



Advancing oncology research: comprehensive blood-based protein biomarker testing for enhanced drug discovery and clinical trials

Rules-Based Medicine (RBM) provides a comprehensive suite of cancer-associated blood-based protein biomarkers to support oncology drug discovery and development. Our cancer biomarkers were selected using peer-reviewed research, as well as guidance from the Cancer Prevention and Research Institute of Texas (CPRIT), the National Cancer Institute (NCI), and the National Clinical Proteomic Technologies for Cancer Initiative's Antibody Characterization Program, highlighting our commitment to advancing cancer research. Our data-driven methodology expedites the identification of novel biomarker patterns, enhancing the efficiency and cost-effectiveness of clinical trials.

RBM offers a broad menu of proteins associated with various processes in the development of cancer, including oncogenesis, immune or inflammatory responses, cell proliferation and metabolites secreted from tumor tissue. Our Luminex®- and Simoa®-based assays undergo rigorous analytical validation under CLSI guidelines in our CLIA-certified laboratory and are optimized into various immunoassay panels. Our validation parameters encompass sensitivity, dynamic range, linearity, cross-reactivity, interference and precision. RBM also performs the Olink® Target 48 Cytokine Panel to help analyze cytokine signaling and inflammatory processes useful in identifying protein biomarker signatures.

Platform	Technology	RBM oncology offering
Luminex	Fluorescent bead-based assays	~100 analytes available in multiple multiplexed assays
Simoa	Single molecule array (Simoa)	~20 ultrasensitive assays with quantification in the femtomolar range
Olink	Proximity extension assay (PEA)	Target 48 Cytokine panel of pre-defined analytes

Whether you need specific markers within our multiplexed assays, ultrasensitive markers for ultra-low quantification, and/or a PCR-amplified option, RBM's menu of assays can help accelerate your oncology clinical trials.

Luminex-based oncology biomarkers

1. 6ckine
2. Adiponectin
3. Alpha-2- macroglobulin
4. Alpha- Fetoprotein
5. Amphiregulin
6. Angiogenin
7. Angiopoietin-1
8. Angiopoietin-2
9. AXL Receptor Tyrosine Kinase
10. B Cell- Activating Factor
11. B Lymphocyte Chemoattractant
12. Beta-2- Microglobulin
13. Betacellulin
14. Cancer Antigen 125
15. Cancer Antigen 15-3
16. Cancer Antigen 19-9
17. Carbonic Anhydrase 9
18. Carcinoembryonic Antigen
19. Cathepsin D
20. Ciliary Neurotrophic Factor
21. Chitinase-3- Like Protein 1 (YKL-40)
22. Collagen IV
23. CXCL13
24. Decorin
25. Eotaxin-2
26. Epidermal Growth Factor
27. Epidermal Growth Factor Receptor
28. Epiregulin
29. FAS Ligand
30. FAS Ligand Receptor
31. Fatty Acid- Binding Protein, Adipocyte
32. Fatty Acid- Binding Protein, Liver
33. Granulocyte Colony-Stimulating Factor
34. Granulocyte-Macrophage Colony-Stimulating Factor
35. Growth/differentiation factor 15
36. Ferritin
37. Human Epididymis Protein 4
38. Heparin-binding EGF- Like Growth Factor
39. Hepatocyte Growth Factor
40. Hepatocyte Growth Factor Receptor
41. Hepsin
42. Human Chorionic Gonadotropin Beta
43. Human Epidermal Growth Factor Receptor 2
44. I-309 (CCL1)
45. Insulin
46. Insulin-like Growth Factor- Binding Protein 1
47. Insulin-like Growth Factor- Binding Protein 2
48. Interferon Gamma Induced Protein 10
49. Interferon-Inducible T- Cell Alpha Chemoattractant
50. Interleukin-18- Binding Protein
51. Interleukin-2 Receptor Alpha
52. Interleukin-6
53. Interleukin-6 Receptor
54. Interleukin-6 Receptor Subunit Beta
55. Kallikrein 5
56. Kallikrein-7
57. Latency- Associated Peptide of Transforming Growth Factor Beta 1
58. Leptin
59. Macrophage Inflammatory Protein 3 Beta
60. Macrophage Migration Inhibitory Factor
61. Maspin
62. MHC Class I Chain-related Protein A
63. Monocyte Chemotactic Protein 1
64. Monocyte Chemotactic Protein 3
65. Monokine Induced by Gamma Interferon
66. Myoglobin
67. Neuron- Specific Enolase
68. Neutrophil Gelatinase- Associated Lipocalin
69. Osteopontin
70. Osteoprotegerin
71. Pepsinogen I
72. Placenta Growth Factor
73. Plasminogen Activator Inhibitor 1
74. Platelet Endothelial Cell Adhesion Molecule
75. Platelet- Derived Growth Factor BB
76. Prostatin
77. Pulmonary Surfactant- Associated Protein D
78. Stromal Cell-derived Factor-1
79. Tenascin- C
80. Thyroglobulin
81. Tissue Inhibitor of Metalloproteinases 1
82. TNF-related Apoptosis-inducing Ligand Receptor 3
83. Tumor Necrosis Factor alpha
84. Tumor Necrosis Factor beta
85. Tumor Necrosis Factor Receptor 2
86. Tumor Necrosis Factor Receptor I
87. Tyrosine Kinase with Ig and EGF Homology Domains 2
88. Urokinase- type Plasminogen Activator Receptor
89. Vascular Cell Adhesion Molecule-1
90. Vascular Endothelial Growth Factor
91. Vascular Endothelial Growth Factor D
92. Vascular Endothelial Growth Factor Receptor 1
93. Vascular Endothelial Growth Factor Receptor 2
94. Vascular Endothelial Growth Factor Receptor 3

Simoa-based oncology biomarkers

1. B Lymphocyte Chemoattractant (CXCL13)
2. Fibroblast Growth Factor 23
3. Granulocyte Colony-Stimulating Factor
4. Granulocyte-Macrophage Colony-Stimulating Factor
5. Granzyme B
6. Growth/differentiation factor 11
7. Interferon alpha
8. Interferon beta
9. Interferon gamma
10. Interferon lambda 1
11. Interleukin-1 beta
12. Interleukin-6
13. Interleukin-8
14. Interleukin -19
15. Myeloid cell surface antigen CD33
16. Programmed Cell Death Protein 1
17. Programmed Death-Ligand 1
18. Receptor Activator of Nuclear Factor Kappa B Ligand
19. Tumor Necrosis Factor alpha

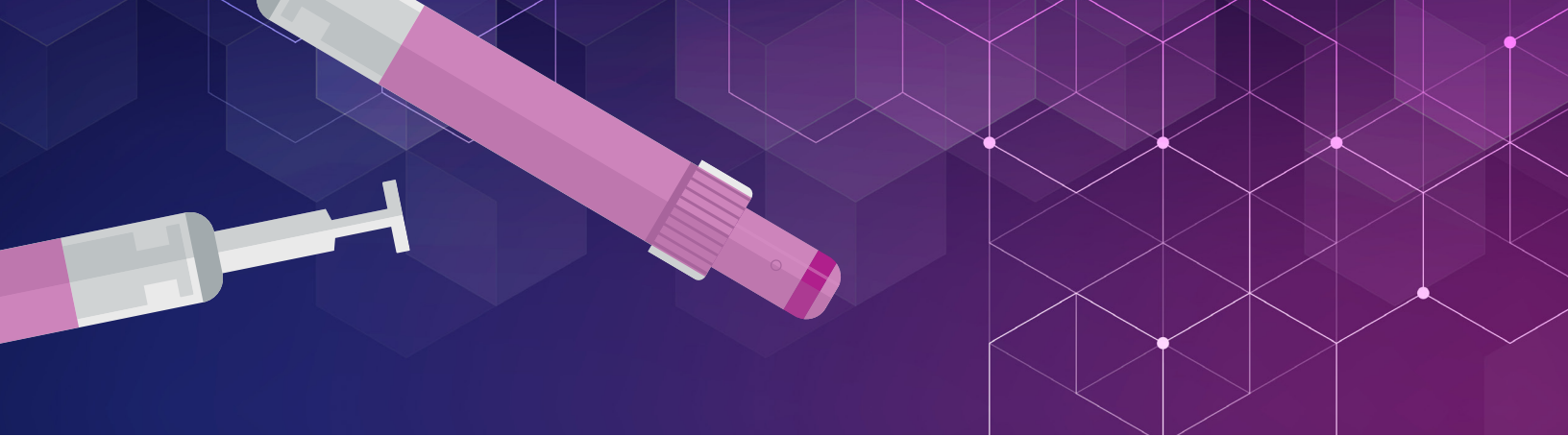
Olink

Olink Target 48 Cytokine – a single multiplex of 45 proteins associated with inflammation and immune system regulation with demonstrated utility in oncology and immuno-oncology.

1. C-C motif chemokine 2 (CCL2)
2. C-C motif chemokine 3 (CCL3)
3. C-C motif chemokine 4 (CCL4)
4. C-C motif chemokine 7 (CCL7)
5. C-C motif chemokine 8 (CCL8)
6. C-X-C motif chemokine 9 (CXCL9)
7. C-X-C motif chemokine 10 (CXCL10)
8. C-X-C motif chemokine 11 (CXCL11)
9. C-C motif chemokine 13 (CCL13)
10. C-C motif chemokine 19 (CCL19)
11. Eotaxin (CCL11)
12. Fms-related tyrosine kinase 3 ligand (FLT3LG)
13. Granulocyte-macrophage colony-stimulating factor (CSF2)
14. Granulocyte colony-stimulating factor (CSF3)
15. Hepatocyte growth factor (HGF)
16. Interferon gamma (IFNG)
17. Interleukin-1 beta (IL1B)
18. Interleukin-2 (IL2)
19. Interleukin-4 (IL4)
20. Interleukin-6 (IL6)
21. Interleukin-7 (IL7)
22. Interleukin-8 (CXCL8)
23. Interleukin-10 (IL10)
24. Interleukin-13 (IL13)
25. Interleukin-15 (IL15)
26. Interleukin-17A (IL17A)
27. Interleukin-17C (IL17C)
28. Interleukin-17F (IL17F)
29. Interleukin-18 (IL18)
30. Interleukin-27 (EBI3_IL27)
31. Interleukin-33 (IL33)
32. Interstitial collagenase (MMP1)
33. Lymphotoxin-alpha (LTA)
34. Macrophage colony-stimulating factor 1 (CSF1)
35. Macrophage metalloelastase (MMP12)
36. Oncostatin-M (OSM)
37. Oxidized low-density lipoprotein receptor 1 (OLR1)
38. Pro-epidermal growth factor (EGF)
39. Protransforming growth factor alpha (TGFA)
40. Stromal cell-derived factor 1 (CXCL12)
41. Thymic stromal lymphopoietin (TSLP)
42. Tumor necrosis factor (TNF)
43. Tumor necrosis factor ligand superfamily member 10 (TNFSF10)
44. Tumor necrosis factor ligand superfamily member 12 (TNFSF12)
45. Vascular endothelial growth factor A (VEGFA)



Our assays require very low sample volume. Ask your RBM representative about acceptable specimens for each platform.



TruCulture® whole blood collection and culture system

TruCulture tubes — available only from Rules-Based Medicine — allow you to collect and culture whole blood at the collection site, requiring only a phlebotomist and a heat block. TruCulture has been utilized in dozens of studies to measure the immune response of candidate therapeutics.

Advantages of TruCulture



Reproducible and consistent results

In a multi-center trial coordinated by the Institut Pasteur, TruCulture demonstrated superior reproducibility and consistency of data compared to PBMC cultures (Duffy, 2017).



Cost-effective and patient-inclusive

No expensive lab equipment or specialized collection techniques are needed, enabling broader representation and mitigating barriers for some clinical sites.



Flexibility

TruCulture samples can be tested at RBM using Luminex- or Simoa-based assays. We can also develop tubes with your requested stimulant or proprietary biologic candidate.

Evaluating adaptive immunity

TruCulture tubes and cytokine testing on RBM's Luminex-based multi-analyte profiles (MAPs) were used in a study published in *Nature* in 2024. The study demonstrated that smoking has a long-term effect on adaptive immunity — specifically on T-cell response — years after quitting (Saint-André, 2024). TruCulture can also be used for innate immunity, pharmacodynamics (including dose-response), disease characterization and antigen recall to support vaccine studies.

Contact us

Toll free: +1 866.726.6277

Direct: +1 512.835.8026

Email: rbm_clientservices@iqvia.com

Website: rbm.iqvia.com

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2. Saint-André, V., Charbit, B., Biton, A., Rouilly, V., Possémé, C., Bertrand, A., Rotival, M., Bergstedt, J., Patin, E., Albert, M. L., Quintana-Murci, L., Duffy, D., & Millieu Intérieur Consortium (2024). Smoking changes adaptive immunity with persistent effects. *Nature*, 626(8000), 827–835. <https://doi.org/10.1038/s41586-023-06968-8>
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