

**TEST CHANGE**

**B Cell Subset Analysis**

3002216, B SUBSETS

Specimen Requirements:	
Patient Preparation:	
Collect:	Lavender (K2EDTA) or <b>p</b> ink (K2EDTA).
Specimen Preparation:	Transport 4 mL whole blood. (Min: 2 mL) Specimens must be analyzed within 48 hours of collection.
Transport Temperature:	Refrigerated.
Unacceptable Conditions:	Clotted or hemolyzed specimens.
Remarks:	
Stability:	Ambient: Unacceptable; Refrigerated: 48 hours; Frozen: Unacceptable
Methodology:	Flow Cytometry
Note:	
CPT Codes:	86355; 86356 x6
New York DOH Approval Status:	This test is New York DOH approved.

**Interpretive Data:**

This panel identifies B-cell dysregulation. B cells start development in the bone marrow (stem cell, pro-B, pre-B), then transition to the spleen and lymph nodes where some mature by acquiring CD27 and switching immunoglobulin class from IgD and IgM to IgG or IgA. Class-switched B-cells may further progress to plasmablasts and finally plasma cells. Different disorders may block different parts of this pathway, disrupting immunoglobulin production.

This panel can also be used to monitor B-cell reconstitution after bone marrow transplantation or targeted B-cell depletion therapy.

This panel can assist in the diagnosis and subclassification of common variable immune ~~deficiency~~**common variable immune** deficiency (CVID). CVID is a heterogeneous group of disorders characterized by low antibody production, defective antibody responses, and recurrent infections. Most cases of CVID have a severe reduction in class switched memory B cells (CD27+, IgD-, IgM-) that correlates with granulomatous disease; many also have an expanded population of CD21low, CD38low B-cells that correlates with splenomegaly. Increased transitional B-cells (CD38+, IgM+) in CVID correlates with lymphadenopathy. Most CVID patients have a low percentage of plasmablasts (CD38+, IgM-) that has a correlation with autoimmune cytopenia.

Class switched memory B-cells are also low in ALPS, but are typically increased in SLE and infection.

Please note, ~~reference intervals~~**reference intervals** for CD20+ B-cells were not established for patients less than 16 years of age. For all other B-cell subsets, reference intervals for populations younger than 16 years are adopted from literature. Piatosa B, Wolska-Kusnierz B,

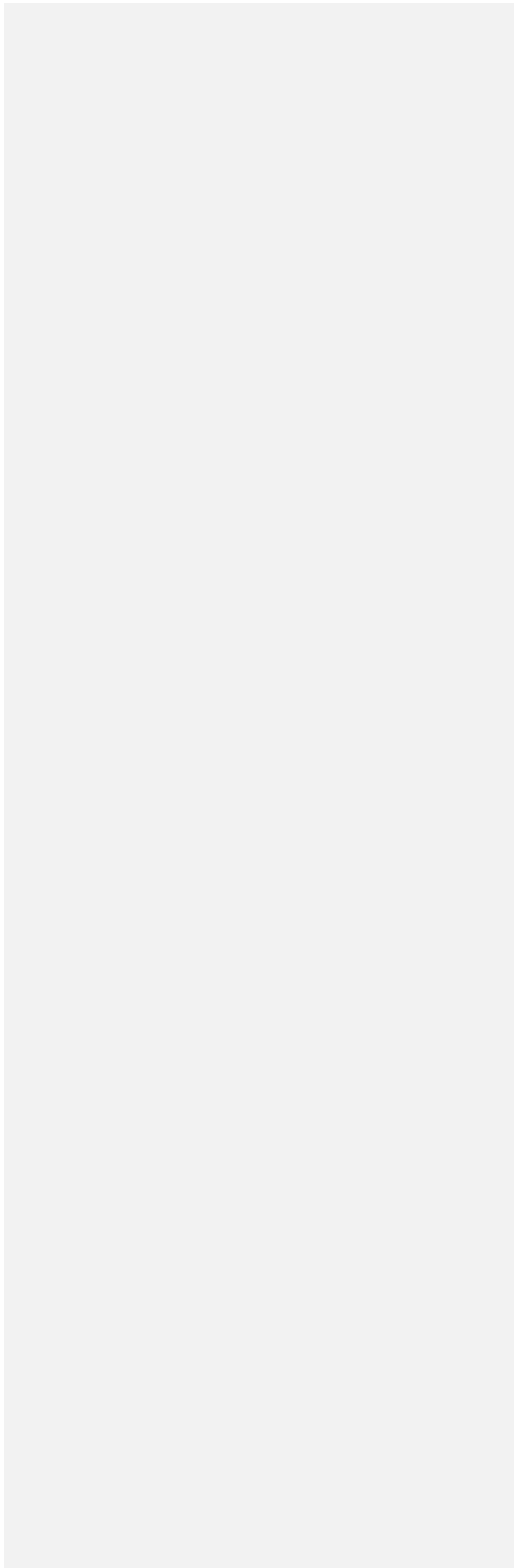


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Pac M, et al. B-cell subsets in healthy children: reference values for evaluation of B-cell maturation process in peripheral blood. *Cytometry B Clin Cytom.* 2010;78(6):372-381.

Reference Interval:



Test Number	Components	Reference Interval	
	Activated CD21 low CD38-	Age	Cells/{u}L
		0-7 days	0-80
		8 days-1 month	0-20
		2-4 months	0-50
		5-8 months	0-50
		9-14 months	0-40
		15-23 months	10-60
		2-4 years	10-60
		5-9 years	10-40
		10-15 years	10-30
		16 years and older	3-26
	Activated CD21 low CD38- %	Age	Percent
		0-7 days	0.5-22.0
		8 days-1 month	0.4-2.2
		2-4 months	0.5-2.9
		5-8 months	0.4-3.3
		9-14 months	0.5-4.5
		15-23 months	1.0-5.7
		2-4 years	1.7-5.4
		5-9 years	2.3-10.0
		10-15 years	2.7-8.7
		16 years and older	1.2-9.0
	CD19+ B cells		

		Age	Cells/(u)L
		0-7 days	200-800
		8 days-1 month	700-1800
		2-4 months	700-2400
		5-8 months	700-2800
		9-14 months	400-2900
		15-23 months	600-1900
		2-4 years	400-1700
		5-9 years	300-600
		10-15 years	200-600
		16 years and older	110-450
CD19+ B cells %			
		Age Reference Intervals	
		0-7 days	6.0-25.0
		8 days-1 month	10.0-31.0
		2-4 months	18.0-38.0
		5-8 months	16.0-34.0
		9-14 months	14.0-28.0
		15-23 months	16.0-34.0
		2-4 years	14.0-29.0
		5-9 years	10.0-24.0
		10-15 years	9.4-23.0
		16 years and older	5.3-25.0
CD20+			
		Age	Cells/(u)L
		0-15 years	N/A
		16 years and older	110-450
CD20+ %			

Inserted Cells

Inserted Cells

		Age	Reference Intervals
		0-15 years	N/A
		16 years and older	90.6-102.8
<b>Class-switched CD27+IgD-IgM-</b>			
		Age	Cells/(u)L
		0-7 days	10-30
		8 days-1 month	10-90
		2-4 months	10-170
		5-8 months	20-140
		9-14 months	10-100
		15-23 months	30-180
		2-4 years	20-220
		5-9 years	40-140
		10-15 years	30-110
		16 years and older	<del>6-81</del> 11-61
<b>Class-switched CD27+IgD-IgM- %</b>			
		Age	Percent
		0-7 days	1.0-7.2
		8 days-1 month	1.5-7.1
		2-4 months	0.3-9.0
		5-8 months	1.6-7.0
		9-14 months	1.4-12.0
		15-23 months	3.9-14.0
		2-4 years	4.7-21.0
		5-9 years	11.0-30.0
		10-15 years	8.7-26.0
		16 years and older	<del>35.1-25.8</del> 22.0
<b>Non switched CD27+IgD+IgM+</b>			

Inserted Cells

Inserted Cells

		Age	Cells/(u)L
		0-7 days	10-40
		8 days-1 month	20-50
		2-4 months	20-200
		5-8 months	30-120
		9-14 months	20-140
		15-23 months	30-170
		2-4 years	20-180
		5-9 years	20-100
		10-15 years	20-70
		16 years and older	<del>9-93</del> 5-46
<b>Non switched CD27+IgD+IgM+ %</b>			
		Age	Percent
		0-7 days	2.6-12.0
		8 days-1 month	1.7-6.5
		2-4 months	2.5-8.7
		5-8 months	2.8-7.4
		9-14 months	3.0-11.0
		15-23 months	4.1-14.0
		2-4 years	2.7-20.0
		5-9 years	5.2-20.0
		10-15 years	4.6-18.0
		16 years and older	<del>2.4, 5-45.9</del> 15.0
<b>Plasmablasts CD38+IgM-</b>			

		Age	Cells/(u)L
		0-7 days	0-10
		8 days-1 month	0-30
		2-4 months	0-40
		5-8 months	0-60
		9-14 months	0-30
		15-23 months	10-40
		2-4 years	10-50
		5-9 years	0-30
		10-15 years	0-20
		16 years and older	1-8
	<b>Plasmablasts CD38+IgM- %</b>		
		Age	Percent
		0-7 days	0.2-3.2
		8 days-1 month	0.2-2.7
		2-4 months	0.4-3.3
		5-8 months	0.2-4.0
		9-14 months	0.4-5.5
		15-23 months	0.5-3.0
		2-4 years	0.6-4.0
		5-9 years	0.6-5.3
		10-15 years	0.6-6.5
		16 years and older	0.4-4.1
	<b>Total Memory CD27+</b>		

		Age	Cells/(u)L
		0-7 days	20-70
		8 days-1 month	30-100
		2-4 months	40-230
		5-8 months	50-270
		9-14 months	40-190
		15-23 months	50-330
		2-4 years	50-390
		5-9 years	60-230
		10-15 years	50-200
		16 years and older	<del>19-170</del> 23-110
<b>Total Memory CD27+ %</b>			
		Age	Percent
		0-7 days	3.6-14.0
		8 days-1 month	3.1-11.0
		2-4 months	3.2-12.0
		5-8 months	5.3-12.0
		9-14 months	4.1-21.0
		15-23 months	9.5-27.0
		2-4 years	7.8-37.0
		5-9 years	18.6-47.0
		10-15 years	13.3-48.0
		16 years and older	<del>11.4-52.7</del> 10.0-33.0
<b>Transitional CD38+IgM+</b>			

	Age	Cells/(u)L
	0-7 days	0-210
	8 days-1 month	50-570
	2-4 months	130-940
	5-8 months	100-300
	9-14 months	20-210
	15-23 months	30-200
	2-4 years	20-200
	5-9 years	10-40
	10-15 years	10-60
	16 years and older	1-17
<b>Transitional CD38+IgM+ %</b>		
	Age	Percent
	0-7 days	1.2-42.0
	8 days-1 month	4.1-44.0
	2-4 months	11.0-38.0
	5-8 months	7.2-20.0
	9-14 months	3.6-13.0
	15-23 months	3.3-17.0
	2-4 years	3.1-12.0
	5-9 years	4.6-8.3
	10-15 years	1.4-13.0
	16 years and older	0.7-5.3, 8-9



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