

Concept Note for China CDC ModPad 2020

Special dedication to COVID-19 Response

Project Name: Training Program about Molecular Diagnosis and Pathogen Determination Techniques by China CDC (China CDC ModPad)

I. Background

Molecular diagnosis and genetic detection technology has been gaining exponential development over the recent decades and has helped to contribute significantly to the efficient and targeted disease prevention, control and treatment. With extensive experiences built up already by China in molecular diagnosis technology, the country is highly competitive in the world. It thus can offer unique and independent support in terms of experts, technologies and products. Especially for the COVID-19 response, the molecular diagnostic techniques such as next-generation sequencing and real-time PCR have played massive roles in SARS-CoV-2 detection and identification. As we know, early testing, early identification, early reporting, early isolation, and early treatment are crucial control principles (5-EARLY measures). Early testing is necessary for targeted control which can improve surveillance and timely response.

Over the past decades, China has had remarkable achievements and obtained extensive experiences in strengthening the core public health functions and optimizing the national network of disease control and prevention centres. China CDC is actively participating in China Africa Public Health Cooperation and hosted several meaningful capacity building activities in recent years. Significantly, China CDC launched a ModPad project (Training Program about Molecular Diagnosis and Pathogen Determination Techniques). This programme aims to improve the laboratory capacities of the participants in conducting molecular detection assay and implementing molecular diagnosis for the potential pathogens associated with the emerging and re-emerging infectious diseases as well as the leadership in scaling up the capacity in their motherlands respectively. More importantly, many African and Asian countries require feasible and practical molecular detection techniques for tackling many infectious diseases, including emerging and re-emerging infectious diseases. Being simple, sensitive, rapid and cost-effective are the main features of these diagnostic techniques. China CDC ModPad has been conducted in China, Nigeria, Pakistan, Senegal successfully for eight cycles in various and adapted designs, covering many African and Asia countries. Both international and Chinese colleagues highly appraise of the China CDC ModPad.

The core curriculums of China CDC ModPad include:

- Overview of sample collection, storage and transportation
- Principle and application of singleplex and multiplex PCR,
- Quantitative real-time PCR, and digital PCR
- Nucleic acid isothermal amplification techniques (RAA)
- Point-of-Care Testing (POCT)
- Next-generation sequencing (NGS) and third-generation sequencing (TGS)
- Bioinformatics
- Emerging and re-emerging viral infectious diseases prevention and control in Africa,
- Leadership in the scaling up of molecular diagnosis and pathogen determination techniques

With the upgrade from China CDC ModPad to China CDC ModPad+, the programme seeks to establish linkages between the training and ongoing local researches, services/interventions, and projects. Thus, ModPad+ is a 12-week on-the-job capacity building programme. The invited participants work in centres/departments inside China CDC, to carry out researches and projects under the guidance of Chinese colleagues and experts at the China CDC. Participants are encouraged to bring research topics from their motherlands to China and complete them in China CDC, with the support of China CDC's experts and core technical facilities.

Currently, China CDC will host a 4-day ModPad activity, using internet video format targeting African and Asia countries from 19-22 October 2020. Top Chinese experts in molecular diagnosis for disease prevention and control will give lectures on the topics of keen interest in SARS-CoV-2 testing, immunology and vaccine development techniques. These experts have firsthand frontline experiences in COVID-19 response, having worked at China CDC, Chinese Science Academy, Tsinghua University, Shandong First Medical University, Guandong CDC, BGI Research of China etc. Participants will receive demonstrations of the testing techniques for SARS-CoV-2 by China CDC. Meanwhile, the ModPad activity will allow participants to make a presentation about the COVID-19 testing and response in their countries, facilitating knowledge exchange with Chinese experts. Beyond COVID-19, several top experts from China CDC will give lectures on the prevention and control of other high-incidence infectious diseases in Africa and Asia using molecular diagnosis techniques.

An electronic invitation letter from Prof. Dr GAO Fu, Director General of China CDC, Academician of Chinese Academy of Sciences, and Deputy Director of National Nature Science Foundation of China, will be sent to participants. The contact person is Dr FENG Ning (fengning@chinacdc.cn), Center for Global Public Health, China CDC.

II. Objective

1. To enhance the laboratory capacities for pathogen determination in the Belt and Road Initiative countries especially for African and Asia countries through the comprehensive introduction and demonstration of advanced molecular detection and diagnosis techniques for pathogens, in particular for SARS-CoV-2 and other major infectious diseases. We expect the participants will become leaders who drive the development of related local work in their homelands.
2. To enhance participants' capacities for the utilization and scaling-up of advanced molecular diagnostic techniques in public health areas, including the establishment of future collaborative research.
3. To promote effective COVID-19 response internationally.

III. Design and Activities

1. Curriculum

- 1.1 Fluorescent real-time PCR in SARS-CoV-2 testing
 - 1) Principle and operation
 - 2) Data analysis and report interpretation
 - 3) Quality control (RT-PCR curves, CT values, RNA extraction etc.)
 - 4) Establishment of local cut-off
- 1.2 Principle and application of digital PCR in SARS-CoV-2 testing
- 1.3 Antibiotic resistance genes and related qPCR detection methods
- 1.4 Next-generation sequencing (NGS) in SARS-CoV-2 identification
 - 1) Principle and operation;
 - 2) Bioinformatics analysis
- 1.5 Capacity expansion on lab testing for SARS-CoV-2
 - 1) Lab construction, biosafety and quality control
 - 2) Biomedical waste management in connection with COVID-19
 - 3) Case studies on the planning and designing of lab construction
 - 4) Lab construction practices for COVID-19 testing abroad
- 1.6 Immunological characters of SARS-CoV-2 and COVID-19
- 1.7 New concept in pathogen identification and testing
 - 1) Laboratory-on-a-chip Systems for Rapid Detection
 - 2) New concept products in pathogen identification and testing
 - 3) Introduction to the Cloud Platform for Pathogen In-depth Analysis
- 1.8 Diagnosis and prevention and control of major infectious diseases
 - 1) Meningococcal disease
 - 2) Lyme disease

3) The molecular diagnosis methods of Mycobacterium infection in China

1.9 Recommendation of self-tutorial videos for participants'

2. Selection of Participants

1) 30 international and 20 Chinese participants will be invited for each cycle of the training program.

2) The eligible participants will be carefully reviewed and selected by an evaluation panel of China CDC, judging based on their professional backgrounds. Frontline work experiences in COVID-19 response, especially performing SARS-CoV-2 testing, will be highly preferred. Chinese participants will undergo a telephone interview.

3. Attending the training course

Use **Microsoft Teams** to attend the China CDC ModPad curriculums. Your guide to successful online meetings is attached.

IV. Mentor and facilitator Invitation

Top experts, internationally renowned in molecular diagnosis, will be invited from China CDC, Chinese Science Academy, Tsinghua University, Shandong First Medical University, Guandong CDC, BGI Research of China etc. for the training program.

V. Agenda and Curriculum Schedule

The training plan and curriculum is attached.

VI. Certification

Participants will receive an official certification from the China CDC if they complete the curriculum.

Tentative Agenda and Curriculum Schedule

Beijing time: 5pm-9pm

Date	Week Day	Day no.	Schedule
19th Oct. 2020	Monday	Day 1	1. Opening remark (Director Professor DONG Xiaoping, Center for Global Public Health, China CDC)
			2. Introduction about the curriculum (Dr FENG Ning, Center for Global Public Health, China CDC)
			3. Fluorescent real-time PCR in SARS-CoV-2 testing - Principle and operation (Professor WANG Wenling, National Institute for Viral Disease Control and Prevention, China CDC) - Results analysis and report interpretation (Dr XU Zuyuan, BGI Research) - Quality control (RT-PCR curves, CT values, RNA extraction etc.) (Dr CHEN Yuhui, BGI Research) - Establishment of local cut-off (Professor ZHANG Yong, National Institute for Viral Disease Control and Prevention, China CDC)
			4. Principle and application of digital PCR in SARS-CoV-2 testing (Professor GUO Yong, Tsinghua University)
			5. Antibiotic resistance genes and related qPCR detection methods. (Professor CHEN Xia, National Institute for Communicable Disease Control and Prevention, China CDC)
20th Oct. 2020	Tuesday	Day 2	1. Laboratory-on-a-chip Systems for Rapid Detection of Infectious Diseases (Academician CHENG Jing)
			2. Next-generation sequencing (NGS) in SARS-CoV-2 identification (Dr SHANG Yubing, BGI Research) - Principle and operation; - Bioinformatics analysis
			3. Introduction to the Cloud Platform for Pathogen In-depth Analysis (Professor, PENG Xianhui, National Institute for Communicable Disease Control and Prevention, China CDC)
			4. Genetic sequencing reveals natural origin, early spread and infectomes of SARS-CoV-2 in China (Director Professor SHI Weifeng, School of Public Health, Shandong First Medical University)
21 st Oct. 2020	Wednesday	Day 3	1. Capacity expansion on lab testing for SARS-CoV-2 - Lab construction, biosafety and quality control (Dr DONG Jie, BGI Research) - Case analysis of the planning and designing of lab construction (Dr DONG Jie, BGI Research)

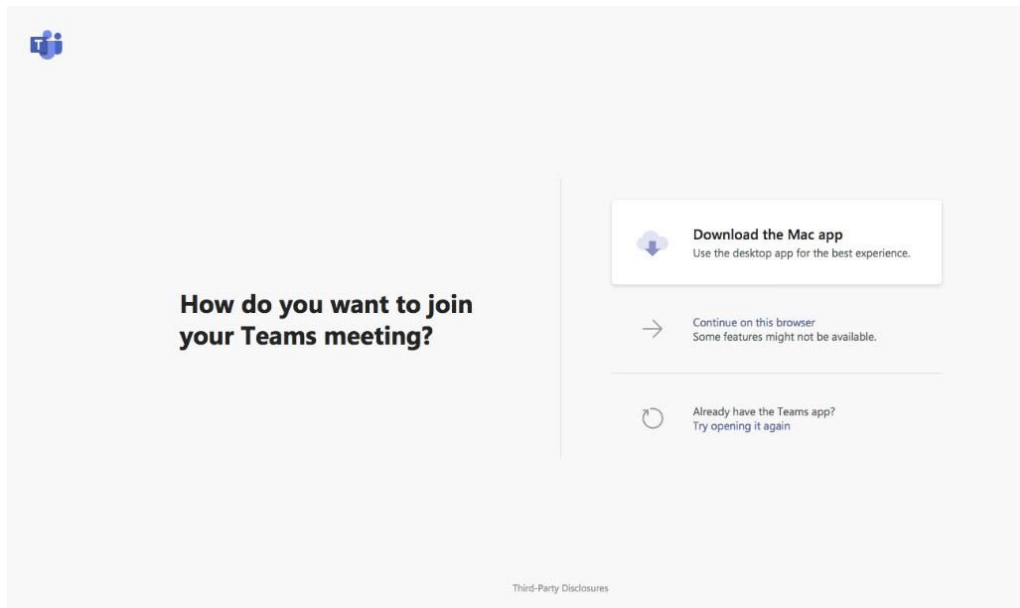
			<ul style="list-style-type: none"> - Biomedical waste management in connection with COVID-19 (Professor KE Changwen, Guangdong CDC)
			2.Diagnosis and prevention and control of meningococcal disease (Professor SHAO Zhujun, National Institute for Communicable Disease Control and Prevention, China CDC)
			3. The molecular diagnosis methods of Mycobacterium infection in China (Dr. LIU Haican, National Institute for Communicable Disease Control and Prevention, China CDC)
			4. Expansion of lab for COVID-19 testing abroad <ul style="list-style-type: none"> - Construction of testing capacity in Sierra Leone (Dr. WUwei, National Institute for Virus Disease Prevention and Control, China CDC) - Construction of Huo-Yan COVID-19 testing laboratories in Africa (Terence Xiong, BGI Research)
22 nd Oct. 2020	Thursday	Day 4	1.Immunological characters of SARS-CoV-2 and COVID-19 (Professor. LIU Jun, National Institute for Viral Disease Control and Prevention, China CDC)
			2.Speech by Academician YANG Huanming (topic TBC)
			3.New concept products in pathogen identification and testing (Professor CHEN Weijun, China Science Academy University)
			4. Epidemiology and laboratory detection of Lyme disease (Professor Hao Qin, National Institute for Communicable Disease Control and Prevention, China CDC)
			5.Recommendation of teaching videos for participants' watching by themselves (Dr. FENG Ning, Center for Global Public Health, China CDC)
			6.Closing (Dr. FENG Ning, Center for Global Public Health, China CDC)

Microsoft Teams Instruction

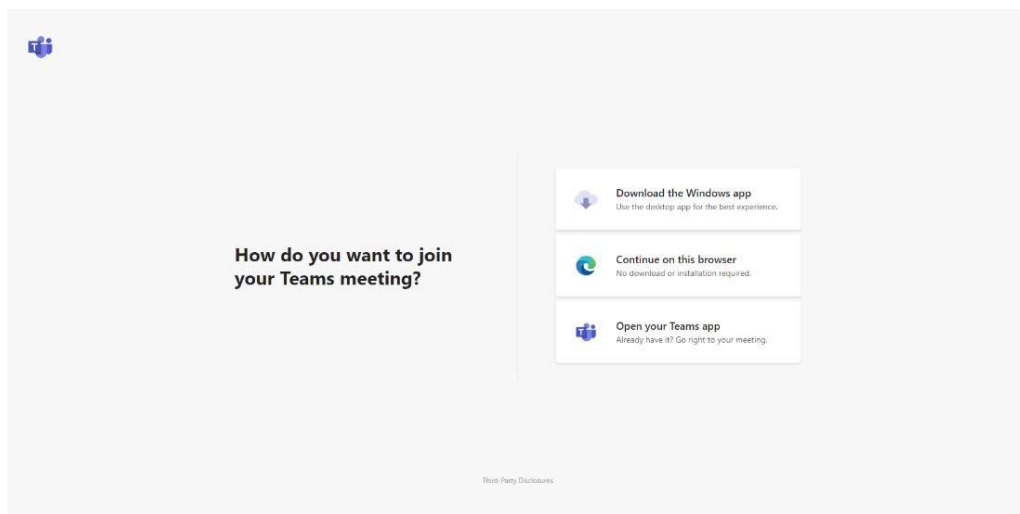
1. To join from your desktop, laptop or tablet:

1.1. Click on the “Join Microsoft Teams Meeting” link that was sent to you in your confirmation email.

If using a Mac, the following screen should appear:





If using a PC, the following screen should appear:

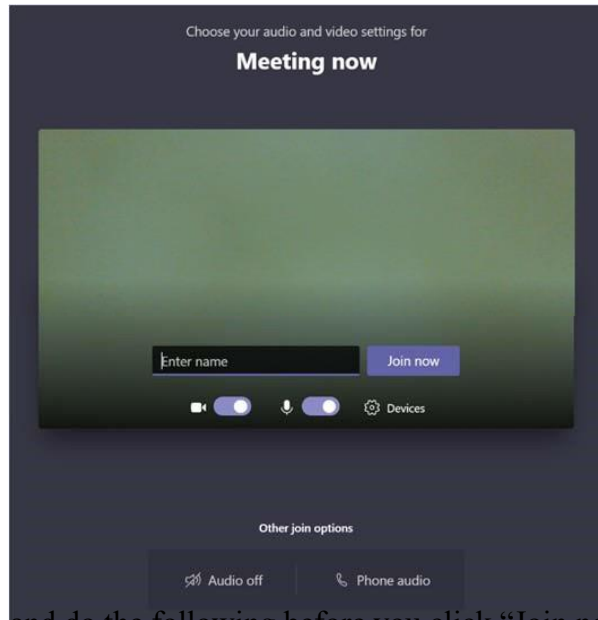


1.2. If you do not currently have the Teams app and/or you do not want to download the Teams app, choose “Continue on this browser”

(Note: You may see “Join on the web instead”).

If joining by web, participants should use the most recent Edge  or Chrome  browser. *(Microsoft Teams is NOT yet compatible with Safari.)*

1.3. Once the meeting window appears, you can choose your audio and video settings.



Please enter your name and do the following before you click “Join now”:

If you would like to appear in meeting’s video feed, please turn your camera to the on position.

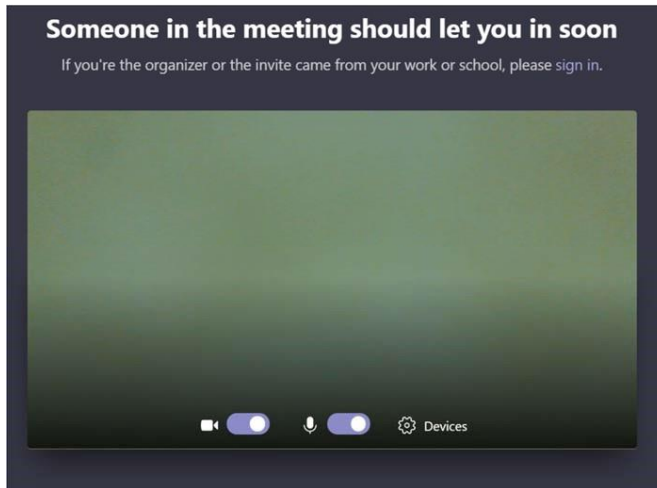


Please turn your audio to the “on” position. You will be able to mute and unmute yourself during the meeting.



Click “Join now”.

1.4. If the meeting has not yet started, you will then see a screen that says, “Someone in the meeting will let you in soon”. Please use this time to confirm on the screen that your video and audio settings are on.

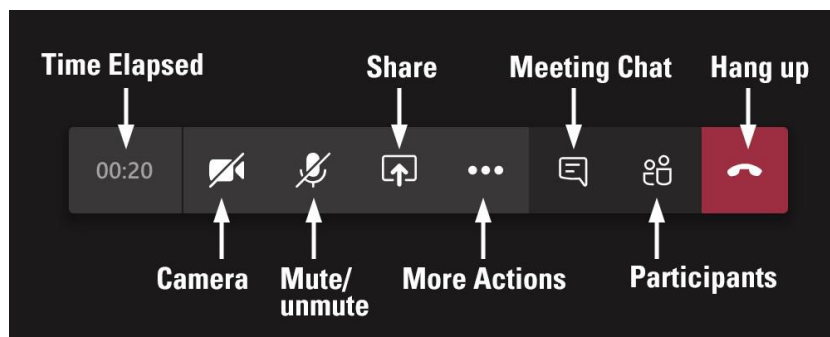


Once the meeting is started you will be admitted.

2. Desktop, laptop and tablet control options

You can control your video and audio by selecting the icons in the taskbar shown below.

To ask a question, select the chat bubble icon. A window will appear on your right-hand side.



You can type your questions in at any time during the presentation.

You may also see a “Raise your hand” icon. Your meeting organizer will communicate if this function will be used during the meeting time.



3. To join by calling in with your phone (no video capabilities, sound only):

- 3.1. Dial the phone number that was sent to you in the confirmation email.
- 3.2. When prompted, enter the conference ID that was sent to you in the confirmation email.
- 3.3. You will be muted upon entry. If you would like to ask a question, you will have to press *6 before speaking.