



# CAPABILITIES OF THE DEPARTMENT OF VIROLOGY, MOLECULAR BIOLOGY AND GENOME RESEARCH

## Overview

There are several laboratories operating at the Lugar Center's department of Virology, Molecular Biology and Genome Research:

- ✓ WHO accredited laboratory of Poliomyelitis and other Enteroviruses, which is involved in the polio research laboratory network of WHO European region;
- ✓ Laboratory of Influenza and other respiratory viruses that is recognized as the national influenza center;
- ✓ Tissue Culture Laboratory, which provides cell lines to virology laboratories;
- ✓ Serological Laboratory, which is involved in both state and international programs, as well as scientific projects;
- ✓ Molecular epidemiology laboratory that performs detection and genetic characterization of a variety of viral, bacterial and parasitic pathogens using modern molecular technologies such as target gene and whole genome sequencing methods.

## Influenza Laboratory

Since 2007 laboratory is recognized by the World Health Organization (WHO) as the National Influenza Center for Georgia and the primary goals of laboratory include: monitoring of Influenza viruses circulating in Georgia; timely detection of new subtypes of the Influenza virus, especially those viruses posing pandemic threats; and ongoing sharing of virus strains with other WHO collaborative centers in order to determine vaccine components.

## Polio Laboratory



Laboratory of poliomyelitis and other enteroviruses is fully accredited by World Health Organization (WHO) and has been a part of the WHO Global Polio Laboratory Network since 2002 year as Georgia's national poliomyelitis laboratory. The laboratory annually performs professional tests and fills out special form about the work done in Laboratory to obtain the status of accreditation. Periodically an assessment is conducted by WHO experts. Laboratory provides weekly online reporting of results to WHO Regional office for Europe.

## Serology Laboratory

Serology laboratory is responsible for testing for various viral, bacterial and vector-born pathogens, such as viral hepatitis, HIV/AIDS, Measles, Rubella, Rotavirus, Cream-Congo Hemorrhagic Fever, Tick-borne encephalitis, Rickettsiosis, Brucellosis, Leptospirosis, Borreliosis, Bartonellosis etc. Laboratory performs the screening as well as confirmatory testing on the samples received from other laboratories.

Laboratory actively participates in „Maternal and Child Health“ and „Safe Blood“ state programs; two World health organization programs – “Surveillance program, subcomponent Diarrhea” and “Hospital-based sentinel surveillance of rotavirus gastroenteritis and evaluation of disease burden in Georgia”.

Laboratory participates in multiple scientific projects: Epidemiology and Ecology of Tularemia in Georgia, Distribution and diversity of *Bartonella* pathogens among people and animals in Georgia and evaluation of factors associated with the emergence of bartonellosis, Epidemiology of *Clostridium difficile* associated diseases in Georgia and Epidemiology and Surveillance of especially dangerous diseases in Georgia.

Measles/Rubella and Rotavirus groups of Serology lab are the members of the EURO/WHO Measles/Rubella and Rotavirus Laboratory network and participate in the external quality control program.

Serology lab is active participant in Hepatitis C elimination program and they performed all confirmatory testing.

## Cell Culture Laboratory



The tissue culture laboratory was established in 1981. Its primary activities include:

- ✓ Working on different tissue culture lines (RD, Hep-2, L-20B, MDCK, VERO-E6, VERO B-4, J 774, etc.);
- ✓ Development of a mini bank for each line which allows work on a single cell line, and Enrichment of the cell bank
- ✓ Preparation of primary trypsinized cell lines;
- ✓ Provision of laboratories with appropriate cell cultures (as required);
- ✓ Use of tissue culture for determining toxicity of different biological and chemical substances, as well as for invasive studies of bacteria.

## Molecular Epidemiology Laboratory

NCDC-Lugar Center Molecular Epidemiology Laboratory is responsible for detection of variety of viral, bacterial and parasitic pathogens in clinical samples collected from patients, as well as environmental samples obtained during the field works. It is also responsible for further investigations of detected pathogens, such as typing and finding of relationships among of those samples based on phylogenetic studies.

The laboratory uses a variety of modern molecular methods to achieve these goals. Mentioned test algorithms were gradually being introduced in routine use during the last ten years. This includes: Polymerase Chain reaction (PCR); Real Time PCR using fluorescent probes; Pulse Field Gel Electrophoresis (PFGE); Restriction Fragment Length Polymorphism Analysis (RFLP); Single Nucleotide Polymorphism (SNP); Multi Locus Variable-Number Tandem Repeat Analysis (MLVA); Sanger sequencing method; Since 2013 laboratory was enriched with Next Generation platform – Illumina MiSeq, that gives an opportunity to perform whole genome sequencing of viral and bacterial pathogens (WGS, Whole Genome Sequence).

Molecular epidemiology lab, together with other laboratories of NCDC assists to epidemiological service to detect various pathogens circulating in different regions within the country. Thus facilitates to the Full-fledged epidemiological control in country.

