Cytokine Research

Offers a comprehensive menu of cytokines, cytokine receptors and growth factors, across five multi-analyte arrays
Cytokines are innate small regulatory proteins involved in immune response and are produced by various cell types including B-cells, T-cells, macrophages, neutrophils, basophils, eosinophils and endothelial cells. Cytokines function as intercellular chemical messengers. They act as external controlling elements in hematopoiesis and also mediate and control immune and inflammatory responses. They have been implicated in pathological conditions, such as cancer, cardiovascular diseases, allergic response and play a significant role in surgery recovery, including transplants.

Cytokine Facts
- Similar functions can be stimulated by different cytokines.
- They can act synergistically or antagonistically therefore measuring a single cytokine may miss an important facet of response progression.
- Have duplicity of function when dealing with infection.
- Can affect their host cell (autocrine), nearby cells (paracrine) or distant cells (endocrine).
- Commonly cascade so cytokines can more readily be observed if many are measured simultaneously.
- Exert their influence through receptors in the cell membrane or within the cell.

Hypersensitive Response
In some cases, the immune response over-reacts, turning cytokines against the body they are designed to protect. When the cytokine cascades fail to shut down, they can drive the host into a state of acute or chronically activated cells, which dominate an otherwise dormant immune system. Examples of the most obvious manifestations of this hypersensitivity are an unnecessary inflammatory response and fever; both of which can be life threatening if left untreated.

Cytokine Biochip Arrays
To determine multiple cytokines in a single sample at a single time point, Randox offers a comprehensive menu of 33 cytokines, cytokine receptors and growth factors, over five multi-analyte arrays. Each cytokine assay is performed on a 9 x 9mm activated biochip with spatially discrete test regions containing antibodies specific to each of the analytes. The combination of highly specific antibodies and advanced chemistries enables cytokines, cytokine receptors and growth factors to be detected simultaneously in a single sample, providing valuable information relating to each cytokine under test and possible associations between cytokines in each sample.

Key Benefits
- Multiple results from a single sample
- Validated for plasma and serum samples*
- Small sample volume - 100µl total / from 8.3µl sample per test
- Excellent analytical performance
- Biochips are ready-to-use
- Dedicated fully and semi-automated analysers available

*Human cell culture supernatants and other human biological fluid e.g. bronchoalveolar lavage, wound fluid and saliva can be assayed using the biochip, but will require end user optimisation.
Cytokine Biochip Arrays Available

<table>
<thead>
<tr>
<th>Cytokine Array I and Cytokine High Sensitivity Array</th>
<th>Cat. No.</th>
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<tbody>
<tr>
<td>• Interleukin-1α (IL-1α)</td>
<td>EV3544 - Evidence (180 biochips)</td>
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<tr>
<td>• Interleukin-1β (IL-1β)</td>
<td>EV3508 - Evidence (360 biochips)</td>
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<tr>
<td>• Interleukin-2 (IL-2)</td>
<td>EV3513 - Evidence Investigator (54 biochips)</td>
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<tr>
<td>• Interleukin-4 (IL-4)</td>
<td>EV3561 - Cytokine Array Calibrator Series</td>
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<tr>
<td>• Interleukin-6 (IL-6)</td>
<td>CY5006 - Cytokine Control (Series I)</td>
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<td>• Interleukin-8 (IL-8)</td>
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<td>• Interleukin-10 (IL-10)</td>
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<tr>
<td>• Epidermal Growth Factor (EGF)</td>
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<tr>
<td>• Interferon-γ (IFN-γ)</td>
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<tr>
<td>• Monocyte Chemotactic Protein-1 (MCP-1)</td>
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<tr>
<td>• Tumour Necrosis Factor-α (TNF-α)</td>
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<td>• Vascular Endothelial Growth Factor (VEGF)</td>
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<tr>
<th>Cytokine Array II*</th>
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<tr>
<td>• Eotaxin</td>
<td>EV3817 - Evidence Investigator (54 Biochips)</td>
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<tr>
<td>• Insulin-like Growth Factor I Free (IGF-I)</td>
<td>CY5132 - Cytokine Control (Series II)</td>
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<tr>
<td>• Interferon inducible protein-10 (IP-10)</td>
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<tr>
<td>• Interleukin-1 receptor antagonist (IL-1Ra)</td>
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<tr>
<td>• Interleukin-12p40 (IL-12p40)</td>
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<tr>
<td>• Platelet Derived Growth Factor BB (PDGF-BB)</td>
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<td>• RANTES</td>
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<th>Cytokine Array III</th>
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<tbody>
<tr>
<td>• Granulocyte Macrophage Colony Stimulating Factor (GM-CSF)</td>
<td>EV3680 - Evidence (180 biochips)</td>
</tr>
<tr>
<td>• Interleukin-5 (IL-5)</td>
<td>EV3678 - Evidence Investigator (54 biochips)</td>
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<tr>
<td>• Interleukin-15 (IL-15)</td>
<td>EV3679 - Cytokine Array III Calibrator Series</td>
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<tr>
<td>• Macrophage Inflammatory Protein-1α (MIP-1α)</td>
<td>CY5012 - Cytokine Control (Series II)</td>
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<th>Cytokine Array IV</th>
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<tr>
<td>• Matrix Metalloproteinase-9 (MMP-9)</td>
<td>EV3659 - Evidence (180 biochips)</td>
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<tr>
<td>• Soluble IL-2 Receptor α (sIL-2Rα)</td>
<td>EV3661 - Evidence Investigator (54 biochips)</td>
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<td>• Soluble IL-6 Receptor (sIL-6R)</td>
<td>EV3658 - Cytokine Array IV Calibrator Series</td>
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<td>• Soluble Tumour Necrosis Factor Receptor I (sTNFRI)</td>
<td>CY5011 - Cytokine Control (Series IV)</td>
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<td>• Soluble Tumour Necrosis Factor Receptor II (sTNFRII)</td>
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<th>Cytokine Array V</th>
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<tr>
<td>• Interleukin-3 (IL-3)</td>
<td>EV3666 - Evidence Investigator (54 biochips)</td>
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<td>• Interleukin-7 (IL-7)</td>
<td>CY5010 - Cytokine Control (Series V)</td>
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<td>• Interleukin-12p70 (IL-12p70)</td>
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<td>• Interleukin-13 (IL-13)</td>
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<td>• Interleukin-23 (IL-23)</td>
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* in development

Examples of Research Applications for Cytokine Biochip Arrays

Cytokine Biochip Arrays have been used in a number of research and clinical studies. A sample of independent publications are shown below:

<table>
<thead>
<tr>
<th>Disease State</th>
<th>Research application</th>
<th>References</th>
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<td>Dogliotti, G. et al. (2010) <em>Immunology and Ageing.</em> 7: 2</td>
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<tr>
<td>Hereditary hemochromatosis</td>
<td>MCP-1 levels and correlations with HFE mutation status and iron indexes.</td>
<td>Lawless, M.W. et al. (2007) <em>Tissue Antigens</em> 70:294-300</td>
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<tr>
<td>Colon Cancer</td>
<td>Determination of levels of cytokines in serum of patients and comparison with controls.</td>
<td>Bürger S. et al. (2011) <em>J. Biomol. Screen</em> 16: 1018-1026</td>
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<tr>
<td>Elderly population studies</td>
<td>Investigating the association between serum fatty acid composition and various inflammatory and endothelial function markers.</td>
<td>Petersson, H. et al. (2009) <em>Atherosclerosis</em> 203:298-303</td>
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<td>Matera, G. et al. (2012) <em>BMC Microbiology.</em> 12:68</td>
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