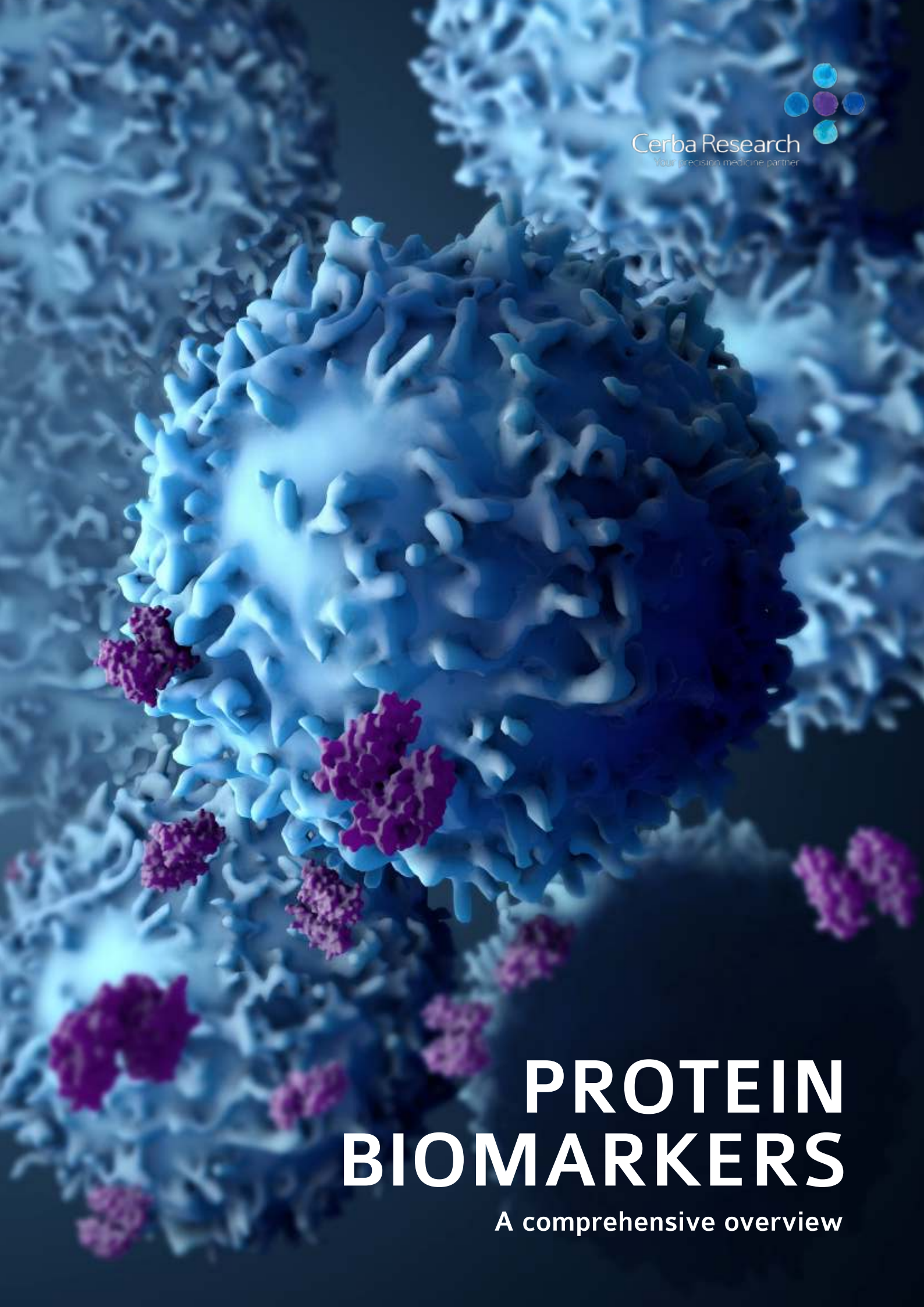
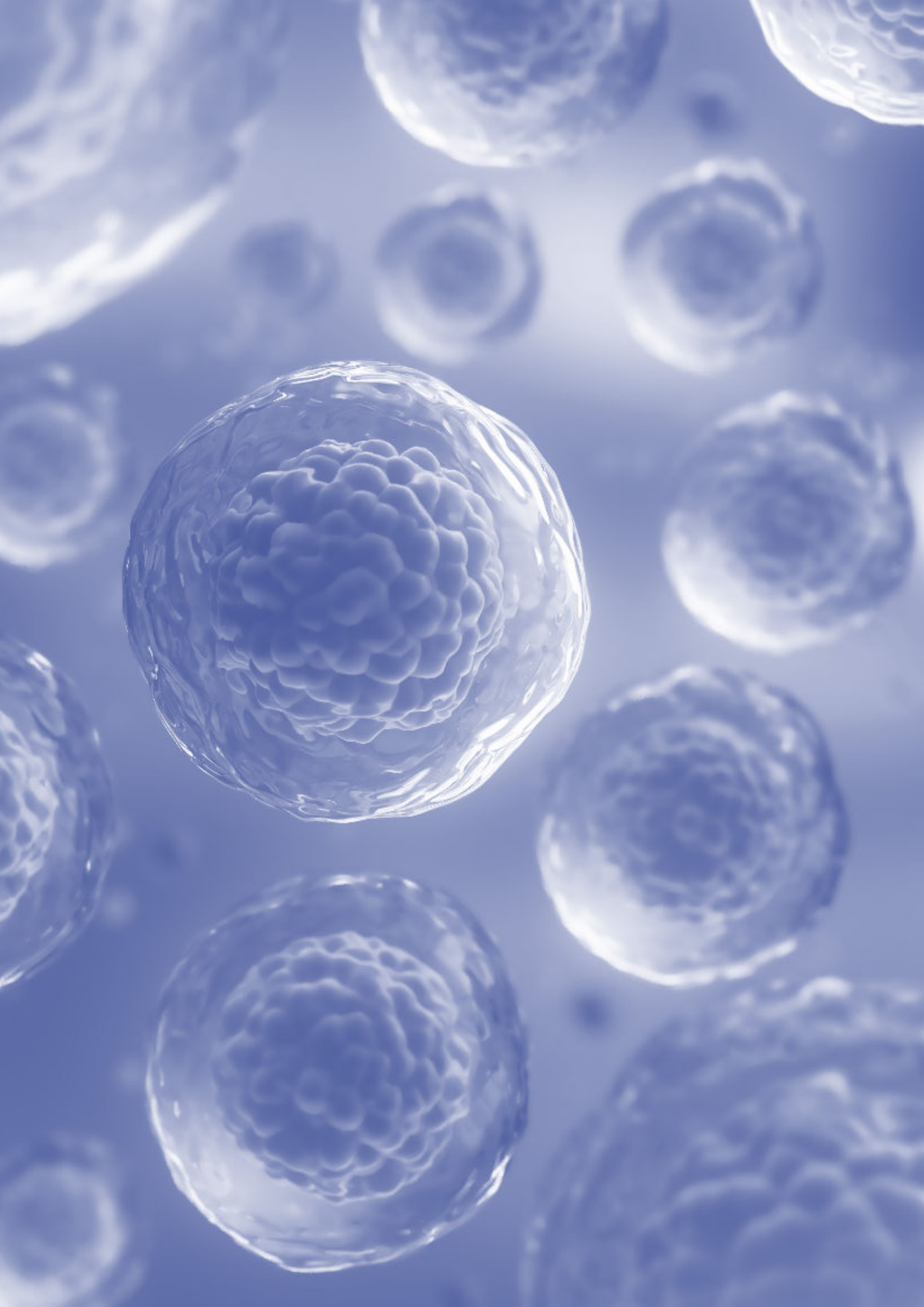


PROTEIN BIOMARKERS

A comprehensive overview



Your Precision Medicine Partner

Molecular Biology

Immunohistochemistry

Flow Cytometry

Introduction

With some therapeutics proving ineffective in as many of 75% of patients, the need for precision medicine is clear, as is the benefit of using selection biomarkers in the drug development process where success rates can triple. With the era of personalized and precision medicine, we have expanded our portfolio beyond the routine safety and efficacy parameters in order to deliver value. We are committed to providing a full repertoire of next-generation assays.

Cerba Research can provide either targeted approaches or broad immune profiling and multifactorial biomarker approaches to identify one or a variety of biomarkers, depending on the stage of your clinical trial and the purpose of the biomarker:

- Guide dose selection
- Characterize mode of action
- Stratify patients
- Predict drug response
- Aid in prognosis of patients
- Monitor disease

As there is **no 'one size fits all'**, we are dedicated to work with you to find the best possible solution that meets your requirements:

- Transfer of the in-house developed assays
- Assessment feasibility of method
- Development and validation of customized assays
- Detailed analyses of samples

Our comprehensive solutions include:

- Specialty testing
- Scientific expertise
- Customized and tailored assays
- Quality

Circulating Biomarkers

Human Plasma

4β-Hydroxcholesterol
α-GST
Aβ-40
Active B-12
Anti-lia
Anti-Xa
Adiponectin
Aldosterone
Auristatin F and Auristatin F HPA
bFGF
Brain Derived Neurotropic Factor (Free)
C3a (Complement 3a)
C4 (Complement 4)
C5a (Complement 5a)
Cholesterol
Cholic Acid
Clozapine
Cortisol
CRP
Cystatin C
DPPIV
Eotaxin
Eotaxin-3
Ergosterol
E-selectin
Estrone/Equiline
Estrone sulfate/Equiline sulfate
Ethyl Estradiol/Norgestimate/17-Desacetyl Norgestmate
Exendin 9-39
Factor II Activity
Factor V Activity
Factor VII Activity
Factor VIII Activity
Factor IX Activity

Factor Xa
Factor X Activity
Factor XI Activity
Factor XII Activity
Factor XIII Activity
Factor VIIIc
Factor IX inhibiting antibodies
Factor VIII inhibiting antibodies
FGF23
Fibrinogen antigen
FLT-1
Fructosamine
FSH (follicle stimulating hormone)
GM-CSF
GLP-1
Glucagon
ICAM-1
IFNγ
IGF-2
IL-1α
IL-1β
IL-2
IL-4
IL-5
IL-6
IL-8
IL-10
IL-12p70
IL-12/23p40
IL-13
IL-15
IL-16
IL-17A
IP-10

Lepin
MCP-1
MCP-4
MDC
MIP-1β
NGAL
PAI-1 Ag
PIGF
Protein C Activity
Protein C Antigen
Protein S Antigen free
Protein S Total and free
Protein S Activity
Osteocalcin
VWF
TARC
Tie-2
TNFα
TNFβ
VCAM-1
VEGF-A
VEGF-D

Human Urine

N2- (1-Carboxyethyl)-2'Deoxy-Guanosine (CEDG)
Cortisol/6β-hydroxycortisol
Creatine
CTx-II
Glucose
IL-18
KIM-1
NGAL
NTx

Human Serum

Active B-12
Adiponectin
Amyloid A
Apolipoprotein A2
Apolipoprotein C3
Apolipoprotein E
APRIL
ATX
BCMA
CCL18
Chitinase 3-like 1
Chromogranin A
CK18 M30
CK18 M65
Cortisol
C-peptide
CRP
CXCL13
E-selectin
Estradiol (E2)
Ethisterone
Eotaxin
Eotaxin-3
FGF-19
FGF-21
Free fatty acids
G-CSF
GDF-15
GM-CSF
Human IgG Total
Human β-Defensin 2 (HBD2)
Human IgG1
Human IgG2
Human IgG3

Human Serum (continued)

Human IgG4
Human 90K/MAC-2BP
HMGB-1
ICAM-1
IFN-α
IFN-γ
IGF-1
IFG-2
IGFPB-3
IL-1β
IL-1RA
IL-2
IL-4
IL-5
IL-6
IL-6 sR
IL-7
IL-8
IL-10
IL-12
IL-12p70
IL-12/23p40
IL-13
IL-15
IL-16
IL-17A
IL-27
Inhibin-B
IP-10
KL-6
Leptin
MCP-1
MCP-4
MDC

MIP-1α
MIP-1β
MMP-1
MMP-2
MMP-3
MMP-7
MMP-9
MMP-12
MPO
Osteocalcin
PARC
S100A12
SP-A
SP-B
SP-C
SP-D
sRF
TARC
Tie-2
TiMP-2
TK-1
TNFα
TNFβ
VCAM-1
VEGF-A
VEGF-C
VEGF-D

Human Cell/Tissue

Cyp1A2
Cyp2B6
Cyp3A4

Whole Blood

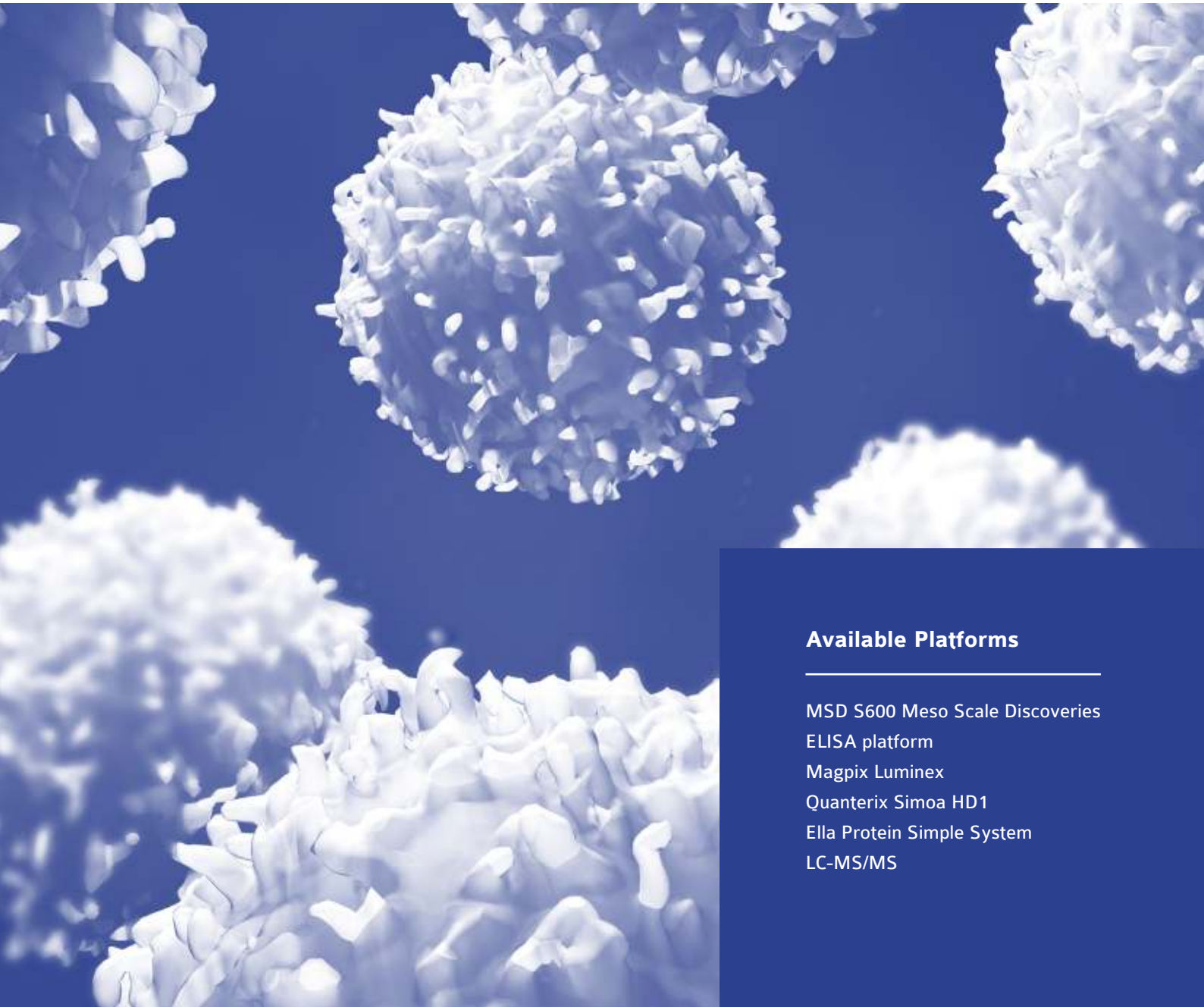
Factor II G20210A
Factor V Leiden
HLA genotyping

Human CSF

Aβ-40
Aβ42
hTau Ag
Phospho-tau

BAL Fluid

ATX



Available Platforms

MSD S600 Meso Scale Discoveries
ELISA platform
Magpix Luminex
Quanterix Simoa HD1
Ella Protein Simple System
LC-MS/MS

Flow Cytometry

Biomarkers

'X'CAR-T	Any CAR-T target 'X'	Drug target
Bcl2	Apoptosis regulator	Apoptosis regulator
BCMA	B cells, plasma cells	Checkpoint, immune cell regulation
CCR7	Memory and naive T cells	Immunophenotyping: T cell activation
CD4	T helper, expressed by monocytes and macrophages	Immunophenotyping: T cell activation
CD5	T cells, B cells	Immunophenotyping: T cell suppression
CD8	T cells, NK cells	Immunophenotyping: cytotoxic T cell = activated T cell
CD11b	Monocytes, MDSCs, neutrophils and macrophages, T cells, B cells, dendritic cells	Immunophenotyping: T cell activation
CD14	Monocytes, macrophages, monocytic MDSCs, granulocytes	Immune cell activation
CD15	Granulocytes, macrophages and monocytes	Immune cell activation
CD16	T cells, dendritic cells, NK cells, macrophages and monocytes, granulocytes	Immune cell activation
CD19	B cells, dendritic cells, stem cells	Immune cell regulation

Flow Cytometry Panels

Basic Immune Phenotyping Panels

- TBNK (CD4/CD8 T cells, B cells, NK cells)
- T cell subsets (CD4/CD8 T cells)

T Cell Phenotyping Panels

T cell backbone (CD45/CD3/CD4/CD8)

- T cell activation (CD25/CD69/CD38)
- Regulatory T cells (CD25/CD127)
- T cell exhaustion(PD1/TIM3/LAG3)
- T cell proliferation and survival (Ki-67/Bcl-2)
- Naive and memory T cells (CD45RO/CD45RA/CD62L/CCR7/CD95)

B and NK Cell Panels

- B cell activation (CD45/viability/CD19/CD20/CD59/CD10/CD5)
- NK cell subsets (CD45/viability/CD3/CD16/CD56)
- NK cell activation (CD45/viability/CD3/CD16/CD56/CD158a;b/CD314/CD335)

Other Immune Cell Panels

- Monocyte and neutrophil (CD45, CD14/CD15/CD11b)
  - » Extensive panel (CD16/CD64/CD300e)
- Monocytic MDSC (CD45/lineage/HLA-DR/CD11b/CD33/CD14/CD15)
- pDC and basophil (CD45/HLA-DR/CD123/BDCA2)

Multiple Myeloma Panel

Contact us for more information

CD25	T cells, B cells, NK cells, macrophages and monocytes	Immune cell activation
CD27	T cells, B cells, NK cells	Immune cell activation
CD28	T cells	T cell proliferation
CD31	T cells, B cells, NK cells, macrophages and monocytes, granulocytes, platelets	Immune cell activation
CD33	Monocytes, MDSCs, neutrophils, macrophages	Cell adhesion and signal transduction
CD38	T cells, B cells, dendritic cells, NK cells, stem cells, macrophages and monocytes	Cell adhesion and signal transduction
CD39	T cells, B cells, NK cells, macrophages and monocytes	Immune cell regulation
CD45	Activated and memory T cells, some B cells subsets, activated monocytes and macrophages, granulocytes, NK cells, dendritic cells	Immune cell regulation
CD47	T cells, B cells, NK cells, macrophages and monocytes, granulocytes, platelets	Cell adhesion and signal transduction
CD52	T cells, B cells, NK cells, macrophages and monocytes	Immunophenotyping: cytotoxicity
CD56	T cells, NK cells	Cell adhesion

Flow Cytometry at Cerba Research

Cutting-edge Expertise

Central review, analysis and reporting by PhD scientists. Whole blood and bone marrow aspirates

Full Global Footprint

Harmonized flow cytometry in Europe, Australia, USA, and Asia (including China)

Tailored Solution

Expert in customized, fit-for-purpose flow cytometry assays

Customized Validation

Validated panels in a multitude of diseases, proven excellence in improving quality of assays

Assays

Results in relative %, absolute cell count and fluorescence quantification

Instruments and Technology for Flow Cytometry

FACS Canto II

Navios (Beckmann Coulter)

8 & 10-color instruments

Biomarkers (continued)

CD69	T cells, B cells, NK cells, macrophages and monocytes, granulocytes, platelets	Immune cell proliferation and signal transduction
CD86	T cells, B cells, dendritic cells, macrophages and monocytes	T cell activation
CD117	Stem cells/precursor	Immunophenotyping: cell adhesion immune cells
CD123	Dendritic cells, stem cells, granulocytes	Immune cell differentiation
CD127	T cells, stem cells, macrophages and monocytes	Immune cell activation
CD137	Activated T cells, NK cells	Checkpoint: immune cell regulation
CD138	B cells, stem cells	Immune cell activation, cell proliferation
CD314	T cells, B cells, NK cells, macrophages and monocytes, granulocytes	Immune cell regulation
CLL1	Car-T target	Drug target
CXCR3	T cells	T cell activation
CXCR4	Leukocytes, tumor cells	Cell migration
HLA	Antigen presenting cells	Immune cell activation
Kappa	Surface marker	Diagnosis and identification of hematopoietic malignancies
Ki67	Tumor cells	Tumor cell proliferation and growth
LAG3	Activated T cells	Checkpoint, immune cell regulation
Lambda	Surface marker	Diagnosis and identification of hematopoietic malignancies
OX40	Activated T cells, NK cells, neutrophils	Immune cell activation and differentiation
PD-1	Activated T cells, B cells	Checkpoint: immune cell regulation
PD-L1	Tumor cells and immune cells including T cells, B cells and antigen presenting cells	Checkpoint: immune cell regulation
RQR8	B cells	Safety switch
TIM3	T cells	Checkpoint: immune cell regulation

Areas of Expertise

Immuno-oncology/ Immuno-phenotyping

Regulatory T-cells, activation, proliferation, memory, B cell panel, TBNK, NK cell panel

Pharmacodynamics (PD) Analysis

Receptor occupancy (RO) and pharmacodynamics (PD)

Pharmacokinetic (PK) Analysis

Expression of therapy, activation and expansion (CAR-T, CAR-NK)

Diagnosis/ Prognosis

Receptor occupancy (RO) and pharmacodynamics (PD)

Follow-up on Evolution of Therapy

Expression of therapy, activation & expansion (CAR-T, CAR-NK)

Histopathology

Special Stains

Alcian Blue
Alcian Blue/Periodic Acid-Schiff (PAS)
Alizarin Red
Azan Mallory
Bodian
Calleja
Giemsa
Gomori's Elastin Trichrome
Gram
Hematoxylin Eosin (HE)
HE/Alcian Blue
Hematoxylin Eosin Saffron (HES)
Kluver-Barrera (Luxol Fast Blue)
Masson's Trichrome
Methylen Blue
Movat Pentachrome
Oil Red O/Hematoxylin
Orcein
PAS
Sirius Red
Von Kossa

Immunohistochemistry Antibodies

4-1BB
4HNE
5T4
α-SMA
β-amyloid
β-galactosidase
ARGINASE 1
BCL2
BCLXL
BCM
CA 19-9
Caspase 3
CC-10
CD3
CD4
CD8
CD11b
CD14
CD15
CD16
CD20
CD30
CD31
CD39
CD45
CD47
CD56
CD68
CD73
CD94
CD138
CD144-VE Cadherin
CD155
CD163
CD226
CEA
CK5/CK6
C-Maf
C-Met
Collagen I
Collagen I/Collagen III
Collagen III
Collagen IV
Connexin 43
CTGF

Immunohistochemistry Antibodies (continued)

CTLA4
Cyr61
Cystatin
DDR1
Dystrophine
E-Cadherin
Elastin
Elastin/Vimentin
Endocan
ER (Estrogen Receptor)
Erb BD
F4/80
Fibrinogen
Fibroblast
Fibronectin
Filaggrin
Fox J1
Foxp3
GATA-3
GFAP
GFP
Glucagon
Glucagon/Insuline
H.Pylori
H2A1
HER2
HLA
HLA-DR
HLA-E
HLA-G
hTERT
HTRA2
IBA1/Map2
IDO
IFN gamma

IL-1α
IL-1β
IL-22
iNOS
Insulin
Integrin 1
Kappa
Ki67
LAG-3
Lambda
Laminin
LC3B
LDH
Lox-1
Luciferase
MAP2
MCL1
MelanA
Muc5AC
Na/K ATPase
Nectin-1
OX-40
p16
p21
p40
p53
p63
PanKeratin
PCNA
PD-1
PD-L1
pEGFR
pH2AX
Plakoglobin
p-Met

pS404
PSMA
pStat1
pStat5
pTau
RIPK3
SCN5A
SIRPa
SLC1A5
Spectrin
Synaptophysin
TAU
T-Bet
TEAD1
TIGIT
TIM-3
TNF-α
TNFRSF14/HVEM
Tryptase
TTF-1
Tyrosine hydroxylase
Vaccinia virus
VCAM1
VEGRF2
Vimentin
VSIG4
Wheat Germ Agglutinin
YAP

Instruments and Technology for IHC

Leica Bond RX + Leica Bond III
Ventana Discovery XT + Ultra
Ventana Benchmark XT + Ultra
Dako Autostainer Link 48
PerkinElmer/Akoya Vectra®Polaris™
Hamamatsu Nanozoomer

Multiplex Panels

CD3/CD8/CD226/CD155/TIGIT
Checkpoint Inhibitors (CKI) CD3/CD8/PD-1/PD-L1/IDO
Checkpoint Inhibitors (CKI) Tim3, SIRPa, E-Cadherin, TIGIT, CD155, CTLA-4, Lag3, CD47, 4-1BB, CD226
Liver Tumor Temperature CD3/CD8/Arginase 1
Lung Tumor Temperature CD3/CD8/TTF-1
M1/M2 CD68/CD163/c-MAF/pSTAT1
MDSC CD11b/CD15/CD14/HLA-DR/LOX1
SIRPa/CD3/CD11b/CD47
Th Polarization (T-Bet/CD4/CD3/GATA3)
Treg Human CD3/CD8/CD4/CD25/FoxP3
Treg Mice CD3/CD8/CD4/CD25/FoxP3/Vimentin

Immunohistochemistry (IHC) at Cerba Research

Multiplex IHC

Measure up to 8 biomarkers at once to better understand spatial cellular context

Outcome

Comprehensive immune profiling, tumor microenvironment, understand spatial context and evaluate co-expression of target biomarkers

Digitization

Automated digitization of slides for both chromogenic and fluorescent purposes

Enhanced Software Image Analysis

Multispectral scanning and imaging solutions to provide morphological and protein expression information from FFPE tissue, cryosections or TMAs

Histoselect: Antibody Selection

Generation of new FFPE IHC-specific antibodies

Design Your Own Multiplex Labeling Strategy

More than 150 validated markers to be combined on demand, validation through strict quality controls

Together, enhancing research with patient- and science-driven insights

Cerba Research

Cerba Research provides the highest quality specialized laboratory and diagnostic solutions while leveraging patient data and scientific insight to shape and advance clinical trials. With our global footprint and access to leading regional labs, data, patients, technology, and partnered resources, we support global biotech, pharma, and IVD organizations to improve the lives of patients around the world.

New tests are added frequently. If a parameter is not included in this folder, please reach out to us for our most current list.

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