

European Tuberculosis Research Initiative

First meeting of the core group, 15 November 2016, Copenhagen, Denmark



ABSTRACT

The goal of ending the global tuberculosis (TB) epidemic by 2035 was set by the WHO End TB Strategy and endorsed by the World Health Assembly in May 2014. The strategy aims to reduce TB deaths by 95% and cut new cases by 90% between 2015 and 2035, and ensure that no family is burdened with catastrophic expenses due to TB. The development and implementation of innovative tools (such as new vaccine(s), diagnostics, medicines, preventive and treatment regimens, and innovative service deliveries) is essential to achieving the goal and targets. Effective and timeous development and implementation of the new tools should be supported by intensified efforts across the continuum of basic science to applied research and development and operational research. With this in mind, the WHO Regional Office for Europe has launched the European Tuberculosis Research Initiative (ERI-TB), whose mission is to advance TB-related research in the European Region. This reports summarises discussions and actions from the first meeting of the ERI-TB core group held in Copenhagen, Denmark on 15 November 2016.

Keywords

TUBERCULOSIS - PREVENTION AND CONTROL RESEARCH DISEASE ERADICATION INTERNATIONAL COOPERATION EUROPE

Address requests about publications of the WHO Regional Office for Europe to:

Publications
WHO Regional Office for Europe
UN City, Marmorvej 51
DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office website (http://www.euro.who.int/pubrequest).

© World Health Organization 2017

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

Image: © Dr Andrei Dadu, WHO Regional Office for Europe.

CONTENTS

	Page
Acknowledgements	iv
Acronyms	v
Executive summary	vi
Introduction	1
Launch of the ERI-TB	1
The place of research in ending TB in the European Region	2
The global action framework for TB research – priorities, challenges and a global perspective	
New diagnostics	4
New drugs and regimens	4
Management of latent TB infection	4
New vaccines	4
Developing national TB research plans	4
Round-table discussions	5
Perspectives from high-burden countries	6
Perspectives from low-burden countries	6
Overcoming barriers to research	7
Areas of research focus for ending TB in Europe	8
Next steps	11
References	12
Annex 1	14
Meeting programme	14
Annex 2	15
Participants	15
Annex 3	17
Group picture	
Annex 4	18
Web-cloud of the European Tuberculosis Research Initiative core group in the domain	public

Acknowledgements

The secretariat of the European Tuberculosis Research Initiative, acting at the WHO Regional Office for Europe, is grateful to the appointed members of the selection committee for the core group members: Dr Lucia Ditiu, Executive Director, Global Stop TB Partnership; Ms Fanny Voitzwinkler, Head, European Union Office of Global Health Advocates; and Dr Masoud Dara, Coordinator for Communicable Diseases, and Programme Manager, Tuberculosis, HIV and Hepatitis programme, Division of Health Emergencies and Communicable Diseases, WHO Regional Officer for Europe.

The secretariat is also grateful to the selected members of the core group for their technical contribution to this report: Dr Sevim Ahmedov, Senior Tuberculosis Adviser, United States Agency for International Development (USAID), United States of America; Dr Daniel Chemtob, Department of Tuberculosis & AIDS, Ministry of Health, Israel; Dr Daniela Maria Cirillo, Director, WHO Collaborating Centre for TB Laboratory Strengthening, Italy; Dr Philipp Du Cros, Head of Manson Unit, Médecins Sans Frontières, United Kingdom; Dr Evgenia Geliukh, Tuberculosis/HIV Programme Manager, Alliance for Public Health, Ukraine; Dr Arax Hovhannesyan, Health Adviser, World Vision South Caucasus, Armenia; Dr Ihor Kuzin, Head, Monitoring and Evaluation Centre, Ukrainian Centre for Socially Dangerous Disease Control of the Ministry of Health, Ukraine; Dr Lucia Mihailescu, Coordinator, Tuberculosis Programme in Prisons and Global Fund projects, Romania; Mr Safarali Naimov, Secretary, STOP TB Partnership, Tajikistan, focal point for Global Coalition of TB Activists (European Region), and former multidrug-resistant tuberculosis patient, Tajikistan; Dr Alena Skrahina, Deputy Director, Republican Research and Practical Centre for Pulmonology and Tuberculosis, Belarus; Dr Ivan Solovic, Chief, Clinic for Tuberculosis and Lung Diseases, Slovak Medical University, Slovakia,; Dr Simon Tiberi, Infectious Diseases Consultant, Newham University and Royal London Hospitals, United Kingdom; Dr Irina Vasilyeva, Director, Research Institute of Phthisiopulmonology, I.M. Sechenov First Moscow State Medical University, and Chief Tuberculosis Expert, Ministry of Health (Russian Federation); Dr Rony Zachariah, Coordinator of Operational Research and Strategic Adviser and Director, Médecins Sans Frontières Brussels Operational Centre, Luxembourg; and Dr Dominik Zenner, Head of Tuberculosis Screening, Centre for Infectious Disease Surveillance and Control Colindale, Public Health England, United Kingdom.

Thanks also to the standing members of the European Tuberculosis Research Initiative for their guidance and coordination: Dr Malgorzata Grzemska, Coordinator, Technical Support Coordination Unit, Global TB Programme; Dr Christian Lienhardt, Scientist, Global TB Programme; and Dr Tim Nguyen, Unit Leader, Evidence and Intelligence for Policy-making, Division of Information, Evidence, Research and Innovation.

The secretariat would like to thank Dr Nedret Emiroglu, Director, Division of Health Emergencies & Communicable Diseases, WHO Regional Office for Europe, for launching the European Tuberculosis Research Initiative at a public event in Copenhagen, Denmark.

The secretariat appreciates the contribution of the Tuberculosis, HIV and Hepatitis unit at the WHO Regional Office for Europe for establishing and maintaining bridges with WHO functioning mechanisms for country support for tuberculosis: Dr Andrei Dadu, Technical Officer, European Tuberculosis Surveillance and Response-monitoring Network; Dr Pierpaolo de Colombani, Medical Officer, Cross-border Tuberculosis Control; Ms Soudeh Ehsani, Technical Officer, European Tuberculosis Laboratory Initiative secretariat; Dr Ogtay Gozalov, Medical Officer, Regional Green Light Committee for Europe secretariat; and Dr Martin van den Boom, Technical Officer, Regional Collaborating Committee secretariat.

The European Tuberculosis Research Initiative secretariat was assisted by Dr Olga Denesiuk, WHO temporary adviser, tuberculosis operational research, and Mrs Anne-Birgitte Gradman, Secretary, TB, HIV and Hepatitis unit, WHO Regional Office for Europe.

The meeting reporter was Dr Ann Galea, WHO reporter.

The report was edited by Dr Andrei Dadu and Dr Masoud Dara, WHO Regional Office for Europe.

The establishment of the European Tuberculosis Research Initiative was supported by USAID.

Acronyms

CSO

civil society organization European Tuberculosis Research Initiative **ERI-TB**

high-burden country HBC low-burden country LBC

multidrug-resistant tuberculosis MDR-TB

TB tuberculosis

Executive summary

The goal of ending the global tuberculosis (TB) epidemic by 2035 was set by the WHO End TB Strategy and endorsed by the World Health Assembly in May 2014. The strategy aims to reduce TB deaths by 95% and cut new cases by 90% between 2015 and 2035, and ensure that no family is burdened with catastrophic expenses due to TB. The development and implementation of innovative tools (such as new vaccine(s), diagnostics, medicines, preventive and treatment regimens, and innovative service deliveries) is essential to achieving the goal and targets.

Effective and timeous development and implementation of the new tools should be supported by intensified efforts across the continuum of basic science to applied research and development and operational research. This important task is included as the third pillar in the End TB Strategy and TB action plan for the WHO European Region 2016–2020.

With this in mind, the WHO Regional Office for Europe has launched the European Tuberculosis Research Initiative (ERI-TB), whose mission is to advance TB-related research in the European Region. Its specific objectives (1) are to:

- 1. map ongoing and planned TB-related research activities in the Region;
- 2. develop and update the regional research-priority agenda regularly for use by relevant research stakeholders in addressing specific needs;
- 3. facilitate collaboration between research institutions and key research stakeholders, and identify and promote areas for further cooperation, by ensuring the engagement of civil society organizations, patients, ex-patients and other relevant non-state actor representatives in TB research;
- 4. facilitate dissemination of the results of research and their translation to evidence-based policies and programmatic implementation via relevant forums and mechanisms; and
- 5. document funding gaps in research and share with potential funding agencies, and bilateral and multilateral organizations.

An ERI-TB core group has been established to provide expert input to ERI-TB work. The group consists of 15 members from a range of backgrounds, including WHO, researchers, public health practitioners, national TB programme managers, experts from health-related humanities and social sciences, representatives from academic institutions, technical and funding agencies, community representatives, ex-patients, and civil society organizations with substantial expertise and experience in areas related to TB prevention, control and care.

The establishment of ERI-TB is one of the key milestones of the TB action plan for the WHO European Region 2016–2020 and its accompanying resolution, which were endorsed by the 65th session of the WHO Regional Committee for Europe. Strengthening implementation and operational research is also a key pillar in the action plan on the use of evidence, information and research for policy-making in the Region.

Reference

1. The European Tuberculosis Research Initiative (ERI-TB) [website]. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/activities/the-european-tuberculosis-research-initiative-eri-tb, accessed 27 January 2017).

Introduction

The goal of ending the global tuberculosis (TB) epidemic by 2035 was set by the WHO End TB Strategy and endorsed by the World Health Assembly in May 2014. The strategy aims to reduce TB deaths by 95% and cut new cases by 90% between 2015 and 2035, and ensure that no family is burdened with catastrophic expenses due to TB. The development and implementation of innovative tools (such as new vaccine(s), diagnostics, medicines, preventive and treatment regimens, and innovative service deliveries) is essential to achieving the goal and targets.

Effective and timeous development and implementation of the new tools should be supported by intensified efforts across the continuum of basic science to applied research and development and operational research. This important task is included as the third pillar in the End TB Strategy and TB action plan for the WHO European Region 2016–2020 (1), and a global action framework for TB research has been developed in support of the third pillar (2,3).

The establishment of the European Tuberculosis Research Initiative (ERI-TB) is one of the key milestones of the TB action plan for the WHO European Region 2016–2020 and its accompanying resolution, which were endorsed at the 65th session of the WHO Regional Committee for Europe (4). Strengthening implementation and operational research is also a key pillar in the action plan and resolution on the use of evidence, information and research for policy-making in the WHO European Region (5).

The first meeting of the ERI-TB core group was held on 15 November 2016 in Copenhagen, Denmark. The objectives were to:

- launch the ERI-TB;
- share research practice and perspectives on TB prevention and control from diverse settings; and
- discuss the research focus for ending TB in the Region.

Experts from WHO started the day by providing regional and global perspectives on TB research. This was followed by a full day of interactive round-table discussions among members of the core group and members from WHO headquarters and the WHO Regional Office for Europe.

The final programme of the meeting is included as Annex 1 and the list of participants can be found at Annex 2. Annex 3 shows a group picture from the meeting and Annex 4 portrays the web-cloud of the ERI-TB core group in the public domain.

Launch of the ERI-TB

Dr Nedret Emiroglu, Director of the Division of Health Emergencies and Communicable Diseases of the WHO Regional Office for Europe, welcomed participants and hailed the landmark launch of the ERI-TB group as one of the key milestones of the TB action plan for the WHO European Region 2016–2020. The mission of the ERI-TB is to advance and support TB-related research by countries in the Region, and she encouraged the group to establish links with the Technical Advisory Group for Tuberculosis for the WHO European Region. She congratulated the 15 selected members forming the ERI-TB core group, who were chosen by a committee of representatives from the Regional Office, WHO headquarters, the Stop TB

Partnership and the TB Europe Coalition. She also thanked Dr Masoud Dara, Coordinator for Communicable Diseases and Programme Manager, TB, HIV and Hepatitis at the WHO Regional Office for Europe, for organizing and facilitating the meeting.

The place of research in ending TB in the European Region

Dr Masoud Dara, Coordinator for Communicable Diseases and Programme Manager, TB, HIV and Hepatitis, WHO Regional Office for Europe

Dr Dara provided a brief overview of the epidemiological situation in the Region. TB remains an important threat to public health in Europe, where it is estimated that a TB-related death occurs every 15 minutes. He stressed that the TB burden is very unequally distributed in the Region, with latest estimates based onpublished data from 2014 showing that the 18 high-priority countries 1 account for 85% of all incident cases, 90% of all deaths, 99% of all multidrugresistant TB (MDR-TB) cases and 91% of TB/HIV coinfections.

Successful treatment of MDR-TB is the key priority for the Region, as 16% of new cases and 48% of retreatment cases are found to have multidrug-resistant strains. The roll-out of MDR-TB treatment has advanced rapidly, with 53 396 MDR-TB patients commencing treatment to date. Dr Dara observed that this is greater than the total number of laboratory-confirmed cases, and this discrepancy will be investigated.

The ERI-TB is one of the five regional platforms² that will support implementation of the TB action plan for the WHO European Region 2016–2020. The action plan has set three ambitious targets: reduce TB deaths by 35%; reduce TB incidence rates by 25%; and reach a 75% treatment success rate among the MDR-TB patient cohort. The plan is built on three pillars, and ERI-TB is an important element of the third pillar, "Intensified research and innovation" (the other two are "Integrated patient-centred care and prevention" and "Bold policies and supportive systems"). The ERI-TB mandate is also embedded in the action plan to strengthen the use of evidence, information and research for policy-making in the WHO European Region (5), which was endorsed by all Member States at the 66th session on the WHO Regional Committee for Europe in 2016.

Dr Dara suggested a number of research areas to the group and observed that while observational studies appear to be conducted commonly in the Region, insufficient basic science research or clinical trials are being taken forward. National TB programmes can further be strengthened by patient-centred qualitative studies, and national polices should be more grounded in operational research and economic cost-effect analysis. He regretted that effective new vaccines are unlikely to be developed in the near future and reminded the group of the objectives set out in the terms of reference for the ERI-TB network (6).

Dr Dara concluded by setting three overarching objectives for the ERI-TB core group:

• guide implementation of the ERI–TB

¹ The 18 high-priority countries are: Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Republic of Moldova, Romania, the Russian Federation, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan.

² The four other regional platforms are: the Regional Green Light Committee for Europe, the Regional Collaborating Committee, the European TB Laboratory Initiative, and the European TB Surveillance Network.

- share research practices and perspectives from diverse settings
- contribute to key regional publications on research.

The global action framework for TB research – priorities, challenges and actions: the global perspective

Dr Christian Lienhardt, Scientist, Global TB Programme, WHO headquarters

Dr. Leinhardt affirmed full support for this regional initiative, stating that research is critical to break the trajectory of the TB epidemic. He reminded participants that ending the TB epidemic is enshrined in Sustainable Development Goal 3.3, that intensified research and innovation is the third pillar of the global End TB Strategy, and that this area of work is being given top priority by WHO.

A brief overview of the global TB epidemiological situation was presented. Most recent published estimate-data for the global burden of TB in 2015 reported 1.8 million deaths from all forms of TB and 10.4 million new active cases, of which 11% were associated with HIV and 480 000 had MDR-TB strains (7). The number of reported cases in 2015 was 6 million, so around 4 million so-called missed cases remain undiagnosed and/or untreated in the community, with 10 countries accounting for 72%. While 90% of the global disease burden of MDR-TB is concentrated in 30 countries, eastern Europe and Asia share the highest burden of MDR-TB in newly diagnosed cases, with the Russian Federation and Ukraine ranking among the highest (more than 18%) in this category.

Current global TB epidemiological trends are showing a slow but steady 1.5% decline per year. Models indicate that this trajectory can be accelerated to 10% per year if current tools are linked to global economic growth that ensure universal health coverage and social protections, but will still fall short of the End TB Strategy global target for 2035 of less than 10 cases per 100 000 population. New tools (such as new drugs, regimens, point-of-care testing and vaccines) are needed to reduce rates even faster (to 17% per year). It is believed that such a rapid decline is possible, as it was achieved in the late 1950s among the Inuit population of Canada.

Dr Leinhardt noted that each region must identify its own priorities and set its own research agenda to include a full range of scientific methods and specialties. Developing new tools and interventions, increasing efficiency of TB programmes and improving health care services require consideration. More specifically, investigations could cover:

- basic science research focusing on development of new tools to diagnose, treat and prevent TB;
- applied research to develop and validate new tools in different settings;
- specific country research testing new approaches to TB management;
- qualitative research exploring factors influencing health-related behaviour (among patients, peers and health-care workers, for instance); and
- operational research and other methods to inform and transform government health policies, health systems, universal health coverage, social protections and other social determinants of health.

A brief review of new tools and strategies in various stages of development or implementation provided the following insights.

New diagnostics

New diagnostic methods of varying complexity are in advanced stages of development. These range from highly complex assays for the molecular detection of TB strains and drug-susceptibility testing (which require advanced laboratory technical capacity), to low complexity antigen/antibody and biomarker assays (which require only minimal training). Concessional pricing for the GeneXpert rapid molecular diagnostic test has facilitated rapid uptake by a number of countries. The search for new methods now follows a diagnostic cascade, starting from point-of-care sputum-based diagnostic and triage testing, to assays that can predict response to treatment and individual susceptibility to reactivation of latent TB infection. Rapid molecular methods (such as GeneXpert MTB/RIF and line probe assays) are now being used to determine the most effective MDR-TB drug regimen on a case-by-case basis.

New drugs and regimens

The drug pipeline in 2016 has some very encouraging candidates in phase II and phase III stages of clinical trial development. The two most encouraging, bedaquiline and delamanid, are undergoing a regulatory review process for the treatment of MDR-TB. The uptake of these drugs is slowly increasing due to compassionate use under normal programmatic conditions, but remains low and even negligible in countries such as China, India and Indonesia. There is only one candidate (a new chemical class Q203) in phase 1 stage of development: this is concerning, given the long time needed to develop new products and the uncertainty on how to use new drugs effectively and efficiently in the field.

Management of latent TB infection

The shift towards detecting and managing latent TB infection, especially in low-burden countries, has recently become a cornerstone of the global End TB Strategy. It is estimated that globally, 2 billion asymptomatic individuals are infected with TB, of which 5–15% will eventually progress to active disease. Progress has been made with alternative shortened combination therapy for latent TB infection using rifapentine and isoniazid delivered once a week over three months. Programmatic approaches to addressing this potential reservoir need to be investigated comprehensively.

New vaccines

Some new vaccines are in the pipeline, with eight candidates currently in phases II and III (testing in humans).

Developing national TB research plans

There are many valid arguments for supporting research in endemic countries. Some so-called pathfinding countries (such as Brazil, India, Ethiopia and Viet Nam) are leading the way and have started developing their own national TB research plans. The Netherlands is the only country in the European Region that has an advanced plan. Dr Leinhardt referred participants to key documents and publications that are of special interest to the group, including:

- the international roadmap for TB research (8);
- the global action framework on TB research (9);
- the toolkit for developing a national TB research plan (10);
- Dr Leinhardt and colleagues' paper on driving the way to tuberculosis elimination: the essential role for fundamental research (11); and

• Dr Leinhardt and colleagues' paper on translational research for TB elimination: priorities, challenges and actions (12).

Dr Leinhardt concluded by noting that TB can be eliminated by 2035 if capacity for research in endemic countries is increased, middle-income countries (including Brazil, China, India, the Russian Federation and South Africa) ensure there are no funding gaps, and high-income countries increase their commitment and financial support for global TB research and innovation efforts.

Round-table discussions

Participants shared a broad range of ideas, issues and experiences during the round-table discussions.

Participants agreed that WHO's specific research agenda for the Region must be defined and should address priority areas of concern for high- and low-burden countries (HBCs and LBCs). A list should be compiled of key problem areas that need to be addressed through more research. WHO can facilitate mapping of activities in the Region and has a complementary role in facilitating collaboration and providing guidance at regional level.

The scope (including regional versus country level, and high visibility to attract funding versus specific capacity-building) and types of research activity where discussed. While they are more resource-intensive, prospective research methods are preferred over retrospective study designs, as results are considered more robust and they satisfy GRADE requirements for policy-making. Randomized controlled trials are the gold standard, but are not always possible in practice. The importance of qualitative types of research (to, for instance, determine patient behaviour patterns) was acknowledged, but this area of study is often neglected. Innovative research methods using new tools and technologies can also be used to realize benefits.

WHO is developing the Global Observatory on Health Research and Development (13) as a platform to identify gaps and prioritize investment based on global public health needs. It was also noted that a new project, E-Detect TB (14), was launched in 2016 by the European Centre for Disease Control to help countries to implement evidence-based interventions and best practice approaches. The group was encouraged to communicate with both projects. Common overarching themes could be explored to avoid redundancy and duplication. Suggested common areas of work include: developing data for policy- and decision-making; optimizing treatment regimens for the Region and individual countries; reducing resistance and transmission; and promoting innovation by exploring new tools and approaches.

Fruitful engagement with non-state actors (especially with the private sector) was discussed. The group was reminded that WHO has set rules through the WHO framework of engagement with non-state actors (15) to determine how WHO and its staff can work with non-state actors (nongovernmental organizations, private sector entities, philanthropic foundations and academic institutions). All agreed that although it is very important to have open dialogue with the private sector, there should be no doubt that WHO policies and guidelines need to be led by evidence and not influenced by industry or external stakeholders.

Perspectives from high-burden countries

Patients with MDR-TB may remain undetected and untreated when drug-sensitivity testing is available in only a few regions of the country. It is estimated, for example, that a 30% gap exists between the number of MDR-TB cases and the number receiving treatment in Romania. This trend is the opposite to that reported by the Regional Office, which suggests the number of actual MDR-TB cases on treatment is even higher than the estimated number of cases.

Results of research undertaken in HBCs are sometimes ignored and do not always lead to policy changes in national TB programmes. Specific reference was made to Armenia, where several studies on ambulatory patient-centred care have been conducted. Although hospitalization rates have been improving, it is estimated that over 90% of TB patients are still hospitalized for at least 60 days, with even longer stays for MDR-TB cases.

More generally, some members of the group claimed that doctors do not know how to interpret and use the results of studies, and may not acknowledge foreign research. Negative findings are often ignored.

Lack of coordination and collaboration is an issue in HBCs. Several operational research studies conducted in Ukraine, for example, involved only hospital doctors and excluded civil society organizations (CSOs). WHO could facilitate closer collaboration in these cases and mapping efforts made by the group could lead to significant improvements.

More country-specific research on the costs and benefits of ambulatory patient-centred care is necessary to convince health ministries and transform health systems. Adverse financing mechanisms are responsible for the persistently high hospitalization rates in many HBC. Many patients are lost to follow up after discharge from hospital due to insufficient support services for ambulatory care: for example, MDR-TB patients often do not receive the injectable drug component of their drug regimen after discharge.

Donor funding mechanisms have a strong influence on the research agenda and may shift resources away from important areas of study. Reference was made to the fact that while it is estimated that 70% of TB patients in Belarus have a history of harmful alcohol use, no funds can be obtained from the Global Fund to study and address this problem.

Intrinsic cultural differences in the international scientific field persist. Scientific research conducted in Russian-speaking HBCs is often presented through doctoral dissertations and results may not be widely shared. Some advances have been seen, however, with sophisticated basic science studies being published in high-impact journals. Reference was made to a study from Belarus that investigated new treatment options with adjuvant mesenchymal stem cells in MDR- TB patients (16).

Perspectives from low-burden countries

LBCs benefit from a number of excellent research institutions and have strong control programmes in place. Many are actively engaged in research and have identified and set their own priority areas for study. Common themes and challenges include:

- pockets of high incidence rates in some specific areas (such as incidence rates exceeding 100 per 100 000 in east London, United Kingdom (England));
- imported cases of TB (including resistant strains) being increasingly recognized; and

• detection and management of latent TB infection, especially among contacts of MDR-TB patients.

Areas of interest in Israel that could apply to other LBCs include:

- researching the impact of migrants on local epidemiology
- defining needs and improving health-care access to vulnerable and hard-to-reach groups
- studying the impact of preventive therapy on high-risk populations
- assessing the cost benefits of shifting to generic formulations
- performing basic science research.

Overcoming barriers to research

Some barriers to research were identified and solutions suggested or implied during the open discussions.

Translating research into policy

Research is often funded and led by academic teams and does not involve national TB programme managers. Research protocols embedded in national TB programmes that allow open access to data and wide sharing of results are more likely to influence countries' TB control policies. Some scientific results may still not be accepted by policy-makers for various political reasons, but it is nevertheless essential that WHO spreads the importance of evidence-based decision-making.

Hard-to-reach groups

There is a paucity of research on vulnerable groups. Operational research at country level must also focus on specific populations (such as MDR-TB patients, prisoners, people who misuse alcohol and/or drugs, migrants and people living with HIV).

Competition for funding

Academic researchers often need to publish their results in high-impact journals to secure funding for their projects. Donors now look for added value and expect their funds to be linked to some visible impacts on TB programmes.

Sustainable and appropriate research funding

The global financial crisis of the past decade has affected the availability and direction of donor funding. High-value donors are more likely to support research in HBCs if the scope of studies is shown to be relevant also to LBCs. Identifying areas of research that would have a high impact would ensure sustainable funding cycles.

Language barriers

Language barriers can exist between researchers in non-English-speaking countries. Highly technical scientific terminology used in research protocols and publications may also present a barrier to approaches to private donor agencies.

Low country capacity

Some countries in the Region, especially smaller ones, may lack capacity to undertake research. Some report having to take on a disproportionate amount of work in relation to the funds they

receive. In some instances, researchers from developed countries may be interested only in getting data from HBCs for their publications. Countries with similar epidemiological trends that face similar challenges can collaborate and engage in multicentre studies, providing an opportunity to form a bloc that could attract funding, develop more equal partnerships for building countries' capacity and generate aggregated data.

Resistance by local health-care providers

Health-care providers, particularly doctors and specialists working in the field, may not endorse or accept research findings if they consider the researchers to be unsuitably qualified. The Regional Collaborating Committee has developed advocacy publications in Russian to address some resistance issues.

Ethical issues

Ethical issues have become an important paradigm, especially when dealing with challenging patient groups such as those with MDR-TB and marginalized populations. Some donor agencies, such as the Global Fund, are specifically addressing issues in this area that may create opportunities.

Areas of research focus for ending TB in Europe

Participants were asked during the afternoon session to address and discuss six areas of research focus for ending TB in Europe in line with the TB action plan 2016–2020.

The following key points arose from the open discussion.

- Current research efforts need to be mapped and structured to facilitate quicker sharing and dissemination of results. This would translate into earlier consideration of positive results by national TB programmes.
- WHO should provide a desk review of national TB programme performance and health system assessments for mapping research capacities and identifying research gaps.
- WHO should organize workshops in Russian-speaking HBCs to link basic science researchers working in countries to international platforms through which to disseminate their research results more widely.
- More rigorous efforts are needed to ensure that the results of research can reach a wider audience across the Region. Good quality translation from and into Russian would be a good starting point.
- A set of measurable indicators are needed to measure progress in research areas.

The following presents a brief summary of discussions for each item on the agenda

- 1. mapping ongoing and planned TB-related research activities in the Region;
- 2. developing and updating regularly the regional research priority agenda;
- 3. facilitating collaboration between research institutions and key research stakeholders, and identifying and promoting areas for further cooperation
- 4. ensuring engagement of civil society organizations, former and current TB patients and other relevant non-state actor representatives in TB research;
- 5. facilitating dissemination of research results and their translation to evidence-based policies and programmatic implementation via relevant forums and mechanisms; and
- 6. documenting funding gaps in research and sharing with potential funding agencies, bilateral and multilateral organizations ERI-TB plan discussion.

Item 1: mapping ongoing and planned TB-related research activities in the Region

Members agreed that there are several layers of intervention and players, including WHO, donors, countries and other partners such as universities and CSOs. They debated whether the core group should influence the research agenda in the Region or should only support research by countries. Mapping of ongoing research should give a clear picture of what is already being done in the Region and identify research gaps in HBC and LBC priority areas.

They mentioned various methodologies focusing on a few areas and agreed to continue discussions. The methodologies were:

- basic science: mycobacteriology, immunology, pathogenesis
- applied science/research and development of new medicines, vaccines and diagnostics
- clinical trials
- qualitative studies
- operational research/better use of data
- cross-cutting links with other research work (anthropology, social science, health system)
- economic/cost-effective analysis.

There was consensus on mapping of relevant research in the Region being important and necessary, and it was suggested that it would be useful if researchers had an easy-access platform on which to publish and share their results. Some alluded to established databases, such as FIND (17), the TB Alliance (18), Pediatric TBNet (19), clinicaltrials.gov (20), and the Influenza Research Database (21). Suggestions on the mechanics for mapping research in practice were many, including publishing a report, launching a dynamic dedicated website and hosting on the WHO website. It was suggested that as a start, a snapshot of research underway in the Region to set time frames (to November 2017, for example) could be uploaded to the Regional Office website with links to the Regional Collaborating Committee.

Members discussed the minimum elements required for studies to be added to such a depository. These would include an abstract of the study, results (but not necessarily the raw data), the principal investigator, institution and source of funding, ethical approval, and a declaration of conflict of interest. A disclaimer could state that studies included in the depository would not automatically be endorsed by WHO or the group.

There were various suggestions on how content could be collected, but to get the ball rolling, it seemed feasible to assign a consultant to map all the research being done in the Region over, for example, the last two years. WHO country officers would be able to contribute by linking with their national counterparts. It was suggested that researchers may not want to share their ideas, especially where competition for funding is strong, and producing a comprehensive mailing list of all interested parties could also be a difficult undertaking. The feasibility of the repository therefore remains uncertain and further discussions are necessary.

Item 2: developing and updating regularly the regional research priority agenda

The group was reminded that a roadmap for the global research agenda has already been published (8), but it is necessary for the Region to set its own research agenda and distinguish the priorities of LBCs and HBCs. It was agreed that it is too early to set a detailed agenda at this

stage, but it is possible to prepare a short draft document as a basis for a concept note that would be presented to the Regional Committee in September 2017.

Item 3: facilitating collaboration between research institutions and key research stakeholders, and identifying and promoting areas for further cooperation

The group agreed that it could reach out to groups and networks already involved in research, such as TB Net, the International Union Against Tuberculosis and Lung Disease (The Union), the European Respiratory Society and the American Thoracic Society. They would also inform and involve national TB programme managers and consult with partners such as the Global Fund and other donors. This initiative should also be seen as an opportunity for academic researchers to widen their collaborative networks and attract funding support.

Item 4: ensuring engagement of CSOs, former and current TB patients and other relevant non-state actor representatives in TB research

The group remarked that CSOs are becoming increasingly more vocal and are recognized as important partners. WHO established a Civil Society Task Force on TB in April 2016 to assist with implementation of the global End TB Strategy by focusing on a whole-of-society approach. CSOs in the Region can make a unique contribution to TB research (such as in designing qualitative research) and have already been instrumental in supporting piloting of new regimens in collaboration with the Regional Green Light Committee for Europe and Médecins Sans Frontières.

Examples of ongoing initiatives and involved organizations include the Tuberculosis Regional Eastern Europe and Central Asia Project (22), TB People and the TB Europe Coalition (23). Members raised several issues, such as the fact that many CSOs are being affected by government austerity measures and that some parts of the research agenda (basic science research in whole genome sequencing was given as an example) may not attract the attention of CSOs, as it may appear too specialized and difficult to understand. Mention was made of the WHO framework of engagement with non-state actors (15) that has been endorsed by Member States and which sets clear boundaries to avoid conflicts of interest and undue influence. Non-state actors are, however, encouraged to promote and disseminate WHO policies.

Item 5: facilitating dissemination of research results and their translation to evidence-based policies and programmatic implementation via relevant forums and mechanisms

A number of issues where raised during discussion of this item. Some east European partners have major issues with the interpretation of scientific findings, and language barriers persist within the Russian-speaking scientific community. The group agreed that they could support capacity-building in this area and could link with other partners, such as Regional Green Light Committee for Europe members and E-Detect TB (14). Specific mention was made of a WHO toolkit (in English) launched in 2016 to help develop national TB research plans (24). It was agreed that the group should seek to assist in translating new research findings into policy and practice in national TB programmes.

Item 6: documenting funding gaps in research and sharing with potential funding agencies, bilateral and multilateral organizations – ERI-TB plan discussion

Some platforms and activities were familiar to some members of the group, so it was felt there was no need to reinvent the wheel. It was suggested that donors should be encouraged to communicate with each other.

Online platforms from the Treatment Action Group (25), the WHO global action framework for TB research (3) and the first TB research funders' forum held in Washington, United States of America in 2016 (26) were mentioned. These resources can be used to triangulate and uncover funding gaps, allowing donor agencies to be approached with country- or region-specific proposals. Members from the Regional Office expressed the need for funding capacity-building in this area but noted that prospective research methods were more common in the Region and insufficient clinical trials were being conducted.

Next steps

others

The following immediate actions were agreed by the group at the end of the meeting:

- a WebEx conference call that includes all members of the core group will be organized, during which the chairperson will be elected (tentative dates: 15 or 16 December 2016);
- a draft document suggesting the research agenda for the Region will be presented;
- the meeting report will be available to all participants for their feedback and will uploaded to the WHO website;
- the proposed timeframe for the next face-to-face meeting will be the end of May 2017 (specific date to follow); and
- WHO will host biannual face-to-face meetings supplemented by regular WebEx conference calls.

A summary overview of planned activities, volunteer leading members and timelines related to these next steps is shown in Table 1.

		<u>'</u>	
Item	Activity	Leading members	Timeline
1	Initiate efforts to form a snapshot view	Dr A. Dadu	In three weeks'
	of research efforts currently underway	Dr S. Tiberi	time (before
	in countries of the WHO European	Dr M. Dara	Christmas)
	Region	Dr D. Zenner	
2	Prepare a draft for the research agenda	Dr A. Skrahina	Before
	for the WHO European Region that	Dr P. Du Cros	Christmas
	would be developed into a concept	Dr E. Geliukh	
	note to present to the Regional	Dr D. Chemtob	
	Collaborating Committee in 2017 ^a	Dr D. Cilillo	
	-	Dr C. Lienhardt	
		Mr S. Naimov	
3	Reach out and link with other groups	All members of the group	Report progress
	and networks such as TB Net, The		at next meeting
	Union, European Respiratory Society, academic institutions, Global Fund,		_
	national TB programme managers and		

Table 1. Summary overview of the planned actions for each item

Item	Activity	Leading members	Timeline
4	(a) Continue engagement of CSOs, former and current TB patients and other relevant non-state actor	g	
	representatives in TB research that is	Dr E. Geliukh	Report progress
	being taken forward by the Regional	Dr P. Du Cros	at next meeting
	Office	Mr S. Naimov	
	(b) Develop an agenda for qualitative research that includes CSOs		
5	Ongoing activity by Regional Office	Dr M. Van den Boom to include	Report progress
		this item with regular scheduled	at next meeting
		national TB programme manager conferences	
6	Included in activities for item 2	Leading members for item 2 will	
		also cover this area	
		Dr M. Dara and Dr A. Dadu will produce a donor distribution list	Report progress at next meeting

^a Any documents for the Standing Committee of the WHO Regional Committee for Europe must be submitted by February 2017.

References

- 1. European action plan for TB prevention and control covering the period 2016–2020. Copenhagen: WHO Regional Office for Europe; 2015 (EUR/RC65/17 Rev.1; http://www.euro.who.int/en/about-us/governance/regional-committee-for-europe/past-sessions/65th-session/documentation/working-documents/eurrc6517-rev.1-tuberculosis-action-plan-for-the-who-european-region-20162020/, accessed 27 January 2017).
- 2. The End TB Strategy. Global strategy and targets for tuberculosis prevention, care and control after 2015. Geneva: World Health Organization; 2015 (http://www.who.int/tb/strategy/End TB Strategy.pdf?ua=1, accessed 27 January 2017).
- 3. A global action framework for TB research in support of the third pillar of WHO's End TB Strategy. Geneva: World Health Organization; 2015 (http://www.who.int/tb/publications/global-framework-research/en/, accessed 27 January 2017).
- 4. WHO Regional Committee for Europe resolution EUR/RC65/R6 on a tuberculosis action plan for the WHO European Region 2016–2020. Copenhagen: WHO Regional Office for Europe; 2015 (http://www.euro.who.int/en/about-us/governance/regional-committee-for-europe/past-sessions/65th-session/documentation/resolutions-and-decisions/eurrc65r6-tuberculosis-action-plan-for-the-who-european-region-20162020/, accessed 27 January 2017).
- 5. Action plan to strengthen the use of evidence, information and research for policy-making in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2016 (http://www.euro.who.int/en/about-us/governance/regional-committee-for-europe/66th-session/documentation/working-documents/eurrc6612-action-plan-to-strengthen-the-use-of-evidence,-information-and-research-for-policy-making-in-the-who-european-region, accessed 27 January 2017).
- 6. Background. In: Heath topics: communicable diseases [website]. Copenhagen: WHO Regional Office for Europe; undated (http://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/news/news/2010/03/tbhiv-workgroup-meeting-focused-on-europe-and-central-asia/background-and-objectives, accessed 27 January 2017).
- 7. Global tuberculosis report 2016. Geneva: World Health Organization; 2016 (http://www.who.int/tb/publications/global_report/en/, accessed 27 January 2017).

- 8. An international roadmap for TB research. Geneva: World Health Organization; 2011 (http://www.stoptb.org/assets/documents/resources/publications/technical/tbresearchroadmap.pdf, accessed 27 January 2017).
- 9. A global action framework for TB research in support of the third pillar of WHO's End TB Strategy. Geneva: World Health Organization; 2015 (http://www.who.int/tb/publications/global-framework-research/en/, accessed 27 January 2017).
- 10. A toolkit for developing a national TB research plan, in support of the third pillar of the End TB Strategy. Geneva: World Health Organization; 2016 (http://www.who.int/tb/publications/TB_research_toolkit/en/, accessed 27 January 2017).
- 11. Lienhardt C, Kraigsley AM, Sizemore CF. Driving the way to tuberculosis elimination: the essential role for fundamental research. Clin Infect Dis. 2016;1;63(3):370–5.
- 12. Lienhardt C, Lönnroth K, Menzies D, Balasegaram M, Chakaya J, Cobelens F et al. Translational research for TB elimination: priorities, challenges and actions. PLoS Med. 2016;2:13(3):e1001965. doi:10.1371/journal.pmed.1001965.
- 13. Global observatory on health R&D [website]. Geneva: World Health Organization; 2017 (http://www.who.int/research-observatory/en/, accessed 27 January 2017).
- 14. E-Detect TB [website]. London: University College London; 2017 (https://e-detecttb.eu/contact/, accessed 27 January 2017).
- 15. WHO's engagement with non-state actors. In: About WHO [website]. Geneva: World Health Organization; 2017 (http://www.who.int/about/collaborations/non-state-actors/en/, accessed 27 January 2017).
- 16. Skrahin A, Ahmed RK, Ferrara G, Rane L, Poiret T, Isaikina Y et al. Autologous mesenchymal stromal cell infusion as adjunct treatment in patients with multidrug and extensively drugresistant tuberculosis: an open-label phase 1 safety trial. Lancet Respir Med. 2014;2(2):108–22.
- 17. FIND [website]. Geneva: FIND; 2017 (http://www.finddx.org/, accessed 27 January 2017).
- 18. TB Alliance [website] New York (NY): TB Alliance; 2017 (https://www.tballiance.org/, accessed 27 January 2017).
- 19. PTBNET. In: TBnet [website]. Borstel: TBnet; 2017 (http://www.tb-net.org/index.php/ptbnet, accessed 27 January 2017).
- 20. clinicaltrials.gov [website]. Bethesda (MD): US National Library of Medicine; 2017 (https://clinicaltrials.gov/, accessed 27 January 2017).
- 21. Influenza research database [online database]. Bethesda (MD): National Institutes of Health; 2017 (https://www.fludb.org/brc/home.spg?decorator=influenza, accessed 27 January 2017).
- 22. TB regional EECA project (TB-REP) regional dialogue [website]. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/publications/2015/tb-regional-eeca-project-tb-rep-regional-dialogue, accessed 27 January 2017).
- 23. TB Europe Coalition [website]. London: Results UK; 2017 (http://www.tbcoalition.eu/, accessed 27 January 2017).
- 24. Toolkit for developing a national TB research plan. Geneva: World Health Organization; 2016 (http://apps.who.int/iris/bitstream/10665/250592/1/9789241511513-eng.pdf?ua=1, accessed 27 January 2017).
- 25. TAG. Treatment Action Group [website]. New York (NY): Treatment Action Group; 2017 (http://www.treatmentactiongroup.org/, accessed 27 January 2017).
- 26. First TB research funders' forum April 7, 2016, Washington DC. Meeting report. Geneva: World Health Organization; 2016 (http://who.int/tb/areas-of-work/research/tb-funders-forum-meeting-report-RTE.pdf, accessed 27 January 2017).

Annex 1

MEETING PROGRAMME

Time	Topic	Facilitator/speaker
09:00-09:15	Welcoming speech and launch of the European Tuberculosis	Dr Nedret Emiroglu
	Research Initiative (ERI-TB)	
09:15-09:30	Briefing on the ERI-TB terms of reference (background, scope	Dr Masoud Dara
	and purpose, and expected outcomes)	
09:30-10:00	The place of research in ending tuberculosis (TB) in the WHO	Dr Masoud Dara
	European Region	
10:00-10:30	The global action framework for TB research/translational	Dr Christian Lienhardt
	research in TB elimination: priorities, challenges and actions –	
	global perspective	
11:00-12:30	Round-table discussion: TB research practice and perspectives	All members
	from diverse settings (in low- and high-TB burden countries)	
14:00-15:30	Open discussion: areas of research focus for ending TB in Europe	All members
	in line with the TB action plan 2016–2020:	
	1. mapping ongoing and planned TB-related research activities	
	in the Region;	
	2. developing and updating regularly the regional research	
	priority agenda;	
	3. facilitating collaboration between research institutions and	
	key research stakeholders, and identifying and promoting	
	areas for further cooperation	
	4. ensuring engagement of civil society organizations, former	
	and current TB patients and other relevant non-state actor	
	representatives in TB research;	
	5. facilitating dissemination of research results and their	
	translation to evidence-based policies and programmatic	
	implementation via relevant forums and mechanisms; and	
	6. documenting funding gaps in research and sharing with	
	potential funding agencies, bilateral and multilateral	
	organizations – ERI-TB plan discussion.	
16:00–16:45	Continuation of the open discussions	All members
16:45-17:00	Final remarks and meeting closure	Dr Masoud Dara

Annex 2

PARTICIPANTS

- 1. Dr AHMEDOV, Sevim,
 - Senior TB Adviser, United States Agency for International Development (United States of America)
- 2. Dr CHEMTOB, Daniel
 - Department of TB & AIDS, Division of Epidemiology, Public Health Services, Ministry of Health, (Israel)
- 3. Dr CIRILLO, Daniela Maria
 - Director, WHO Collaborating Centre for TB Laboratory Strengthening (Italy)
- **4.** Dr DU CROS, Philipp
 - Head of Manson Unit, Médecins Sans Frontières (United Kingdom)
- **5.** Dr GELIUKH, Evgenia
 - TB/HIV Programme Manager, Alliance for Public Health (Ukraine)
- 6. Dr HOVHANNESYAN, Arax
 - Health Adviser, World Vision South Caucasus (Armenia)
- 7. Dr KUZIN, Ihor
 - Head, Monitoring and Evaluation Centre, Ukrainian Centre for Socially Dangerous Disease Control of the Ministry of Health (Ukraine)
- 8. Dr MIHAILESCU, Lucia
 - Coordinator, Tuberculosis Programme in Prisons and Global Fund projects (Romania)
- 9. Mr NAIMOV, Safarali
 - Secretary, STOP TB Partnership, Tajikistan, focal point for Global Coalition of TB Activists (European Region), and former MDR-TB patient (Tajikistan)
- 10. Dr SKRAHINA, Alena
 - Deputy Director, Republican Research and Practical Centre for Pulmonology and TB (Belarus)
- 11. Dr SOLOVIC, Ivan
 - Chief, Clinic for TB and Lung Diseases, Slovak Medical University (Slovakia)
- 12. Dr TIBERI, Simon
 - Infectious Diseases Consultant, Newham University and Royal London Hospitals, United Kingdom (United Kingdom)
- 13. Dr VASILYEVA, Irina
 - Director, Research Institute of Phthisiopulmonology, I.M. Sechenov First Moscow State Medical University, and Chief TB Expert, Ministry of Health (Russian Federation)
- **14.** Dr ZACHARIAH, Rony
 - Coordinator of Operational Research and Strategic Adviser and Director, Médecins Sans Frontières Brussels Operational Centre (Luxembourg)
- 15. Dr ZENNER, Dominik
 - Head of TB Screening, Centre for Infectious Disease Surveillance and Control Colindale, Public Health England (United Kingdom)

European Tuberculosis Research Initiative: first meeting of the core group, 15 November 2016 page 16

WHO headquarters

16. Dr GRZEMSKA, Malgorzata

Coordinator, Technical Support Coordination unit, Global TB Programme

17. Dr LIENHARDT, Christian

Scientist, Global TB Programme

WHO Regional Office for Europe

18. Dr EMIROGLU, Nedret

Director, Division of Health Emergencies & Communicable Diseases

19. Dr DARA, Masoud

Coordinator, Communicable Diseases & Programme Manager TB, HIV and Hepatitis, Division of Health Emergencies & Communicable Diseases

20. Mr NGUYEN, Tim

Unit Leader, Evidence and Intelligence for Policy-making, Division of Information, Evidence, Research and Innovation

21. Dr DADU, Andrei

Technical Officer, TB, HIV and Hepatitis programme

22. Dr DE COLOMBANI, Pierpaolo

Medical Officer, TB, HIV and Hepatitis programme

23. Dr EHSANI, Soudeh

Technical Officer, TB, HIV and Hepatitis programme

24. Dr GOZALOV, Ogtay

Medical Officer, TB, HIV and Hepatitis programme

25. Dr VAN DEN BOOM, Martin

Technical Officer, TB, HIV and Hepatitis programme

26. Mrs GRADMAN, Anne-Birgitte

Secretary, TB, HIV and Hepatitis programme

Consultant

27. Dr DENISIUK, Olga

WHO temporary adviser, research and development

Annex 3

GROUP PICTURE

The first meeting of the European Tuberculosis Research Initiative core group (1,2), 15 November 2016, Copenhagen, Denmark.



From left: Arax HOVHANNESYAN; Soudeh EHSANI; Christian LIENHARDT; Martin VAN DEN BOOM; Masoud DARA; Andrei DADU; Malgorzata GRZEMSKA; Pierpaolo DE COLOMBANI; Evgenia GELIUKH; Simon TIBERI; Alena SKRAHINA; Philipp DU CROS; Olga DENISIUK; Dominik ZENNER; Lucia MIHAILESCU; Ogtay GOZALOV; Ann GALEA.

References

- 1. The European Tuberculosis Research Initiative (ERI-TB) [website]. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/activities/the-european-tuberculosis-research-initiative-eri-tb, accessed 27 January 2017).
- 2. TB @ WHO/Europe. European Research Initiative to #EndTB launched @WHO_Europe. Twitter. 29 December 2016 (https://twitter.com/i/moments/814454845658853376, accessed 27 January 2017).

Annex 4

Web-cloud of the European Tuberculosis Research Initiative core group in the public domain

ShareFile Attachments	
A_Scope and purpose	386.5 KB
B_budget	0 B
C_programme	254.7 KB
D_Lists	264.5 KB
E_information circular	886.6 KB
G_back-docs	7.8 MB
P_presentations	6.5 MB
R_report	168.5 MB
X_photos	10.6 MB
Download Attachments	