

CYPRUS ORGANIZATION FOR THE PROMOTION OF QUALITY  
CYPRUS ACCREDITATION BODY



**ACCREDITATION CERTIFICATE no. L088-2**

The Board of Governors  
of the Cyprus Organization for the Promotion of Quality,  
the National Accreditation Body,  
in accordance with the Article 7 of the Law 156(I)/2002

**GRANTS ACCREDITATION to**

**LABORATORIES of**  
**THE KARAIKAKIO FOUNDATION**

in Nicosia

The Departments/Laboratories shown in annexes were assessed according to the Accreditation Criteria for Medical Laboratories, as defined in the Standard

**CYS EN ISO 15189:2012**

and were found technically competent to carry out the **Tests** included in the Scope of Accreditation which is described in the **Annexes** to this Certificate and is an **integrated part of it. The Scope of Accreditation** can change only after approval from the Cyprus Accreditation Body.

The current Accreditation Certificate, no. **L088-2**, is issued on the **3<sup>rd</sup> September 2021** and is valid from **20<sup>th</sup> September 2020** until the **19<sup>th</sup> September 2024**.

Accreditation was awarded for the first time on the 20<sup>th</sup> September 2016.

Antonis Ioannou  
Director

Date: **3<sup>rd</sup> September 2021**

*This laboratory is accredited in accordance with the recognised International Standard ISO 15189:2012. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management System (ISO-ILAC-IAF Communiqué, January 2015).*



**Annex**  
**to the Accreditation Certificate no. L088-2 (CG)**

**SCOPE OF ACCREDITATION**

for

***THE KARAIKAKIO FOUNDATION LABORATORIES***  
***CYTOGENOMICS (CG)***

<b>Materials/ Products</b>	<b>Types of Tests</b>	<b>Methods applied/ Technical fields</b>
Peripheral Blood, Bone Marrow	Interphase Fluorescence in situ hybridization ("FISH")	Interphase FISH using enumeration, break apart and fusion probes (CE-IVD). Hybridization Detection and Analysis using ThermoBrite Hybridization Machine and GenASIs Scan and Analysis System.
Peripheral Blood, Bone Marrow or Tissue	Analysis for copy number changes	CGH array protocol by Agilent. DNA labeling, hybridization, scanning, interpretation. MS 200 NimbleGen Scanner Agilent Cytogenomics Software

**Authorised persons to sign the test reports are Dr Paul Costeas or Dr Jason Chi.**



**Annex**  
**to the Accreditation Certificate no. L088-2 (MH)**

**SCOPE OF ACCREDITATION**

for

**THE KARAIKAKIO FOUNDATION LABORATORIES**  
**MOLECULAR HAEMATOLOGY-ONCOLOGY (MH)**

\*Valid as from the 1st April 2021 till the 19<sup>th</sup> September 2024.

Materials /Products	Types of examinations	Methods applied / Technical fields
Peripheral Blood, Bone Marrow or Tissue	“Sample Processing” by isolation of PBMCs, nucleic acid extraction and storage of stabilized cells for future testing	In House Protocol: FBC (Sysmex), Erythrocyte lysis, RNA extraction (QIAGEN QIAcube), DNA extraction (QIAGEN QIAcubeor RBC MagCore), RNAlater (QIAGEN)
Peripheral Blood, Bone Marrow	<p>“Multiplex Fusion Gene Screening” for the detection of the following 28 distinct fusion transcripts associated with different type of haematological malignancies:</p> <p>del1(p32) (STIL-TAL1), t(1;11) (p32;q23) (MLL-EPS15), (1;11) (q21;q23) (MLL-MLLT11), t(1;19) (q23;p13) (TCF3-PBX1), t(3;5) (q25;q34) (NPM1-MLF1), t(3;21) (q26;q22) (RUNX1-MECOM), t(4;11) (q21;q23) (MLL-AFF1), t(5;12) (q33;p13) (ETV6-PDGFRB), t(5;17) (q35;q21) (NPM1-RARA), t(6;9) (p23;q34) (DEK-NUP214), t(6;11) (q27;q23) (MLL-MLLT4), t(8;21) (q22;q22) (RUNX1-RUNX1T1), t(9;9) (q34;q34) (SET-NUP214), t(9;11) (p22;q23) (MLL-MLLT3), t(9;12) (q34;p13) (ETV6-ABL1), t(9,22) (q34;q11) (BCR-ABL1), t(10;11) (p12;q23) (MLL-MLLT10), t(11;17) (q23;q21) (MLL-MLLT6), t(11;17) (q23;q21) (ZBTB16-RARA), t(11;19) (q23;p13.1) (MLL-ELL), t(11;19) (q23;p13.3) (MLL-MLLT1), t(12;21) (p13;q22) (ETV6-RUNX1), t(12;22) (p13;q11) (ETV6-MN1), t(15;17) (q24;q21) (PML-RARA), inv(16) (p13;q22) (CBFB-MYH11), t(16;21) (p11;q22) (FUS-ERG), t(17;19) (q22;p13) (TCF3-HLF), t(X;11) (q13;q23) (MLL-FOXO4)</p>	Hemavision Screen (CE-IVD): Tandem nested multiplex RT-PCR and electrophoresis

Peripheral Blood, Bone Marrow	<p>“Fusion Transcript QNT” of fusion gene transcripts: ratio to control gene transcript  (t(1;19)(q23;p13) E2A-PBX1, t(4;11)(q21;q23) MLL-AF4, t(12;21)(p13;q22) TEL-AML1, t(9;22)(q34;q11) BCR-ABL m-bcr, t(9;22)(q34;q11) BCR-ABL M-bcr, del(1)(p32p32) SIL-TAL1, t(15;17)(q22;q21) PML-RARA, inv(16)(p13q22) CBFβ-MYH11, t(8;21)(q22;q22) AML1-ETO)</p>	EAC Protocol: RT-qPCR, BioRad CFX96 Real Time System
Peripheral Blood, Bone Marrow or Tissue	<p>Mutation detection  (JAK2 p.V617F, c-KIT p.D816V, BRAF p.V600E, MYD88 p.L265P)</p>	In House Protocol: Single tube semi-nested PCR, Allele Specific Oligonucleotide (ASO) priming, gel electrophoresis
Peripheral Blood, Bone Marrow	<p>Mutation Screening  (JAK2 exon 12, BCR-ABL kinase domain, TP53, Hemoglobin Alpha, Beta and Delta gene)</p>	In House Protocol: PCR amplification, Sanger DNA Sequencing 3500XL Sequencer
Peripheral Blood	<p>Mutation Detection</p> <p>1) CVD: FV G1691A (Leiden), FV H1299R (R2), Prothrombin G20210A, Factor XIII V34L, β-Fibrinogen - 455 G-A, PAI-1 4G/5G, GPIIb L33P (HPA-1), MTHFR C677T, MTHFR A1298C, ACE I/D, Apo B R3500Q, Apo E2/E3/E4</p> <p>2) TPMT alleles #1, #2, #3A, #3B, #3C</p> <p>3) Alpha-globin gene mutations:  3.7 single gene deletion, 4.2 single gene deletion, MED double gene deletion, SEA double gene deletion, THAI double gene deletion, FIL double gene deletion, 20.5 kb double gene deletion, anti-3.7 gene triplication, a1 cd 14 [TGG&gt;TAG], a1 cd 59 [GGC&gt;GAC] (Hb Adana), a2 init cd [ATG&gt;ACG], a2 cd 19 [-G], a2 IVS1 [-5nt], a2 cd 59 [GGC&gt;GAC], a2 cd 125 [CTG&gt;CCG] (Hb Quong Sze), a2 cd 142 [TAA&gt;CAA] (Hb Constant Spring), a2 cd 142 [TAA&gt;AAA] (Hb Icaria), a2 cd 142 [TAA&gt;TAT] (Hb Pakse), a2 cd 142 [TAA&gt;TCA] (Hb Koya Dora), a2 poly A-1 [AATAAA-AATAAG], a2 poly A-2 [AATAAA-AATGAA].</p> <p>4) Beta-globin gene mutations:  - 101 [C&gt;T], - 87 [C&gt;G], - 30 [T&gt;A], codon 5 [-CT], codon 6 [G&gt;A] HbC, codon 6 [A&gt;T] HbS, codon 6 [-A], codon 8 [-AA], codon 8/9 [+G], codon 15 [TGG&gt;TGA], codon 27 [G&gt;T] Knossos, IVS 1.1 [G&gt;A], IVS 1.5 [G&gt;C], IVS 1.6 [T&gt;C], IVS 1.110 [G&gt;A], IVS 1.116 [T&gt;G], IVS 1.130 [G&gt;C], codon 39 [C&gt;T], codon 44 [-C], IVS 2.1 [G&gt;A], IVS 2.745 [C&gt;G], IVS 2.848 [C&gt;A]</p> <p>5) CYP2C9 #2, #3</p>	ViennaLab StripAssay SSO (CE-IVD) PCR array hybridization Auto-Lipa (hybridization)

Peripheral Blood, Bone Marrow	Chimerism detection of donor DNA component percentage in post-transplant sample	GenDX KMRtype & KMRtrack Chimerism Monitoring (CE-IVD) ABI 7500 Real Time PCR System KMRengine Analysis Software
Peripheral Blood, Bone Marrow or Tissue	Germline Mutation Detection by whole exome and targeted exome sequencing	Agilent SureSelect Enrichment Protocol (Library Preparation) Illumina (NGS Sequencing) Saphetor Clinical Varsome Software Analysis
Peripheral Blood, Bone Marrow	IGH and TCR sequencing by NGS, IGHV somatic mutation analysis	Invivoscribe LymphoTrack Dx (CE-IVD) Illumina NGS Sequencing LymphoTrack Analysis Software
Peripheral Blood, Bone Marrow	MRD Detection in Lymphoid Malignancies using Patient Specific Immunoglobulin or T-Cell Receptor Allele Specific Oligonucleotide (ASO)-based Real-Time PCR	In house ASO Primer Design, Real Time PCR BioRad CFX96 Real Time System
Peripheral Blood, Bone Marrow or Tissue	<p>FusionPlex Screening for fusions, splicing or exon skipping in the following genes:</p> <p><b>Sarcoma:</b> ALK, EPC, GLI1, MKL2, PLAG1, TAF15, USP6, CAMTA1, EWSR1, HMGA2, NCOA2, ROS1, TCF12, YWHAE, CCNB3, FKHR, JAZF1, NTRK3, SS18, TFE3, CIC, FUS, MEAF6, PDGFB, STAT6, TFG.</p> <p><b>Thyroid and Lung Cancer:</b> AKT1, ALK, AXL, BRAF, CALCA, CCND1, CTNNB1, DDR2, EGFR, ERBB2, FGFR1, FGFR2, FGFR3, GNAS, HRAS, IDH1, IDH2, KRAS, KRT20, KRT7, MAP2K1, MET, NRAS, NRG1, NTRK1, NTRK2, NTRK3, PIK3CA, PPARG, PTH, RAF1, RET, ROS1, SLC5A5, THADA, TTF1</p> <p><b>Solid Tumors:</b> AKT3, EWSR1, NOTCH1/2, RAF1, ALK, FGFR1/2/3, NRG1, RELA, ARHGAP26, FGR, NTRK1/2/3, RET, AXL, INSR, NUMBL, ROS1, BRAF, MAML2, NUTM1, RSPO2/3, BRD3/4, MAST1/2, PDGFRA/B, TERT, EGFR, MET, PIK3CA, TFE3, ERG, MSMB, PKN1, TFEB, ESR1, MUSK, PPARG, THADA, ETV1/4/5/6, MYB, PRKCA/B, Tmprss2</p>	Archer FusionPlex assay (Library Preparation) Illumina NGS Sequencing Archer Bioinformatics Analysis Software



	<p><b>Hematological Malignancies:</b> ABL1, ABL2, ALK, BCL11B, BCL2, BCL3, BCL6, BCR, BIRC3, CBF, CCND1, CCND2, CCND3, CD274, CDK6, CDKN2A, CEBPA, CEBPD, CEBPE, CEBPG, CHD1, CHIC2, CIITA, CREBBP, CRLF2, CSF1R, CTLA4, DEK, DUSP22, EBF1, EIF4A1, EPOR, ERG, ETV6, FGFR1, FOXP1, GLIS2, ID4, IKZF1, IKZF2, IKZF3, IRF4, IRF8, JAK2, KAT6A, KLF2, KMT2A, MALT1, MECOM, MKL1, MLF1, MLLT10, MLLT4, MUC1, MYC, MYH11, NF1, NFKB2, NOTCH1, NTRK3, NUP214, NUP98, P2RY8, PAG1, PAX5, PDCD1, PDCD1LG2, PDGFRA, PDGFRB, PICALM, PML, PRDM16, PTK2B, RARA, RBM15, ROS1, RUNX1, RUNX1T1, SEMA6A, SETD2, STIL, TAL1, TCF3, TFG, TP63, TYK2, ZCCHC7</p>	
<p>Peripheral Blood, Bone Marrow or Tissue</p>	<p>VariantPlex Screening for single nucleotide variants (SNVs), copy number, variations (CNVs), insertions and deletions in the following genes:</p> <p><b>Thyroid and Lung Cancer:</b> AKT1, ALK, BRAF, CCND1, CTNNB1, DDR2, EGFR, EIF1AX, ERBB2, FGFR1, FGFR2, FGFR3, GNAS, HRAS, IDH1, IDH2, KIT, KRAS, MAP2K1, MDM2, MET, NRAS, PDGFRA, PIK3CA, PTEN, RET, ROS1, STK11, TERT, TP53, TSHR</p> <p><b>Solid Tumors:</b> ABL1, AKT1, ALK, APC, ATM, AURKA, BRAF, CCND1, CCNE1, CDH1, CDK4, CDKN2A, CSF1R, CTNNB1, DDR2, EGFR, ERBB2, ERBB3, ERBB4, ESR1, EZH2, FBXW7, FGFR1, FGFR2, FGFR3, FLT3, FOXL2, GNA11, GNAQ, GNAS, H3F3A, HNF1A, HRAS, IDH1, IDH2, JAK2, JAK3, KDR, KIT, KRAS, MAP2K1, MDM2, MET, MLH1, MPL, MYC, MYCN, NOTCH1, NPM1, NRAS, PDGFRA, PIK3CA, PIK3R1, PTEN, PTPN11, RB1, RET, RHOA, ROS1, SMAD4, SMARCB1, SMO, SRC, STK11, TERT, TP53, VHL</p> <p><b>Myeloid Malignancies:</b> ABL1, ANKRD26, ASXL1, BCOR, BRAF, CALR, CBL, CEBPA, CSF3R, DDX41, DNMT3A, ETNK1, ETV6, EZH2, FLT3, GATA1, GATA2, IDH1, IDH2, JAK2, KIT, KRAS, MPL, NPM1, NRAS, PHF6, PTPN11, RUNX1, SETBP1, SF3B1, SRSF2, STAG2, TET2, TP53, U2AF1, WT1, ZRSR2</p> <p><b>Circulating cell-free tumor DNA (ccfDNA / cfDNA / ctDNA):</b> AKT1, ALK, AR, BRAF, CTNNB1, DDR2, EGFR, ERBB2, ESR1, FGFR1, HRAS, IDH1, IDH2, KIT, KRAS, MAP2K1, MAP2K2, MET, MTOR, NRAS, NTRK1, NTRK3, PDGFRA, PIK3CA, RET, ROS1, SMAD4, TP53</p>	<p>Archer VariantPlex assay, ctDNA assay (Library Preparation) Illumina NGS Sequencing Archer Bioinformatics Analysis Software</p>

Peripheral Blood, Bone Marrow	Indel Detection for FLT3 (ITD), CALR exon9	In House Protocol: PCR amplification, Agarose gel electrophoresis, Fragment Separation and Analysis 3500XL Sequencer
Peripheral Blood, Bone Marrow or Tissue	T Cell Receptor and Immunoglobulin Gene Rearrangement Assays to identifying clonal B-cell and T-cell populations	Invivoscribe Technologies' IdentiClone™ assays (CE-IVD), PCR Amplification, Fragment Separation and Analysis 3500XL Sequencer
Peripheral Blood, Bone Marrow or Tissue	<p>Multiplex ligation-dependent probe amplification (MLPA)</p> <p>MLPA Probe Mixes: P212-DBA, P031-FANCA mix 1, P032-FANCA mix 2, P113-FANCB, P088-Oligodendroglioma 1p-19q, P105-Glioma-2, P472-SUFU, P002-BRCA1, P045-BRCA2/CHEK2, P260-PALB2-RAD50-RAD51C-RAD51D, P190-CHEK2, P043-APC, P251-NB mix 1, P252-NB mix 2, P253-NB mix 3, P067-PTCH1, P225-PTEN, P070-Subtelomeres mix2B, P036-Subtelomeres mix1, P047-RB1, P056-TP53, P016-VHL, P028-FHL, P335-ALL-IKZF1, P037-CLL-1, P038-CLL-2, P081-NF1 mix 1, P082-NF1 mix 2, P044-NF2, P124-TSC1CE, P046-TSC2</p> <p>Methylation Specific MLPA Probe Mixes: ME012-MGMT-IDH1-IDH2, ME030-BWS/RSS</p>	<p>MRC Holland MLPA and MS-MLPA protocols, Fragment separation (ABI 3500XL sequencer), analysis (Coffalyser Software)</p> <p>MLPA Probe Mixes: P212-DBA, P031-FANCA mix 1, P032-FANCA mix 2, P113-FANCB, P088-Oligodendroglioma 1p-19q, P105-Glioma-2, P472-SUFU, P002-BRCA1, P045-BRCA2/CHEK2 (CE-IVD), P260-PALB2-RAD50-RAD51C-RAD51D (CE-IVD), P190-CHEK2 (CE-IVD), P043-APC (CE-IVD), P251-NB mix 1, P252-NB mix 2, P253-NB mix 3, P067-PTCH1, P225-PTEN (CE-IVD), P070-Subtelomeres mix2B (CE-IVD), P036-Subtelomeres mix1(CE-IVD), P047-RB1 (CE-IVD), P056-TP53(CE-IVD), P016-VHL(CE-IVD), P028-FHL, P335-ALL-IKZF1, P037-CLL-1, P038-CLL-2, P081-NF1 mix 1 (CE-IVD), P082-NF1 mix 2 (CE-IVD), P044-NF2, P124-TSC1CE (CE-IVD),</p>



		P046-TSC2 Methylation Specific MLPA Probe Mixes: ME012-MGMT-IDH1- IDH2, ME030- BWS/RSS
Tissue or Liquid Biopsy	EGFR, KRAS, NRAS, BRAF Mutation detection	Idylla Biocardis BRAF (CE-IVD), KRAS (CE-IVD), NRAS-BRAF (CE-IVD), EGFR (CE- IVD), ctKRAS (CE- IVD), ctNRAS-BRAF (CE-IVD), NRAS- BRAF-EGFR S492R, ctBRAF, ctKRAS, ctNRAS-BRAF-EGFR S492R, ctEGFR
Tissue (FFPE)	*Detection of Microsatellite Instability (MSI) colorectal cancer or in solid tumors in 7 MSI loci (ACVR2A, BTBD7, DIDO1, MRE11, RYR3, SEC31A, and SULF2)	Idylla Biocardis (CE- IVD)

**Authorised person to sign the test reports is Dr Paul Costeas.**

**In his absence, Dr Jason Chi or Dr Laura Koumas are authorized to sign reports.**



**Annex**  
**to the Accreditation Certificate no. L088-2 (IG)**

**SCOPE OF ACCREDITATION**

for

***THE KARAIKAKIO FOUNDATION LABORATORIES***  
***IMMUNOGENETICS (IG)***

<b>Materials /Products</b>	<b>Types of examinations</b>	<b>Methods applied / Technical fields</b>
Peripheral Blood, Bone Marrow	Class I and Class II HLA Genotyping	1) PCR / SSP gel electrophoresis (OlerupSSP) (CE-IVD) 2) PCR/Reserve Array Hybridization (CE-IVD) (Histospot, BAG Healthcare) 3) Next generation sequencing (Holotype, Omixon)

**Authorised person to sign the test reports is Dr Paul Costeas.  
In his absence, Dr. Laura Koumas is authorized to sign reports.**



**Annex**  
to the Accreditation Certificate no. L088-2 (FC)

**SCOPE OF ACCREDITATION**  
for  
**THE KARAIKAKIO FOUNDATION LABORATORIES**  
**FLOW CYTOMETRY (FC)**

Materials /Products	Types of examinations	Methods applied / Technical fields
Peripheral Blood, Bone Marrow, CSF	(1) General Bone Marrow Investigation (2) Basic acute leukemia immunophenotyping (3) Basic LPD immunophenotype (4) B-Acute lymphoblastic leukemia, Minimal Residual Disease (5) Plasma Cell Multiple Myeloma Minimal Residual Disease	Cytoplasmic and surface cellular marker staining, Flow Cytometry Analysis FACS Verse Flow Cytometer
Peripheral Blood	T Lymphocyte Enumeration	BD Trucount Absolut Counting tubes (CE-IVD), CD3/ CD8/ CD45/ CD4 BD Multitest (CE-IVD) surface cellular marker staining, FACS Verse Flow Cytometry Analysis
Peripheral Blood, Bone Marrow	Lymphocyte subpopulation analysis	FACS Verse Flow Cytometry Analysis CD3/ CD4/ CD8/ CD19/ CD16+56
Peripheral Blood	Paroxysmal Nocturnal Hemoglobinuria (PNH)	In-house method Detection of glycoposphatidylinositol (GPI)-linked antigens on hematopoietic cells using monoclonal antibodies FACS Verse
Peripheral Blood, Bone Marrow, Cord Blood and Apheresis Products	CD34+ stem cell enumeration	BD Stem Cell Enumeration assay (CE-IVD), BD FACS Verse
Peripheral Blood	Full Blood Count of Blood Samples by an automated Haematology Analyser (WBC, RBC, HB, HCT, MCV, PLT, NEUT, LYMPH, MONO, EO and BASO)	Full Blood Count of Blood Samples Using the Haematology Analyser Sysmex XT-1800i (CE-IVD)

**Authorised person to sign the test reports are Dr Paul Costeas or Dr Laura Koumas.  
In their absence, Dr Chryso Pierides is authorized to sign reports.**

## **General Remarks**

These Annexes refer **only to tests** carried out **in the premises of the Laboratory**,  
Address: 15, Nicandrou Papamina Avenue, 2032, Nicosia

Antonis Ioannou  
Director

Date: **3<sup>rd</sup> September 2021**