

A high-magnification, colorized electron micrograph of Mycobacterium tuberculosis bacteria. The bacteria are rod-shaped with distinct internal structures and are densely packed within a larger, irregularly shaped cluster. The background is a mottled green.

ANTI - TUBERCULOSIS DRUG RESISTANCE IN THE WORLD

Report No.4

THE
WHO / IUATLD
GLOBAL PROJECT
ON ANTI-TUBERCULOSIS
DRUG RESISTANCE SURVEILLANCE



WORLD HEALTH ORGANIZATION



Geneva 2008

ANTI-TUBERCULOSIS DRUG RESISTANCE IN THE WORLD

Fourth Global Report

The World Health Organization/International Union Against Tuberculosis
and Lung Disease (WHO/UNION) Global Project on
Anti-Tuberculosis Drug Resistance Surveillance
2002–2007

WHO Library Cataloguing-in-Publication Data

Anti-tuberculosis drug resistance in the world : fourth global report.

«WHO/HTM/TB/2008.394»

1.Tuberculosis, Multidrug-resistant – epidemiology. 2.Drug resistance, Bacterial – statistics. 3.Bacteriological techniques. 4.Data collection – methods. 5.Cross-sectional studies. I.WHO/IUATLD Global Project on Anti-Tuberculosis Drug Resistance Surveillance.

ISBN 978 92 4 156361 1

(NLM classification: WF 360)

© World Health Organization 2008

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

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 expressed 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.

Designed and typeset in Italy

Printed in Italy

WRITING COMMITTEE

The report was written by:

Abigail Wright, Matteo Zignol

The following WHO staff assisted in compiling, analysing and editing information:

WHO Headquarters, Geneva

Abigail Wright, Matteo Zignol, Christopher Dye, Brian Williams, Mehran Hosseini, Ana Bierrenbach, Salah Ottmani, Mohamed Aziz, Ernesto Jaramillo, Mario Raviglione, Paul Nunn, Kathrin Thomas, Rosalie Edma, Fabio Scano, Karin Weyer, Louise Baker, Diana Weil.

WHO African Region Office (AFRO)

Oumou Bah-Sow (AFRO), Bah Keita (AFRO, West Africa), Daniel Kibuga (AFRO), Motseng Makhetha (South Africa), Vainess Mfungwe (AFRO), Wilfred Nkhoma (AFRO), Tom Sukwa (AFRO).

WHO Region of the Americas Office (AMRO)

Raimond Armengol (AMRO), Mirtha del Granado (AMRO), Rafael Lopez Olarte (AMRO), Pilar Ramon-Pardo (AMRO), Rodolfo Rodriguez-Cruz (Brazil), Matías Villatoro (Brazil).

WHO Eastern Mediterranean Region Office (EMRO)

Samiha Baghdadi (EMRO), Ghada Muhjazi (EMRO), Akihiro Seita (EMRO).

WHO European Region Office (EURO)

Evgeny Belilovsky (Russian Federation), Andrei Dadu (EURO), Pierpaolo de Colombani (EURO), Irina Danilova (Russian Federation), Jean de Dieu Iragena (Russian Federation), Lucica Ditiu (EURO), Wieslaw Jakubowiak (Russian Federation), Kestutis Miskinis (Ukraine), Gombogaram Tsogt (Central Asia), Richard Zaleskis (EURO).

WHO South-East Asia Region Office (SEARO)

Mohammed Akhtar (Nepal), Erwin Cooreman (Bangladesh), Puneet Dewan (SEARO), Hans Kluge (Myanmar), Nani Nair (SEARO), Suvanand Sahu (India), Chawalit Tantinimitkul (Thailand), Fraser Wares (India), Supriya Weerusavithana (Sri Lanka).

WHO Western Pacific Region Office (WPRO)

Daniel Chin (China), Philippe Glaziou (WPRO), Cornelia Hennig (China), Liu Yuhong (China), Pieter van Maaren (WPRO), Masaki Ota (WPRO), Michael Voniatis (Philippines).

International Union Against TB and Lung Disease (UNION), Paris, France

Hans Rieder, Armand Van Deun, Sang Jae Kim

EuroTB, Paris, France

Fatima Aït-Belghiti, Hedwidge Bousquié, Isabelle Devaux, Dennis Falzon, Yao Kudjawu.

GLOBAL NETWORK OF SUPRANATIONAL REFERENCE LABORATORIES

- Laboratoire de la Tuberculose, Institut Pasteur d'Algérie, *Alger, ALGERIA* (Prof. Fadila Boulahbal)
- Mycobacteria Laboratory, National Institute of Infectious Diseases, ANLIS (Dr Carlos G Malbran), *Buenos Aires, ARGENTINA* (Dr Lucia Barrera)
- Mycobacterium Reference Laboratory, Institute of Medical and Veterinary Science, *Adelaide, AUSTRALIA* (Dr Ivan Bastian, Dr Richard Lumb)
- Queensland Mycobacterium Reference Laboratory, *Brisbane, AUSTRALIA* (Dr Chris Coulter, Dr Chris Gilpin)
- Département de Microbiologie Unité de Mycobactériologie, Institut de Médecine Tropicale, *Antwerp, BELGIUM* (Prof. Françoise Portaels, Dr Armand Van Deun)
- Instituto de Salud Publica de Chile, *Santiago, CHILE* (Dr. María Cecilia Riquelme Jaqke)
- National Institute of Public Health, *Prague, CZECH REPUBLIC* (Dr Marta Havelková)
- Central Health Laboratory, Ministry of Health and Population, *Cairo, EGYPT* (Dr Mushira Ismail)
- Institut Pasteur, Centre National de Référence des Mycobactéries, *Paris, FRANCE* (Dr Véronique Vincent)
- Institute of Microbiology and Laboratory Medicine (IML) IML Diagnostik MVZ GmbH c/o Asklepios Fachkliniken-Muenchen-Gauting, *GERMANY* (Prof Knut Feldman, Dr med Harald Hoffmann)
- National Reference Center for Mycobacteria, *Borstel, GERMANY* (Dr Sabine Rüsch-Gerdes)
- TB Reference Laboratory Department of Health, *Hong Kong SAR, CHINA* (Dr Kai Man Kam)
- TB Research Centre (TRC), Indian Council of Medical Research, *Chennai, INDIA* (Dr Selvakumar, Dr Ranjani Ramachandran)
- Istituto Superiore di Sanità Dipartimento di Malattie Infettive, Parassitarie e Immunomediate, *Rome, ITALY* and Laboratory of Bacteriology & Medical Mycology and San Raffaele del Monte Tabor Foundation (hSR), *Milan, ITALY* (Dr Lanfranco Fattorini, Dr Daniela Cirillo)
- Research Institute of Tuberculosis, Japan Anti-Tuberculosis Association, *Tokyo, JAPAN* (Dr Satoshi Mitarai)
- Korean Institute of Tuberculosis, *Seoul, REPUBLIC OF KOREA* (Dr Woojin Lew)
- Departamento de Micobacterias, Instituto de Diagnóstico y Referencia Epidemiológicos (INDRE), *MEXICO* (Dr Susana Balandrano)
- National Institute of Public Health and the Environment (RIVM), *Bilthoven, NETHERLANDS* (Dr Dick van Soolingen)
- Centro de Tuberculose e Micobacterias (CTM), Instituto Nacional de Saude, *Porto, PORTUGAL* (Dr Maria Filomena Rodrigues)
- The Medical Research Council, TB Research Lead Programme, *Pretoria, SOUTH AFRICA* (Dr Karin Weyer)
- Servicio de Microbiología Hospital Universitari, Vall d'Hebron, *Barcelona, SPAIN* (Dr Nuria Martin-Casabona)
- Swedish Institute for Infectious Disease Control (SIDC), *Solna, SWEDEN* (Dr Sven Hoffner)

- National TB Reference Laboratory Center Tuberculosis Cluster, *Bangkok, THAILAND* (Somsak Rienthong, Dhanida Rienthong)
- Health Protection Agency, National Mycobacterium Reference Unit, Department of Infectious Diseases, *UNITED KINGDOM* (Dr Francis Drobniewski)
- Centers for Disease Control and Prevention, Mycobacteriology/Tuberculosis Laboratory, *Georgia, UNITED STATES OF AMERICA* (Dr Tom Shinnick, Dr Beverly Metchock)
- Massachusetts State Laboratory, *Massachusetts, UNITED STATES* (Dr Alexander Sloutsky)

CONTRIBUTORS

WHO African Region

Côte d'Ivoire: Jacquemin Kouakou, **Ethiopia:** Daniel Demisse, Getachew Eyob, Mekedes Gebeyehu, Wenimagine Getachew, Feven Girmachew, Eshetu Lemma, Zerihun Tadesew, Jan van den Hombergh, Dick van Soolingen, **Madagascar:** Rarivoson Benjamin, Ramarokoto Herimanana, **Rwanda:** Michel Gasana, John Gatabazi, Leen Rigouts, Alaine Umubyeyi, Greet Vandebriel, **Senegal:** Fatoumata Ba, Henriette Cécile Diop, **United Republic of Tanzania:** Saidi Egwaga, Fred Lwillia, Martin Chonde, Basra E. Doulla, Sayonki Mfinanga, Saidi Mfaume.

WHO Region of the Americas

Argentina: Lucía Barrera, María Delfina Sequeira, Elsa Zerbini **Canada:** Edward Ellis, Victor Gallant, Melissa Phypers, Derek Scholten, Joyce Wolfe, **Costa Rica:** Zeidy Mata A, María Cecilia Matamoros, **Cuba:** María Josefa Llanes Cordero, Miguel Echemendía, Ernesto Montoro, Dihadenys Lemus Molina, **Guatemala:** Licda Nancy Ayala Contreras, Edwin Antonio Quiñonez Villatoro, **Nicaragua:** Luis Alberto Chacón, Alejandro A. Tardencilla Gutiérrez, **Paraguay:** Juan Carlos Jara Rodríguez, Nilda Jimenez de Romero, **Peru:** Cesar Antonio Bonilla Asalde, Luis Asencios Solis, **Puerto Rico:** Ada S. Martinez, Beverly Metchock, Valerie Robinson, **Uruguay:** Carlos María Rivas-Chetto, Jorge Rodriguez-De Marco, **United States of America:** Sandy Althomsons, Kenneth G Castro, Beverly Metchock, Valerie Robison, Ryan Wallace.

WHO Eastern Mediterranean Region

Jordan: Said Abu Nadi, Khaled Yusra Rihani, Abu Rumman, **Lebanon:** Georges Aaraj, Mtanios Saade, **Morocco:** Naima Ben Cheikh, Quafae Lahlou, **Oman:** Hassan Al Tuhami, **Qatar:** Abdul Latif Al Khal, **Syrian Arab Republic:** Roula Hammoud, Fadia Maamari, **Yemen:** Amin N Al-Absi,

WHO European Region

Andorra: Margarita Coll Armangue, **Armenia:** Alvard Mirzoyan, Andrei Mosneaga, Vahan Poghosyah, **Austria:** Alexandra Indra, Jean-Paul Klein, **Azerbaijan:** Rafik Abuzarov, Faik Agayev, Ogtay Gozalov, Andrei Mosneaga, **Belgium:** Maryse Fauville-Dufaux, Francoise Portaels, Leen Rigouts, Greet Vankerschaever, Maryse Wanlin, **Bosnia & Herzegovina:** Zehra Dizdarevic, Mladen Duronjic, Hasan Zutic, **Croatia:** Aleksandar Simunovic, Vera Katalinic-Jankovic, **Czech Republic:** Martha Havelkova, Ludek Trnka, Jiri Wallenfels, **Denmark:** Peter Henrik Andersen, Zaza Kamper-Jorgensen, **Estonia:** Kai Kliiman, Tiina Kummik, **Finland:** Merja Marjamäki, Petri Ruutu, **France:** Delphine Antoine, Marie Claire Paty, Jérôme Robert, **Georgia:** Archil Salakaia, Nino Lomtadze, Marina Janjgava, Rusudan Aspindzelashvili, Maia Kipiani, Ucha Nanava, **Germany:** Bonita Brodhun, Walter Haas, Sabine Rüsch-Gerdes, **Iceland:** Thorsteinn Blöndal, Ingibjörg Hilmarsdóttir, **Ireland:** Noel Gibbons, Joan O'Donnell, **Israel:** Daniel Chemtob, **Italy:** Daniela Cirillo, F Piana, Maria Grazia Pompa, **Latvia:** Janis Leimans, Girts Skenders, **Lithuania:** Edita Davidaviciene, Anaida Sosnovska, **Luxembourg:** Pierrette HUberly-Krau, François Schneider, **Malta:** Analita Pace Asciak, **Netherlands:** Connie Erkens, Vincent Kuyvenhoven, Dick van Soolingen, **Norway:** Brita Askleand Winje, Turid Mannsaker, **Poland:** Kazimierz Roszkowski, Maria Korzeniewska-Kosela, Zofia Zwolska, **Republic of Moldova:** Valeriu Crudu, Nicolae Moraru, Dimitrii Sain, Silviu Sofronie, **Romania:** Dominica Chiotan, Daniela Homorodean, Ioan Paul Stoicescu, **Russian Federation:** Michael V Nikiforov, Yekaterina Kakorina, **Serbia:** Gordana



Radosavljevic Asic, Rukije Mehmeti, **Slovakia**: Ivan Solovic, Juraj Trenkler, **Slovenia**: Manca Žolnir Dovc, Damjan Erzen, Jurij Sorli, **Spain**: Odorina Tello Anchuela, Nuria Martín Casabona, Fernando Alcaide Fernandez de la Vega, Elena Cruz Ferro, Luisa Pérez del Molino Bernal, Soledad Jimenez, Antonia Lezcano, Julia Gonzalez Martin, Elena Rodriguez Valin, Asunción Vitoria, **Sweden**: Sven Hoffner, Victoria Romanus, **Switzerland**: Peter Helbling, **Ukraine**: Iryna Dubrovina, Mykhailo Golubchykov, Svetlana Lyepshina, Igor Raykhert, Yelena Yann, **United Kingdom**: Francis Drobniowski, Jim McMenamin, Roland Salmon, Brian Smyth, John Watson, **Uzbekistan**: Dilrabo Ulmasova.

WHO South-East Asia Region

India: LS Chauhan, PR Narayanan, Ranjani Ramachandran, MR Joseph, CN Paramasivan, B Mahadev, P Kumar, Nalini Sundarmohan, **Indonesia**: Carmelia Basri, Paul Kelly, **Myanmar**: Win Maung, Ti Ti, CN Paramasivan **Nepal**: Pushpa Malla, SS Jha, Niraj Tuladar, Bhagawan Maharjan, Bhabna Shrestha, **Sri Lanka**: Chandra Sarukkali, **Thailand**: Sriprapa Nateniyom, Dhanida Rienthong, Somsak Rienthong.

WHO Western Pacific Region

Australia: Ivan Bastian, Krissa O'Neil, Richard Lumb, John Walker, Sandra Gebbie **China**: Wang Lixia, Liu Jianjun, Zhao Yanlin, Mei Jian, An Yansheng, Ren Yulin, Xie Yanguang, **China, Hong Kong Special Administrative Region (SAR)**: Kai Man Kam, Cheuk-ming Tam, **Macao SAR, China**: Chou Kuok Hei, Lao U Lei, **Fiji**: William B. Kaitani, **Guam**: Cecilia Teresa T. Arciaga, **Japan**: Satoru Miyake, Satoshi Mitarai, **New Caledonia**: Bernard Rouchon, **New Zealand**: Kathryn Coley, Helen Heffernan, Leo McKnight, Alison Roberts, Ross Vaughan, **Northern Mariana Island**: Richard Brostrom, Susan Schorr, **Philippines**: Nora Cruz, Noel Macalalad, Remingo Olveda, Rosalind Vianzon, **Republic of Korea**: Hwa Hyun Kim, Woojin Lew, **Singapore**: Gary Ong, Raymond Lin Tzer Pin, Khin Mar Kyi Win, Wang Yee Tang, Sng Li Hwei, **Solomon Islands**: Noel Itogo, **Vanuatu**: Russel Tamata, **Viet Nam**: Dinh Ngoc Sy.

预览已结束，完整报告链接和二维

<https://www.yunbaogao.cn/report/index/report?reportId=1>