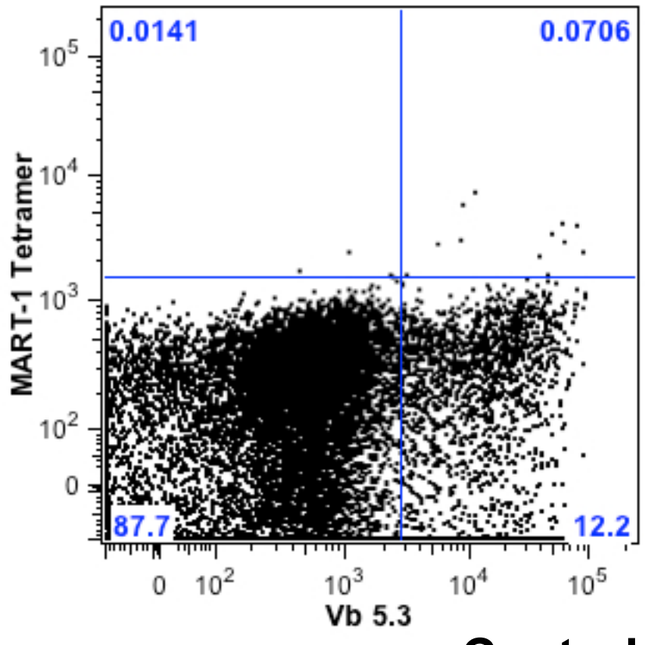

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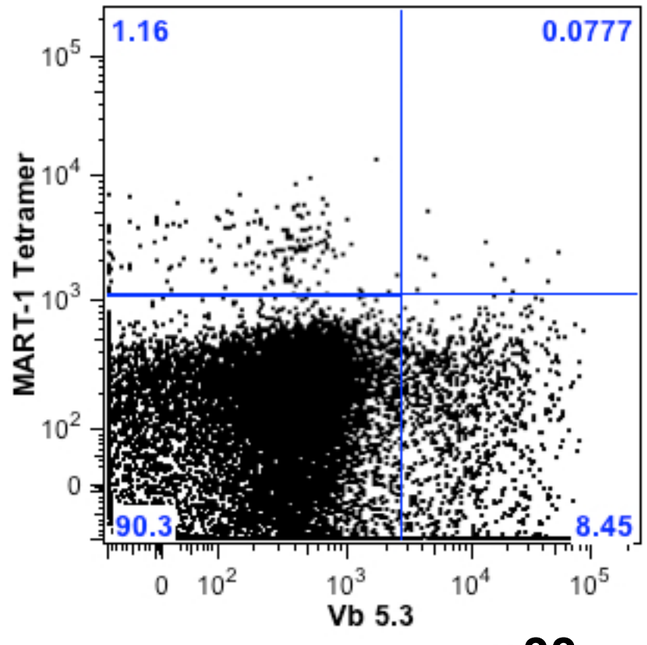

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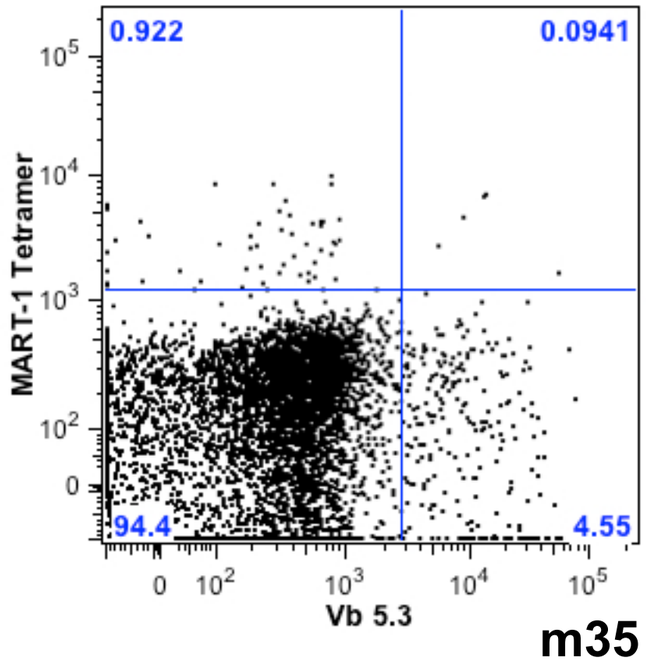

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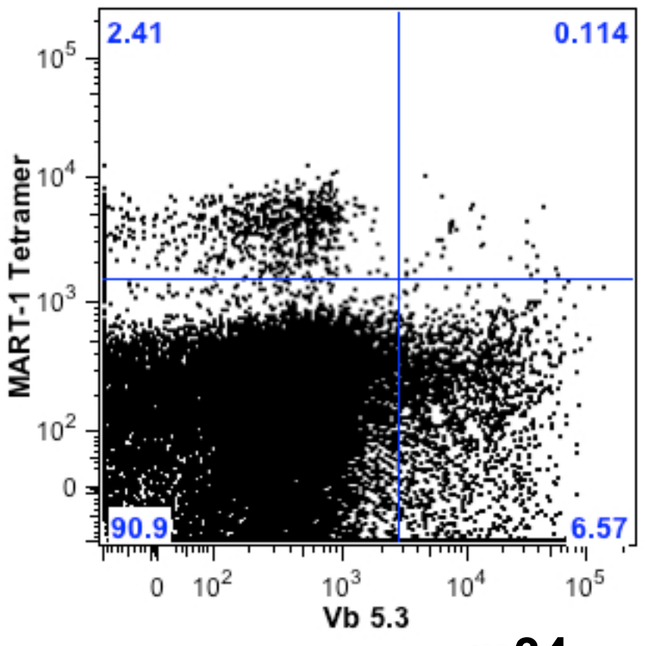

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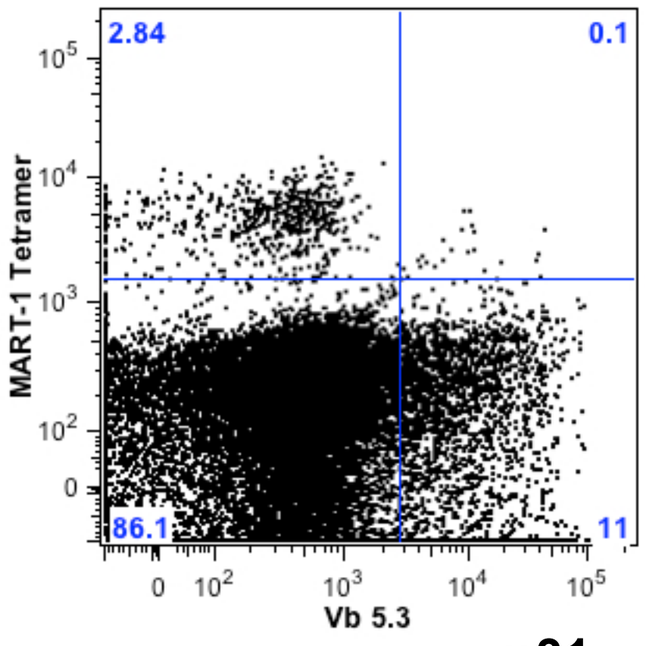

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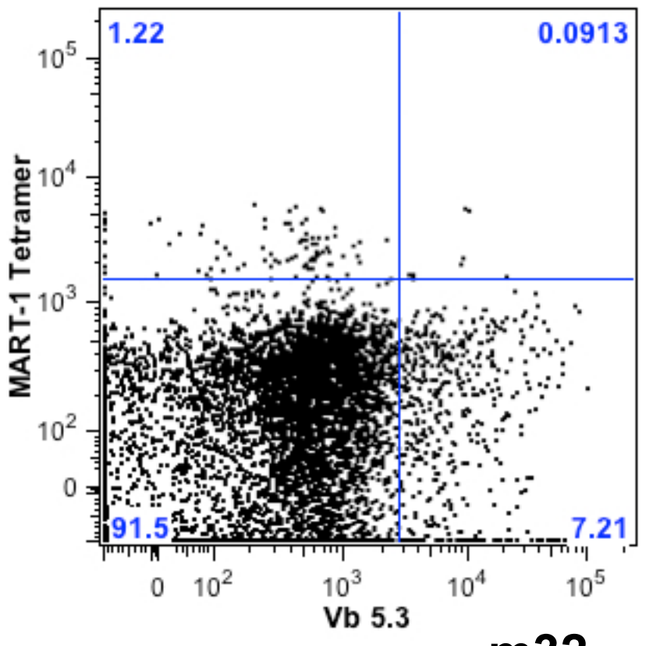

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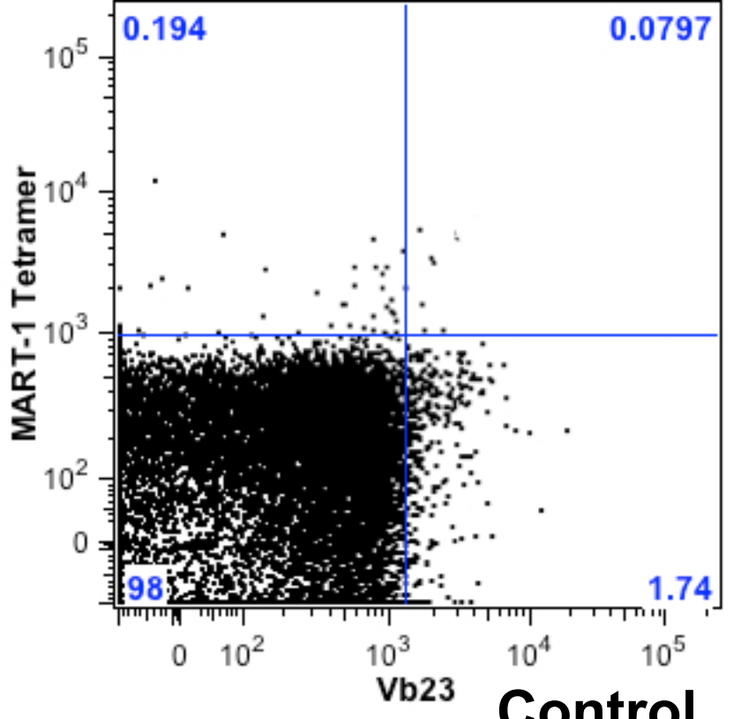
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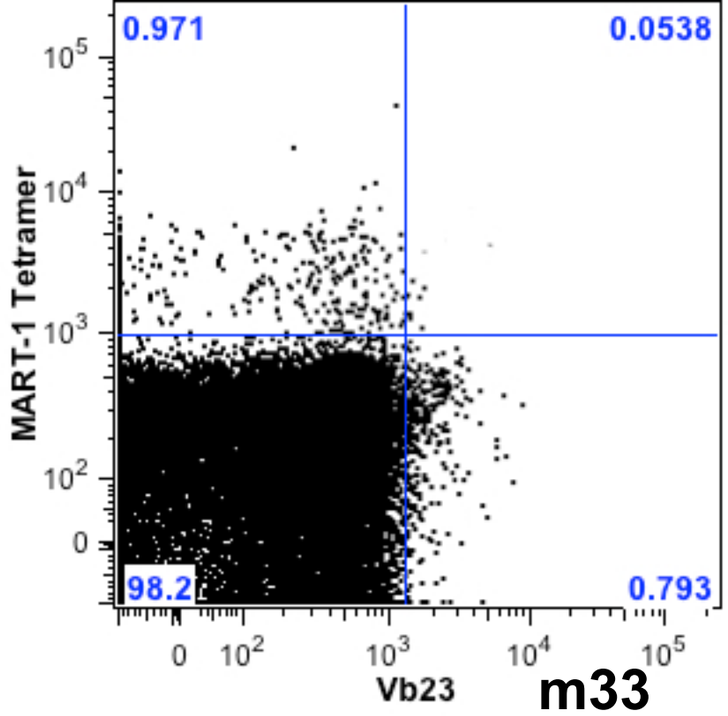
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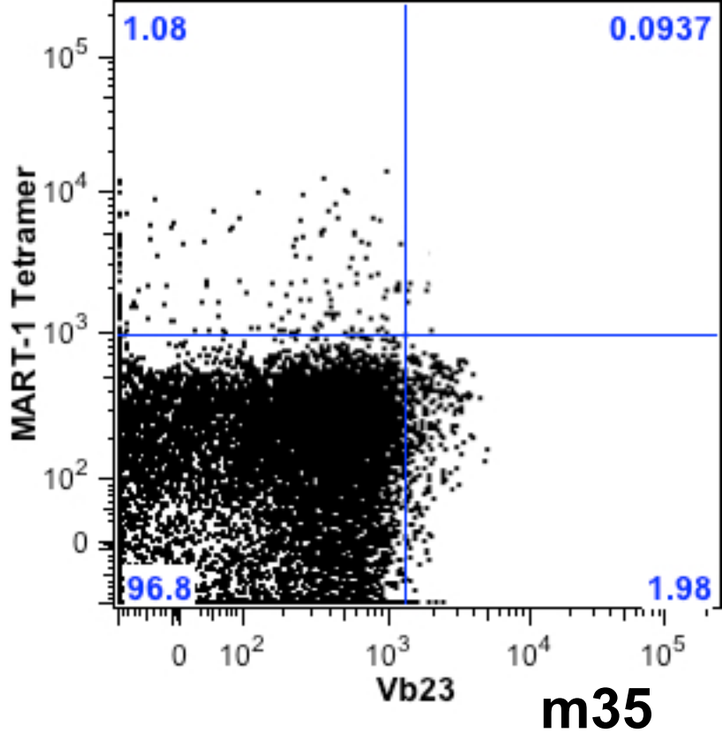
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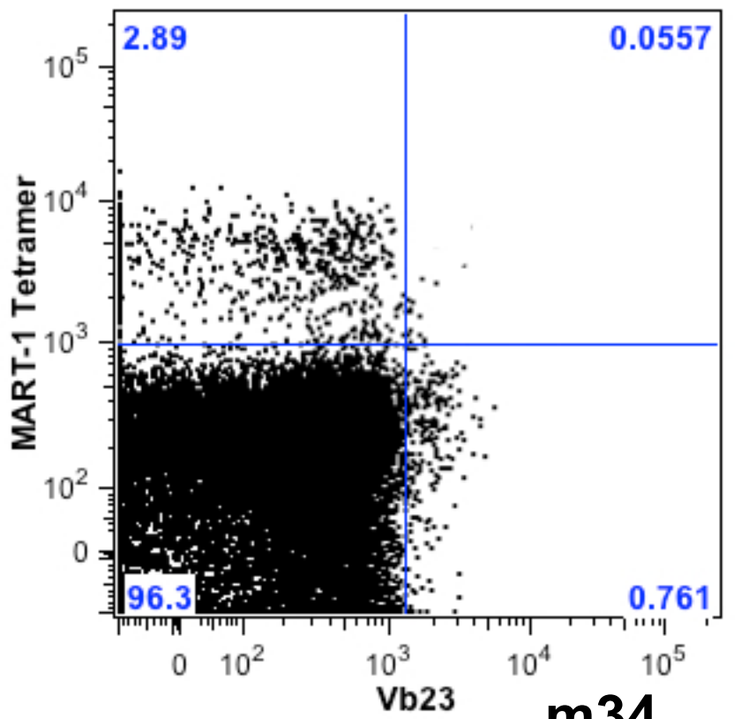
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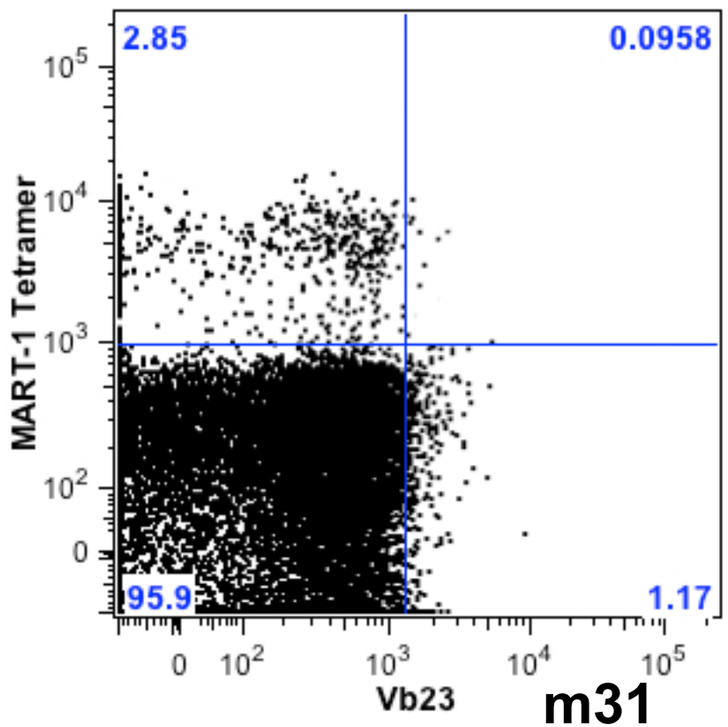
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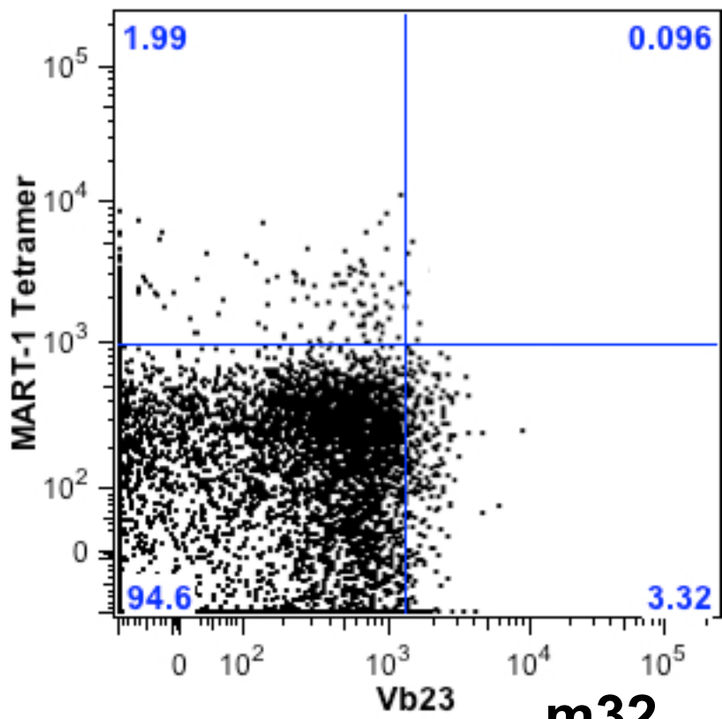
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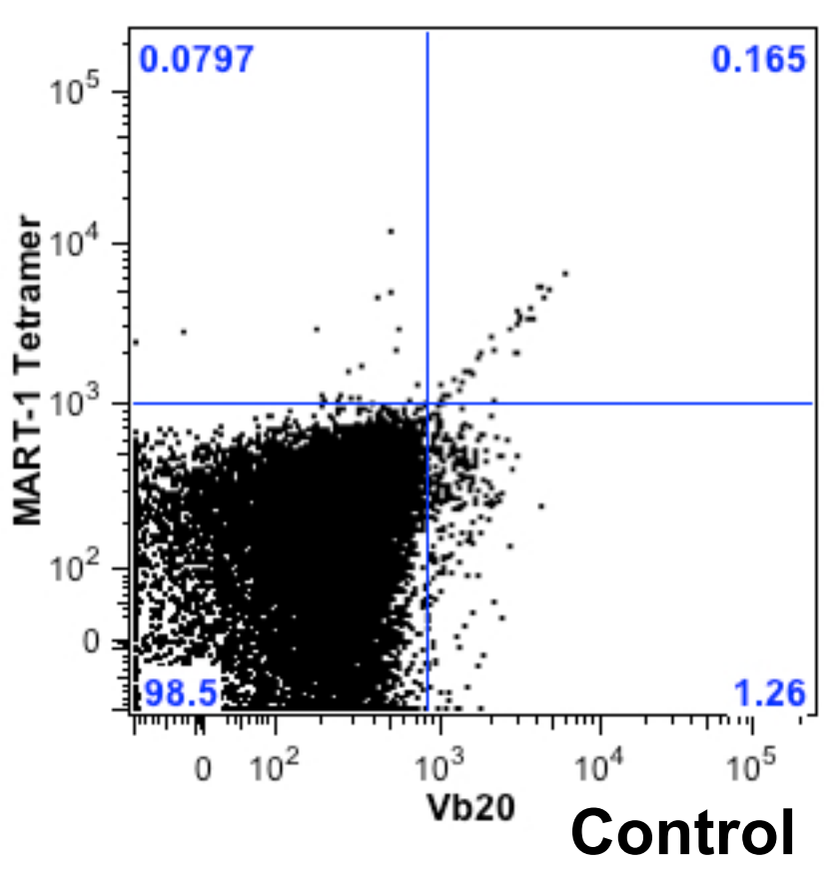
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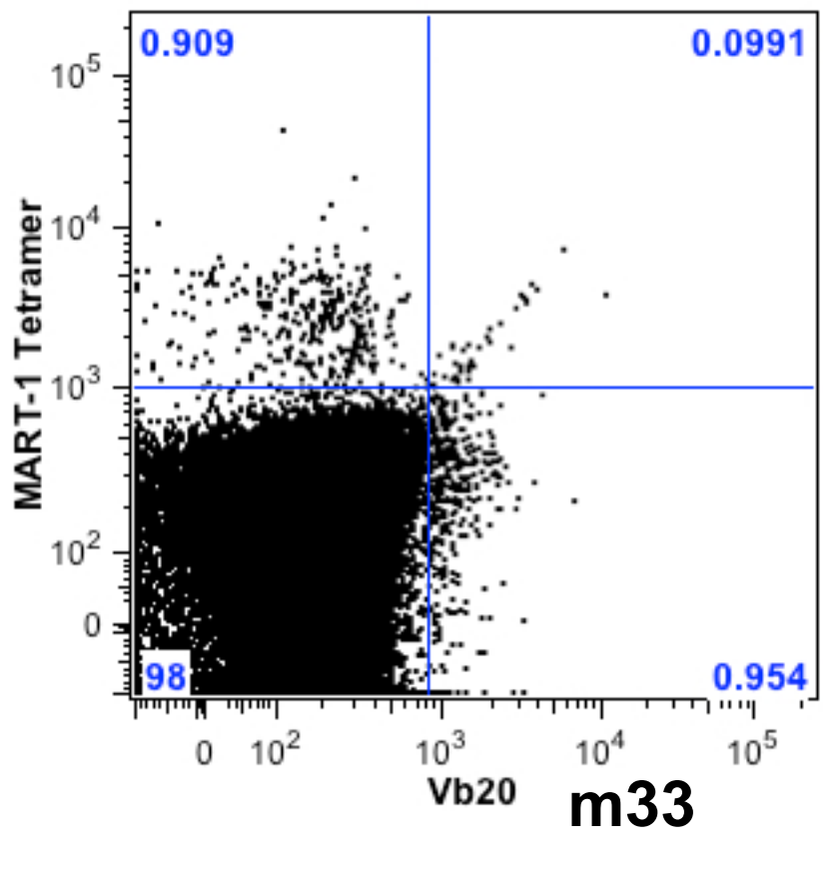
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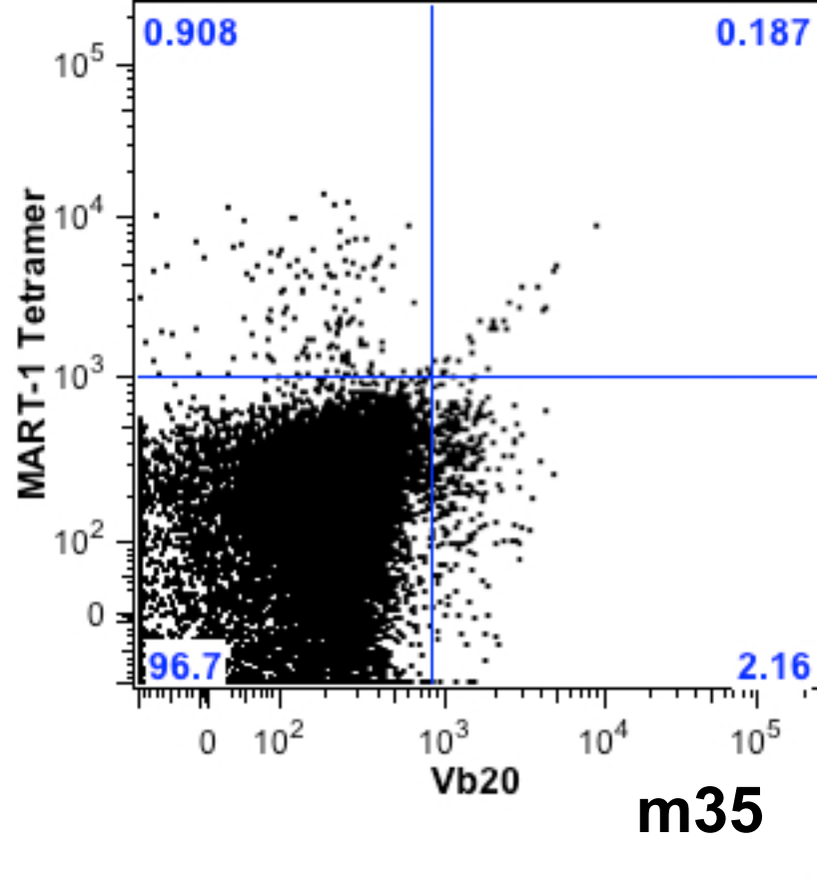
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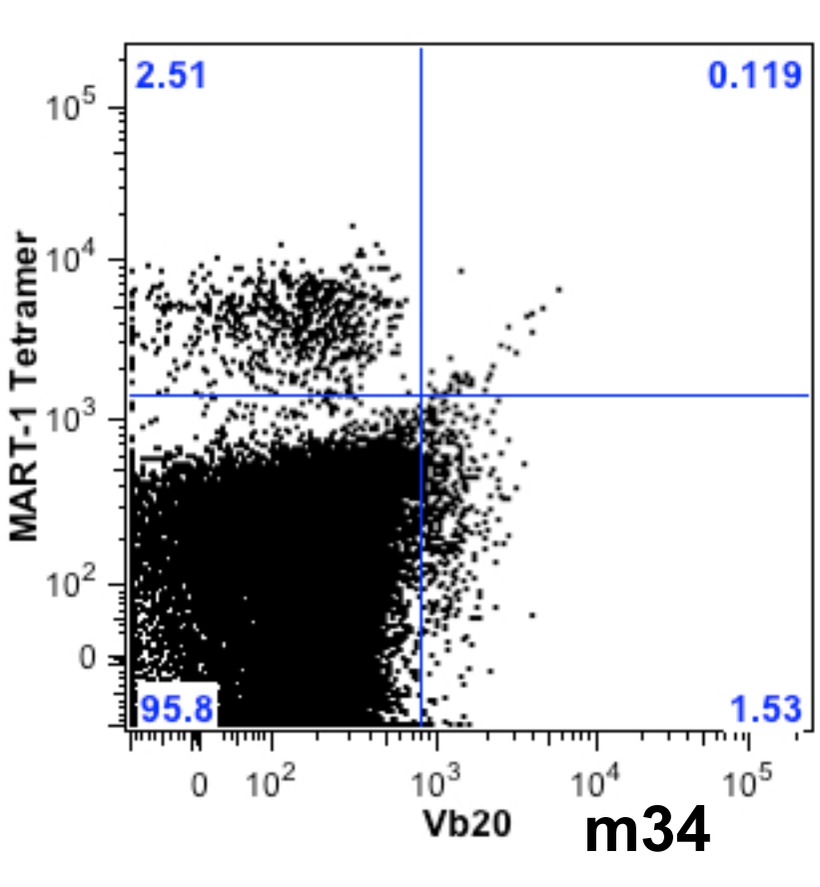
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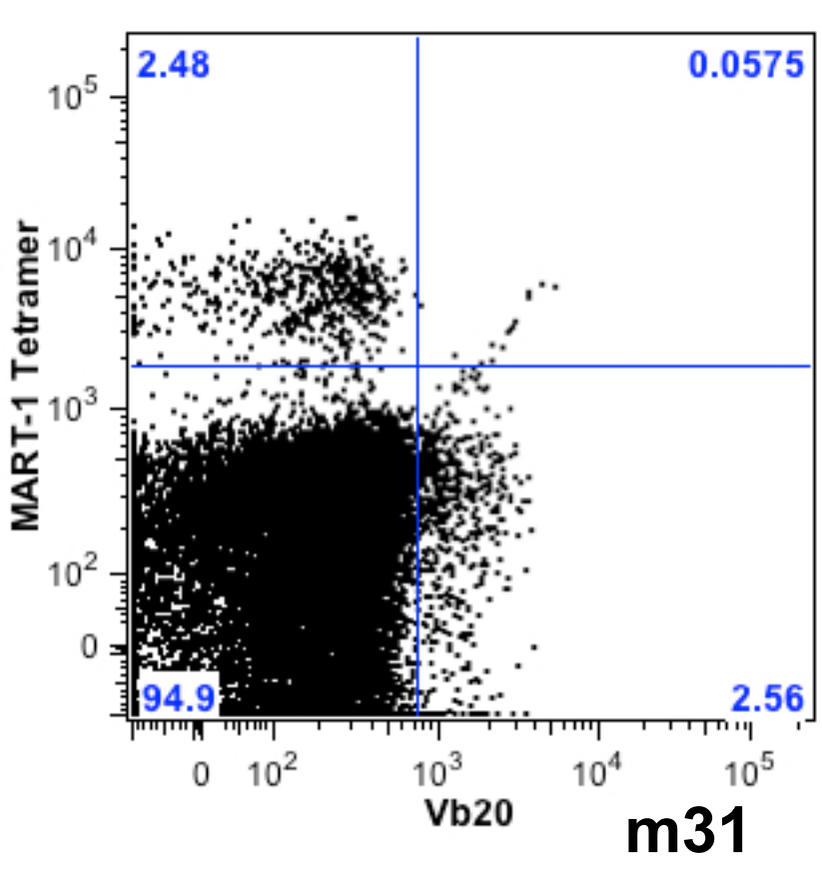
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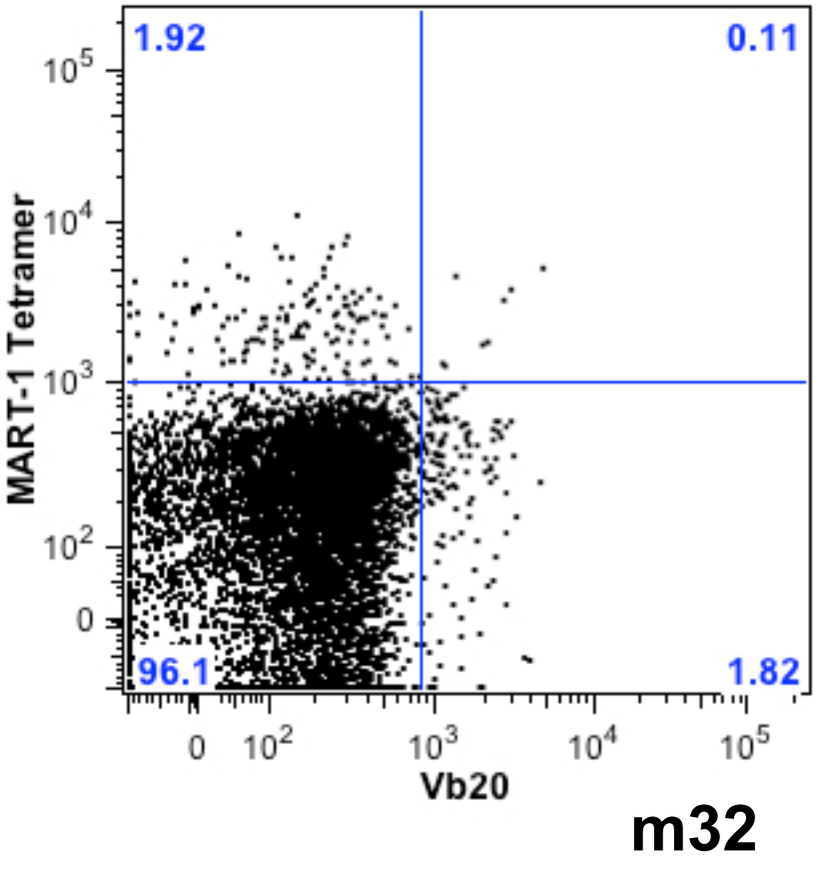
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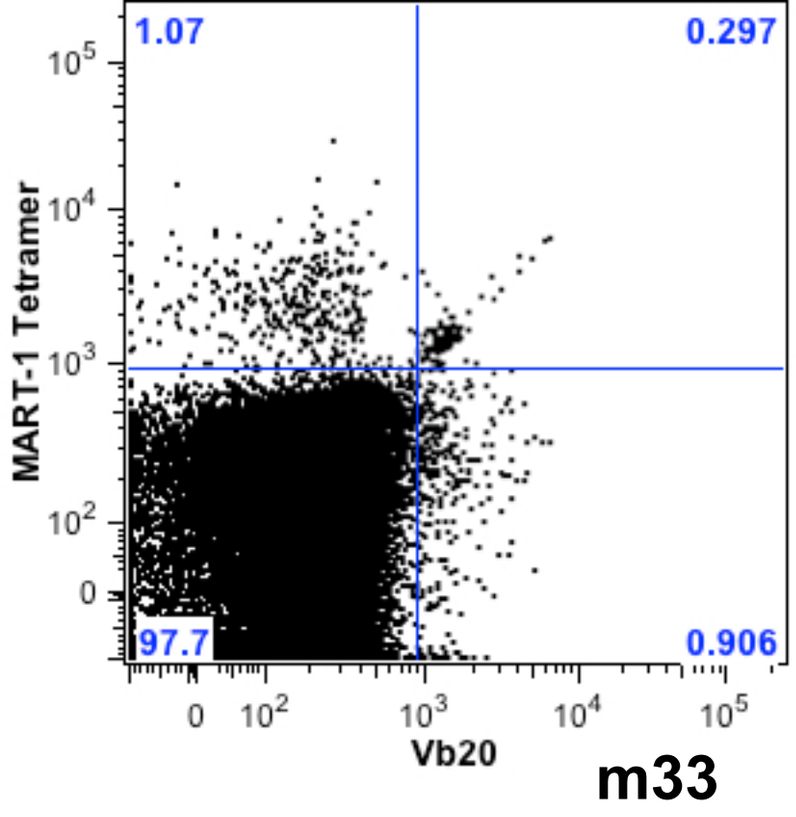
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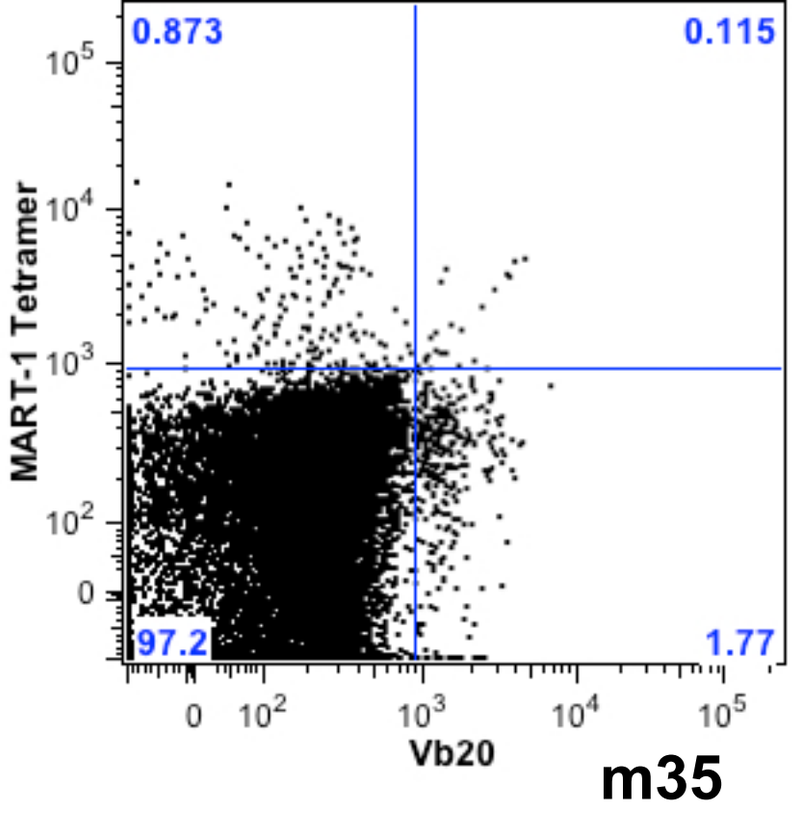
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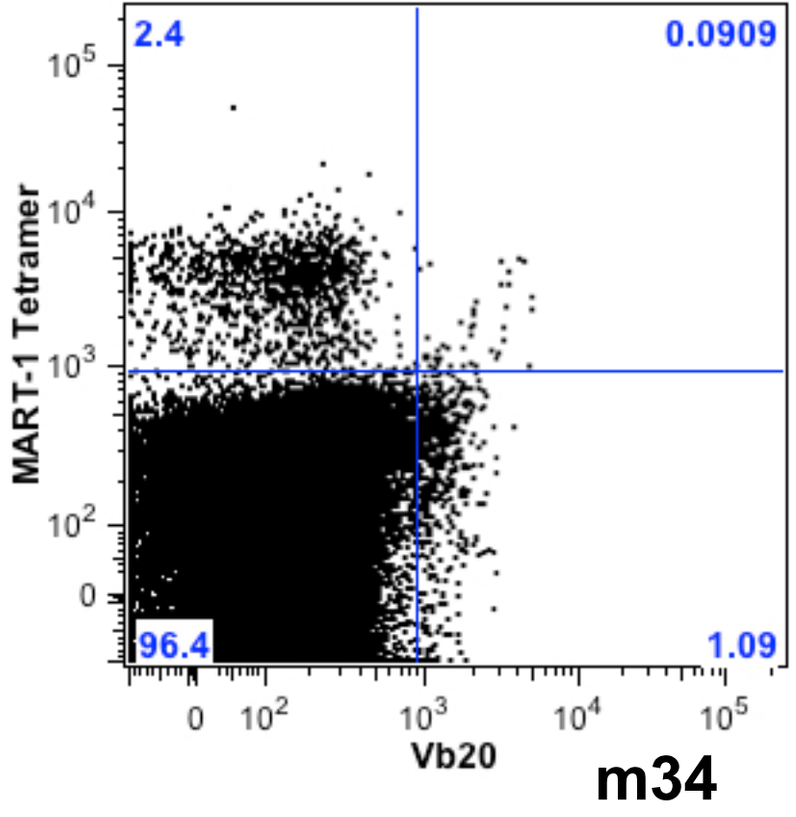
m35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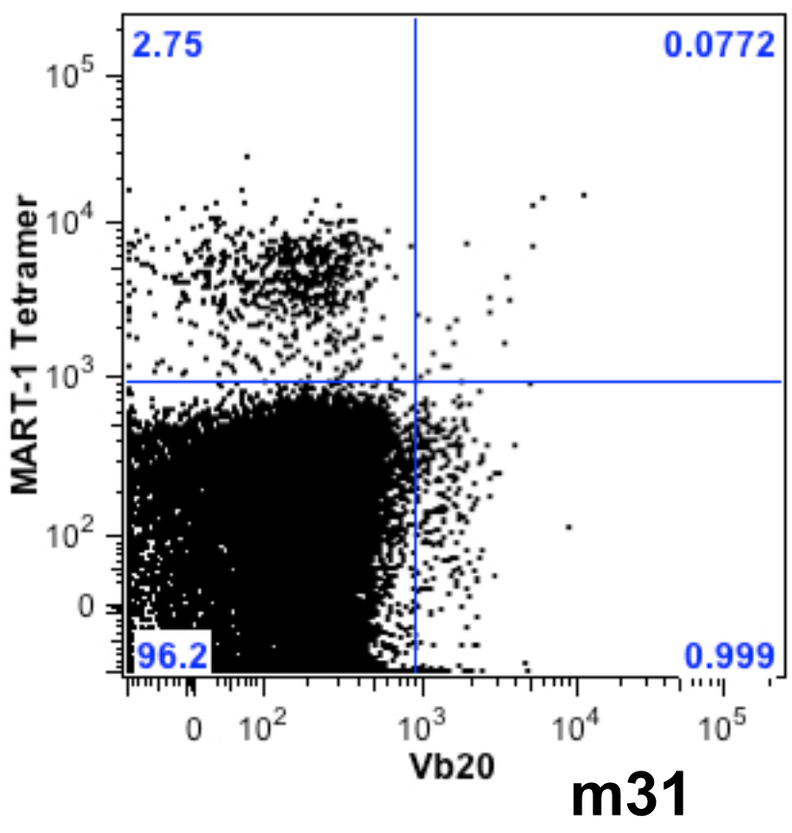
0.0909
96.4
1.09
MART-1 Tetramer
Vb20
m34


2.75
0.0772
96.2
0.999
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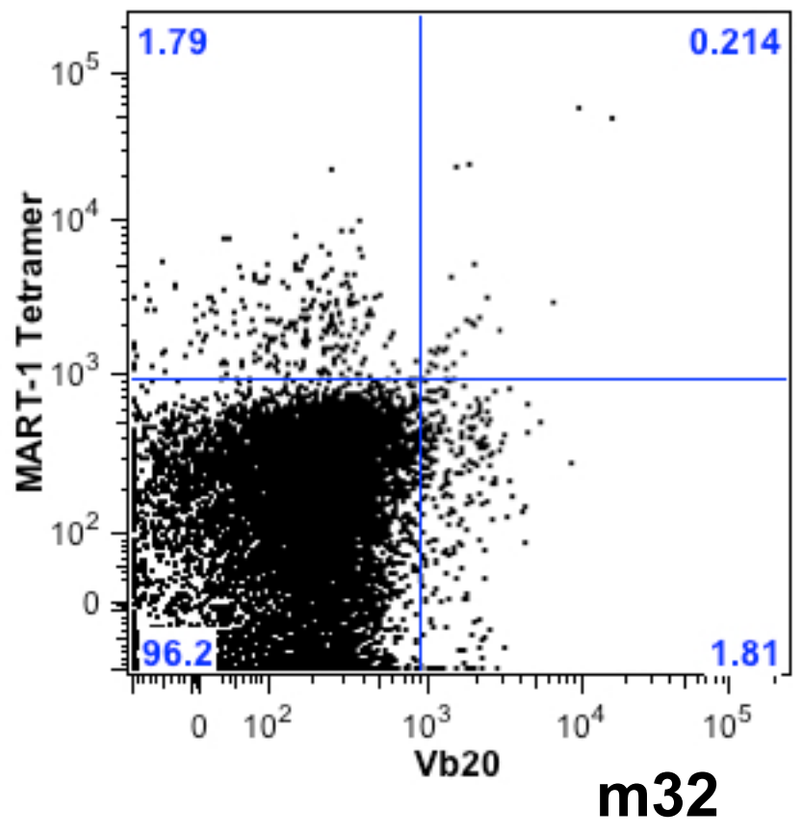
Vb20
m31


1.79
0.214
96.2
1.81
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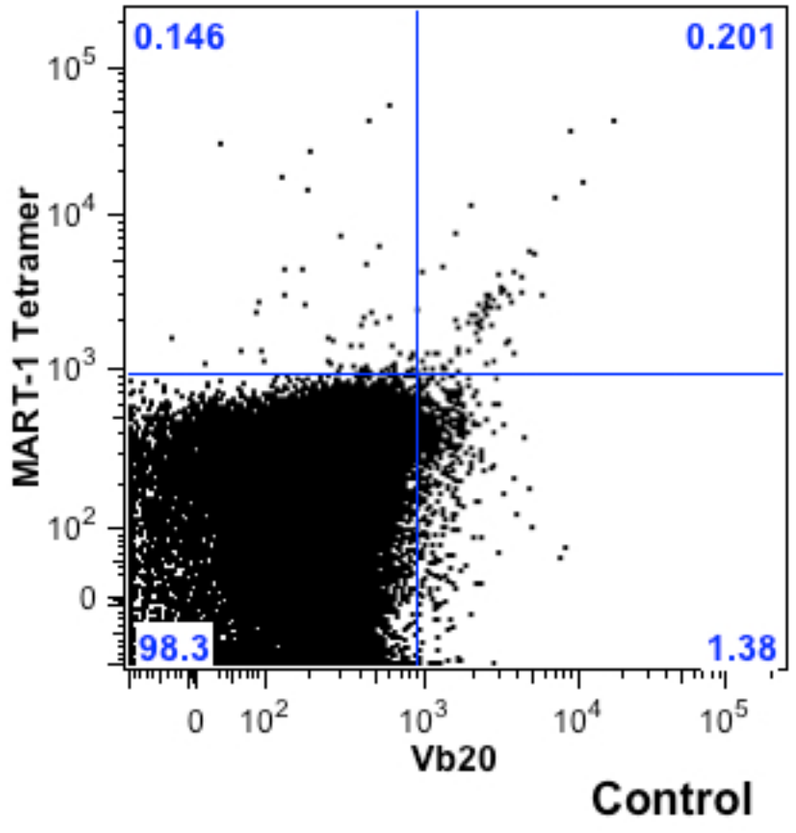
Vb20
m32


0.146
0.201
98.3
1.38
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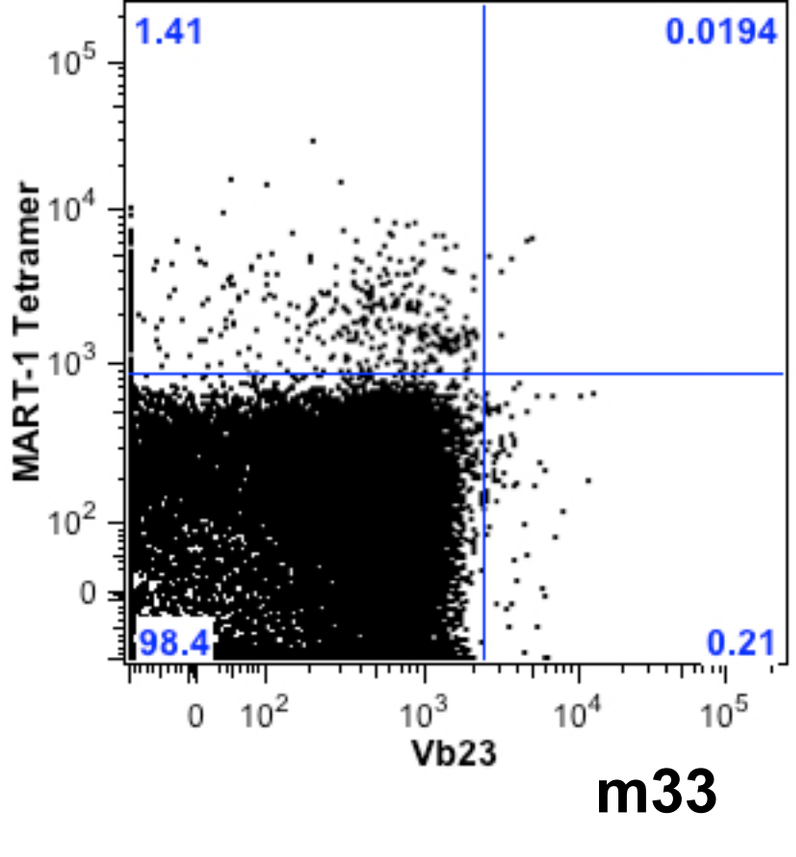
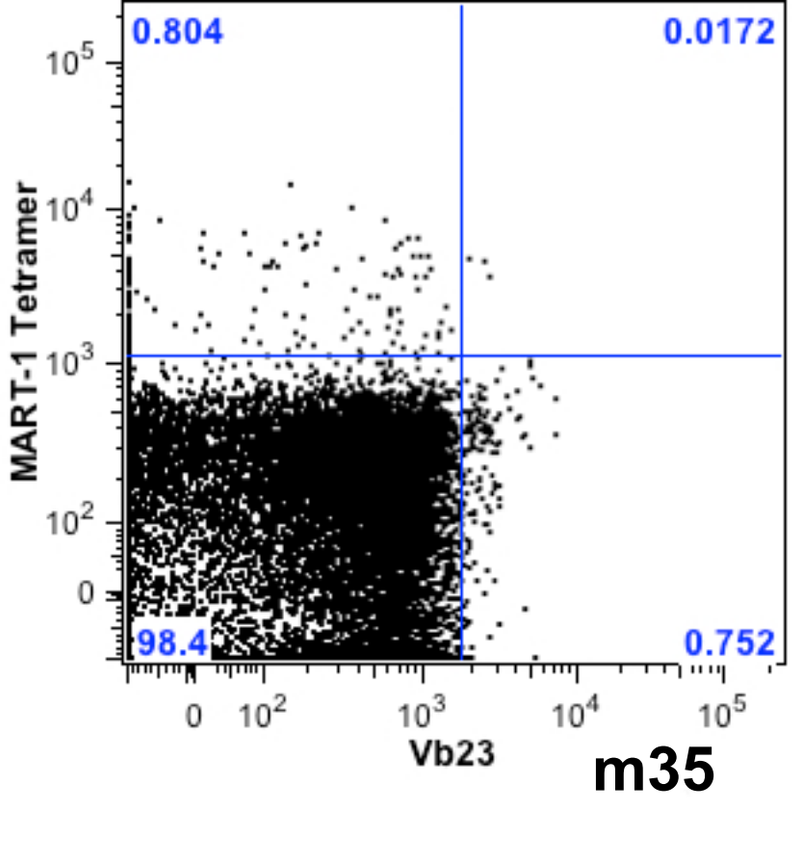
Vb20
Control


1.41
0.0194
98.4
0.21
MART-1 Tetramer
Vb23
m33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0.0172
98.4
0.752
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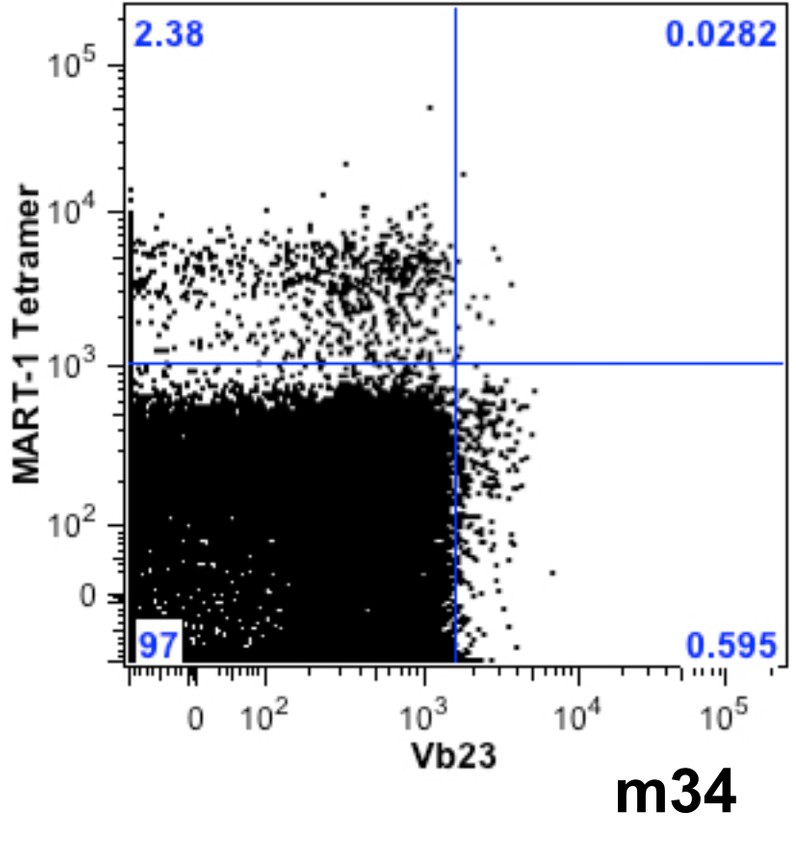
Vb23
m35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0.0282
97
0.595
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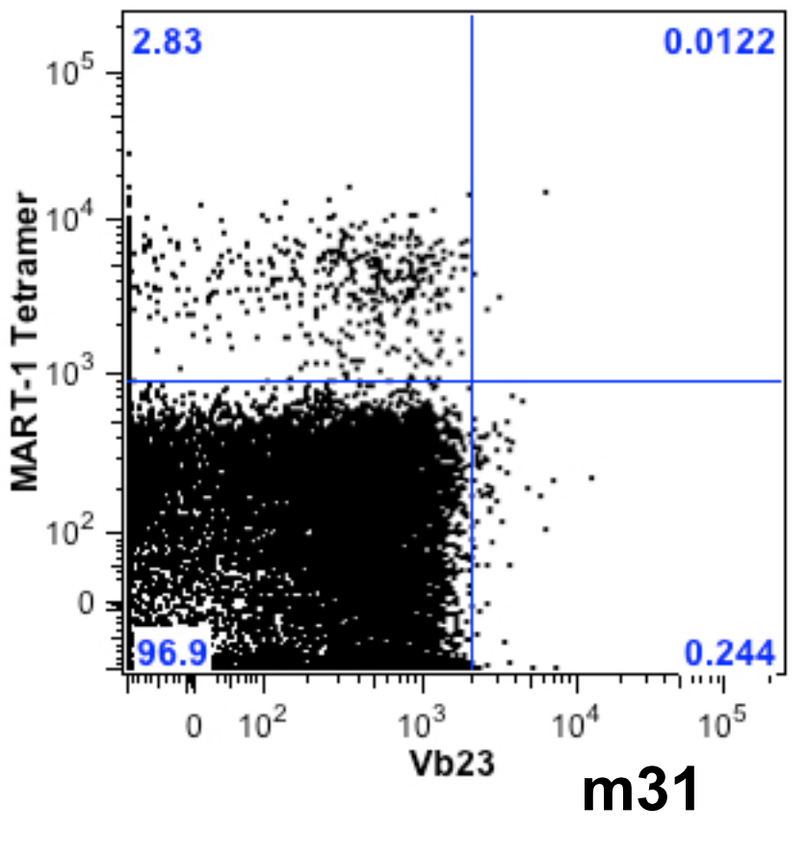
Vb23
m34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0.0122
96.9
0.244
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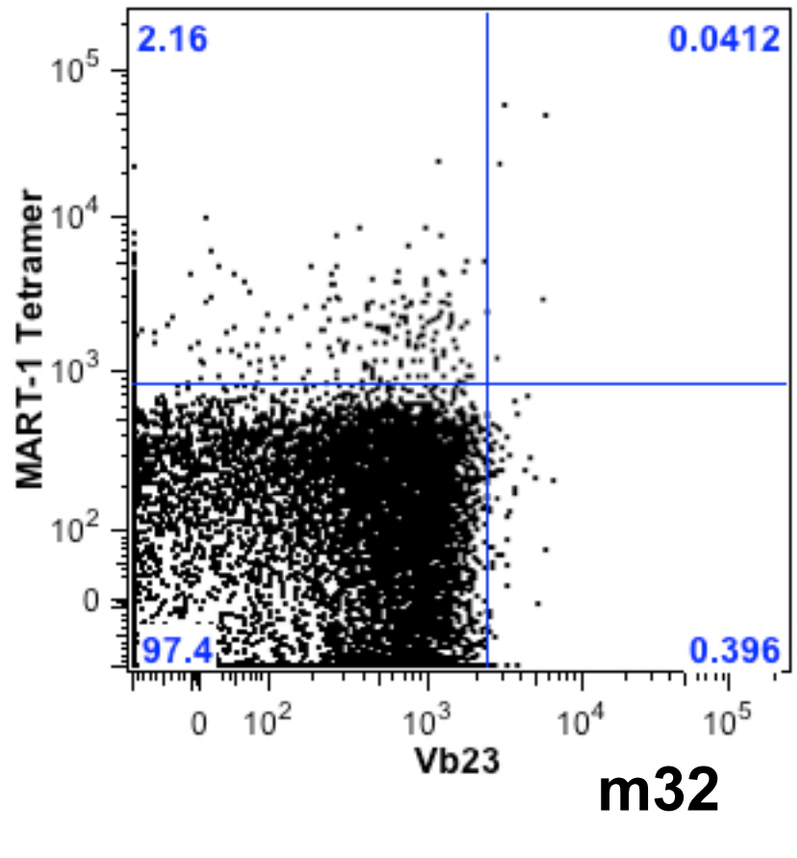
Vb23
m31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0.0412
97.4
0.396
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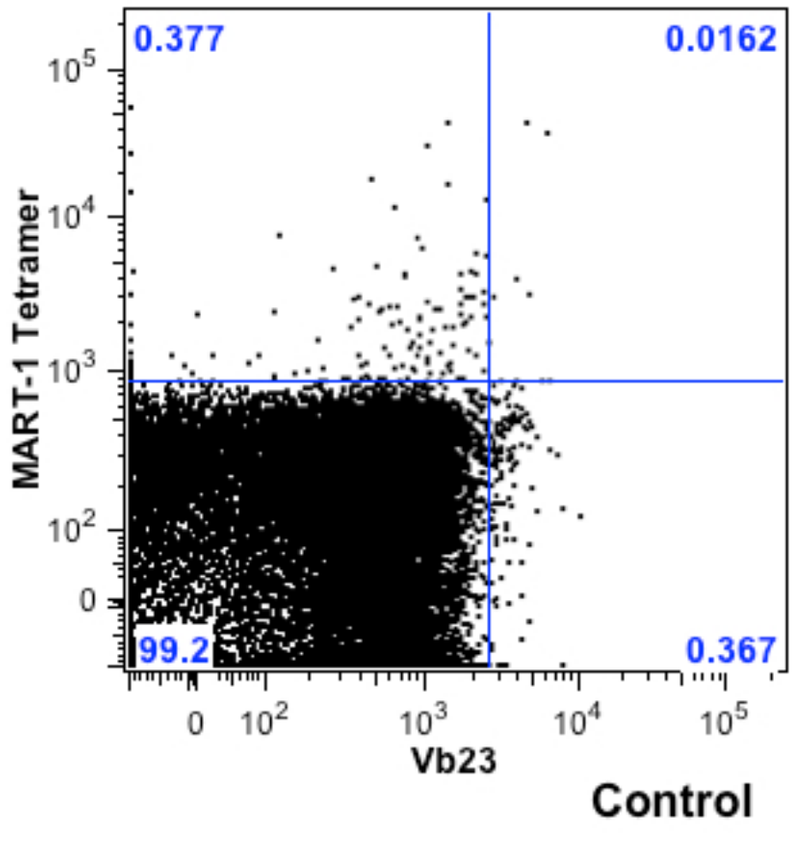
Vb23
m32


0.377
0.0162
99.2
0.367
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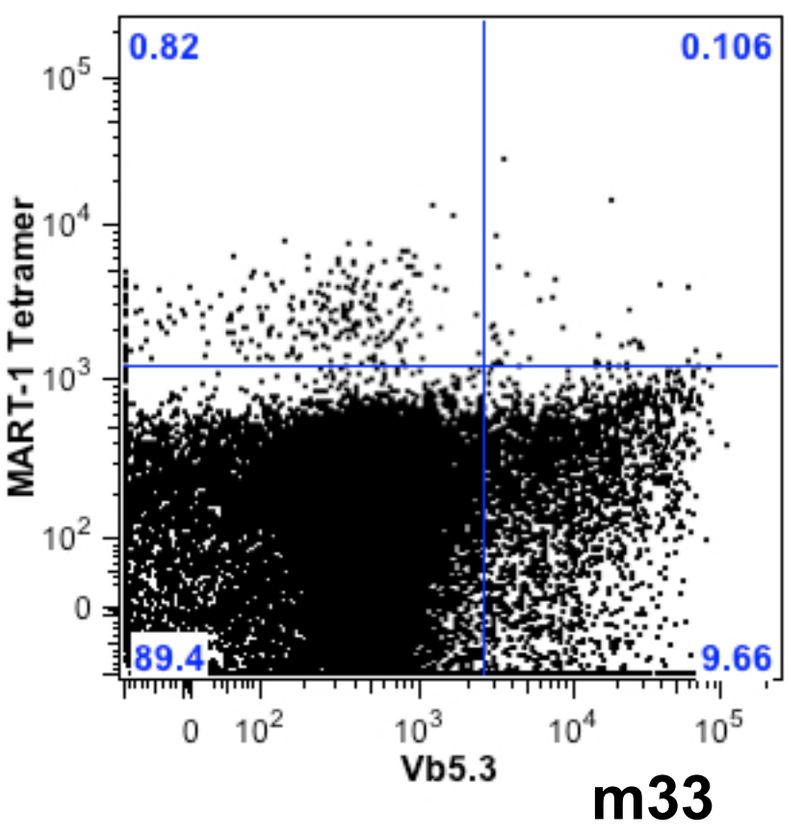
Vb23
Control



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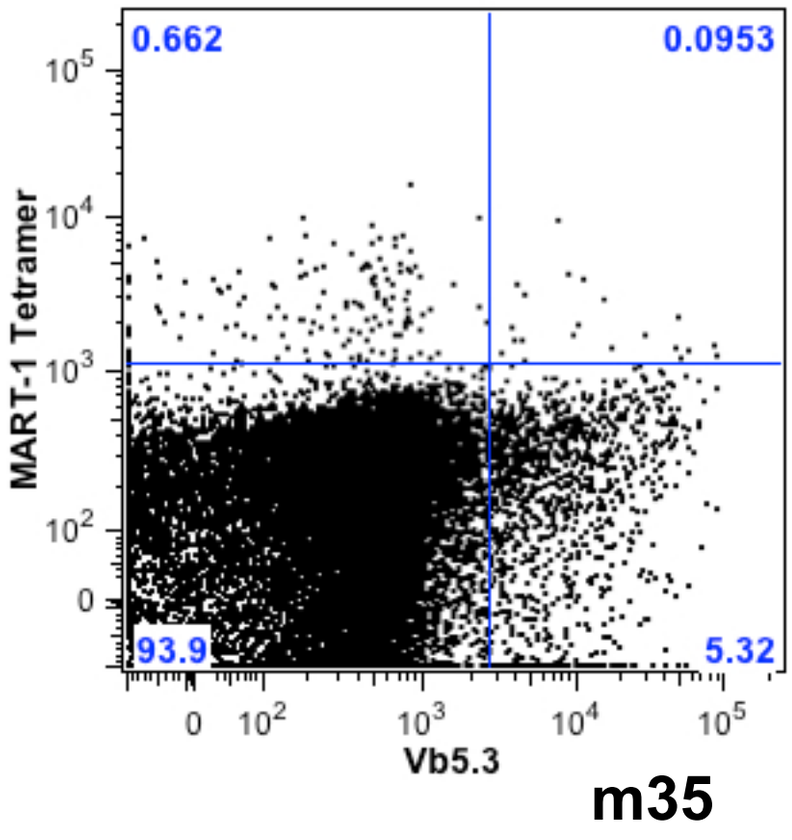

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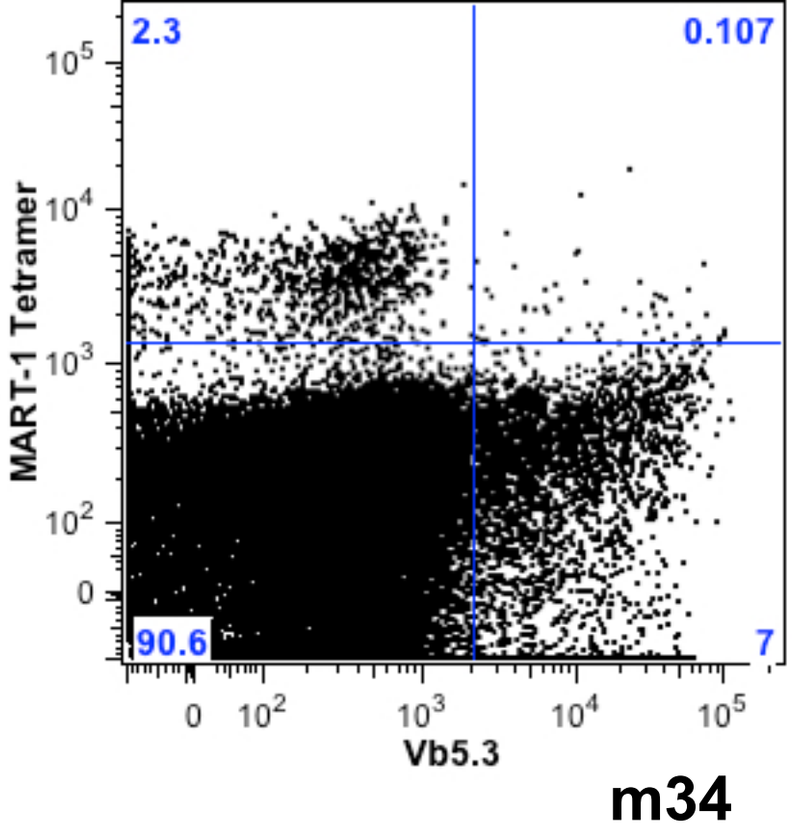

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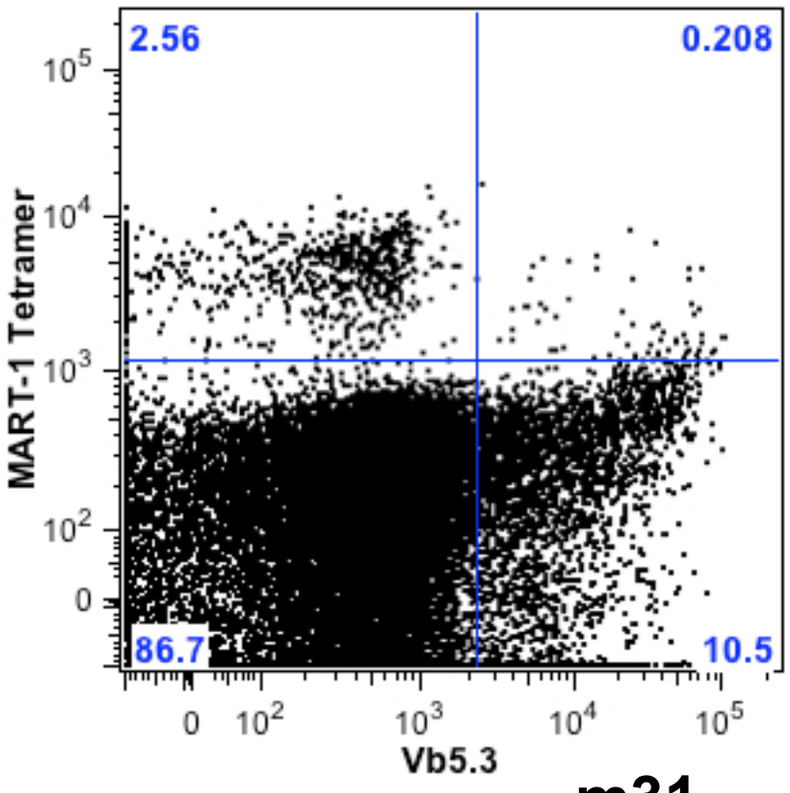
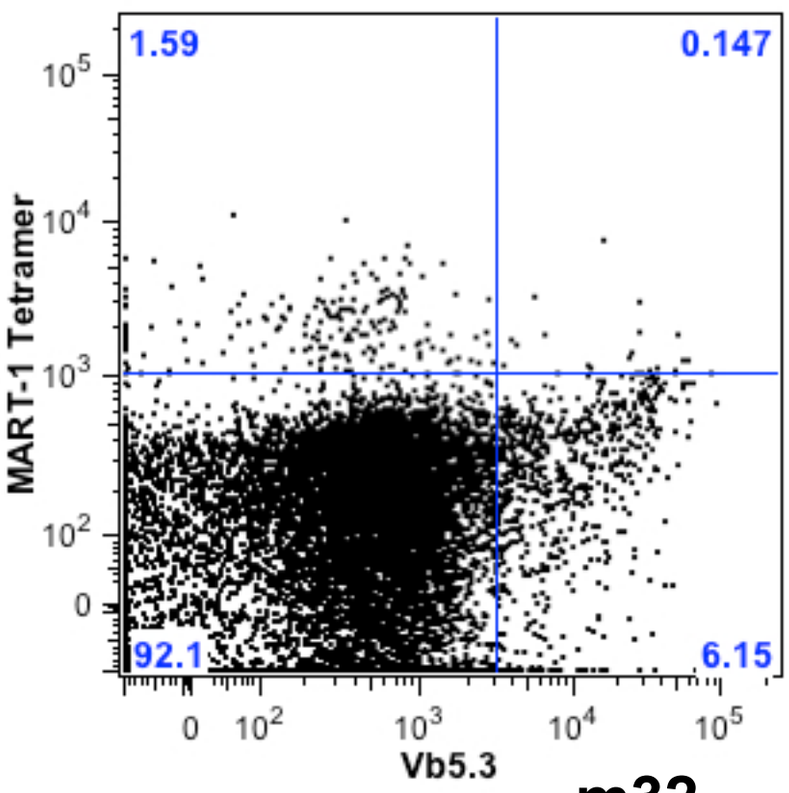


m31



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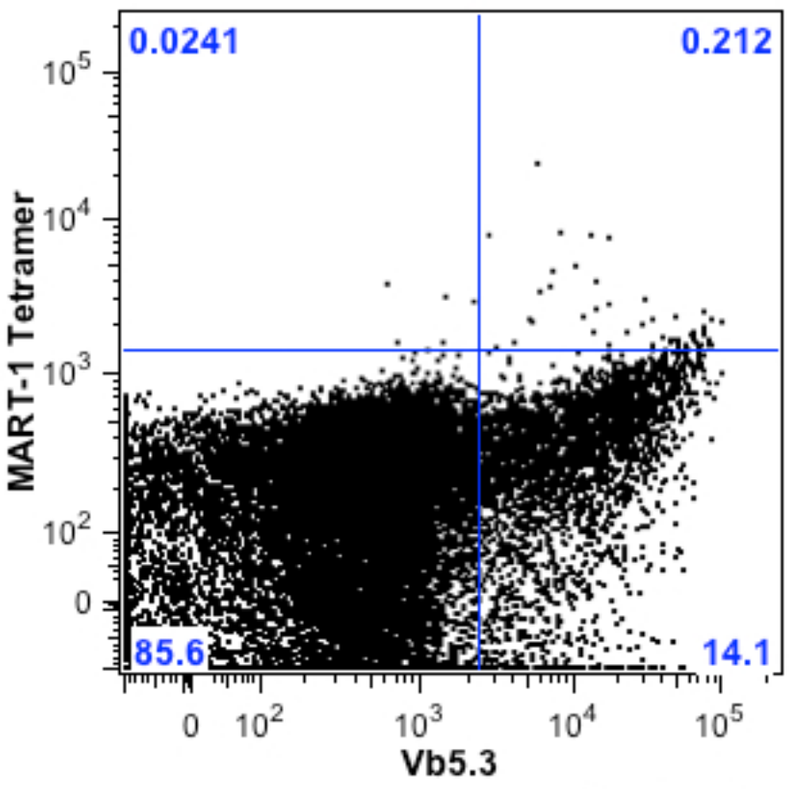

Control