



Dengue Collaborating Center Activities

Centers for Disease Control and Prevention

Dengue Branch

San Juan, Puerto Rico

State of the Art: Prevention and Control of Dengue in the
Americas

PAHO Washington DC

May 28-29, 2014

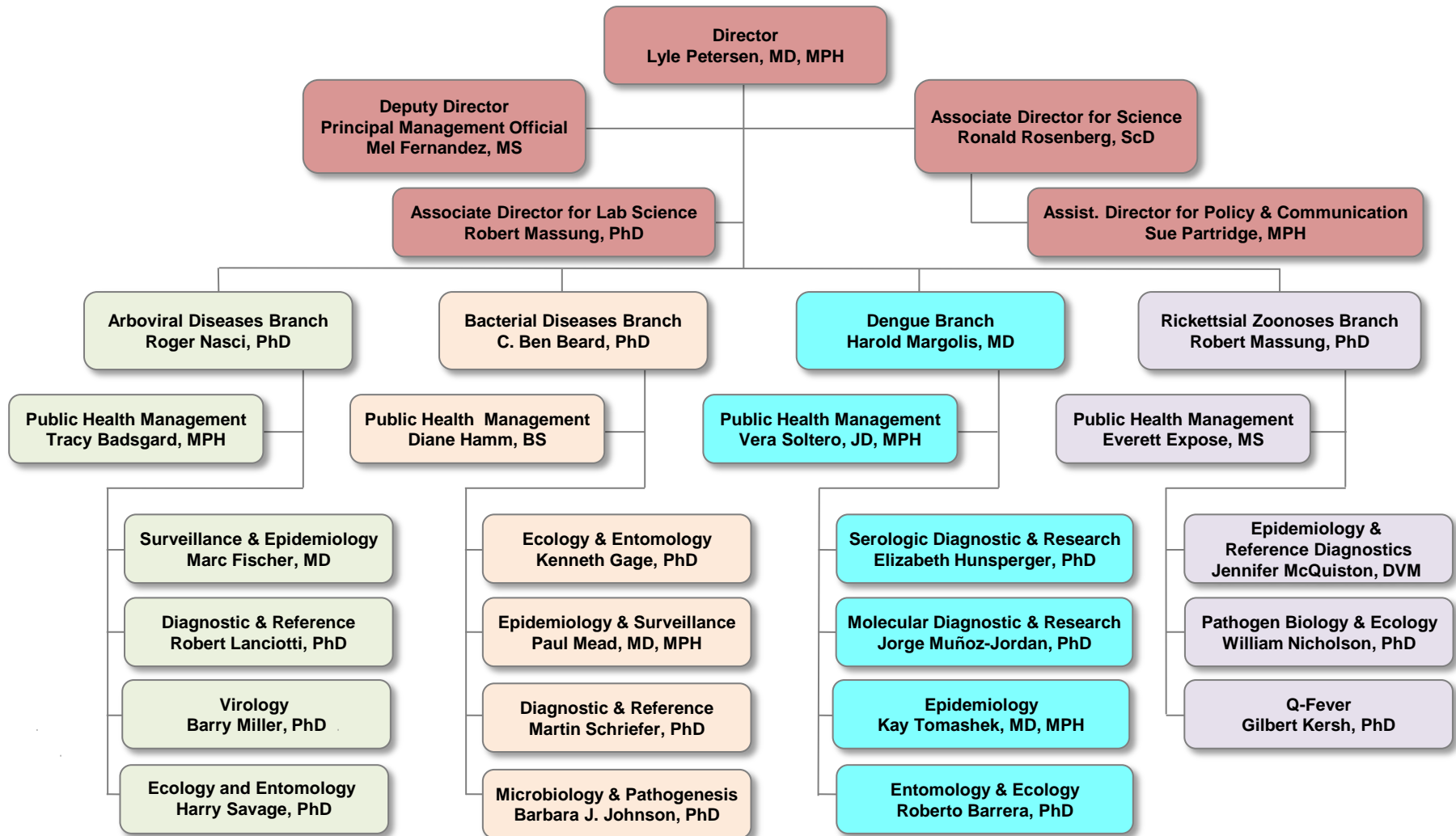
Harold S. Margolis, MD
Chief, Dengue Branch

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National Center for Emerging and Zoonotic Infectious Diseases

Division of Vector-Borne Diseases



Dengue Branch Staff

- **Epidemiology Activity**
 - Epidemiologists – MD, PhD
 - Nurse epidemiologist
 - MPH research associates
 - Statistician
 - Postgraduate fellows
- **Immunodiagnostics Laboratory**
 - Virologists (PhD)
 - Diagnostics technicians
 - Postgraduate fellows
- **Molecular Diagnostics Laboratory**
 - Molecular virologists (PhD)
 - Diagnostic technicians
 - Postgraduate fellows
- **Entomology and Ecology Activity**
 - Entomologist (PhD)
 - Entomologists (MS)
 - Field biologists
 - Postgraduate fellows
- **Public Health Management Activity**
 - Public Health Advisor
 - Computer programmers
 - IT support technicians
- **Communications Unit**
 - Health educators – MS
 - Psychologist

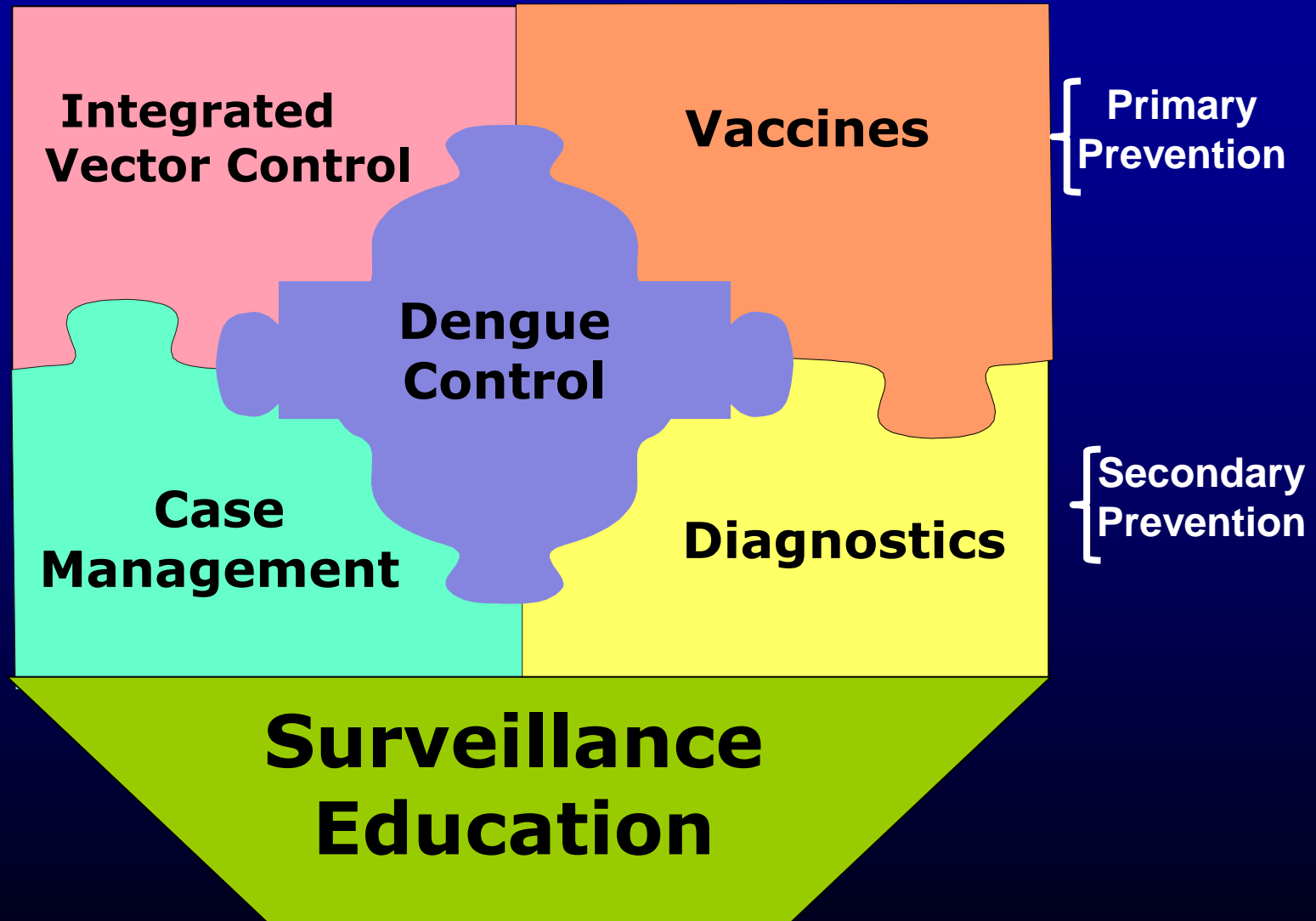
Resources

- **Funding primarily from CDC budget process as part of Division of Vector Borne Diseases budget**
- **In-kind support of activities, including travel and postgraduate students**
- **Outbreak response activities supported through CDC's Emergency Operations Center (EOC)**

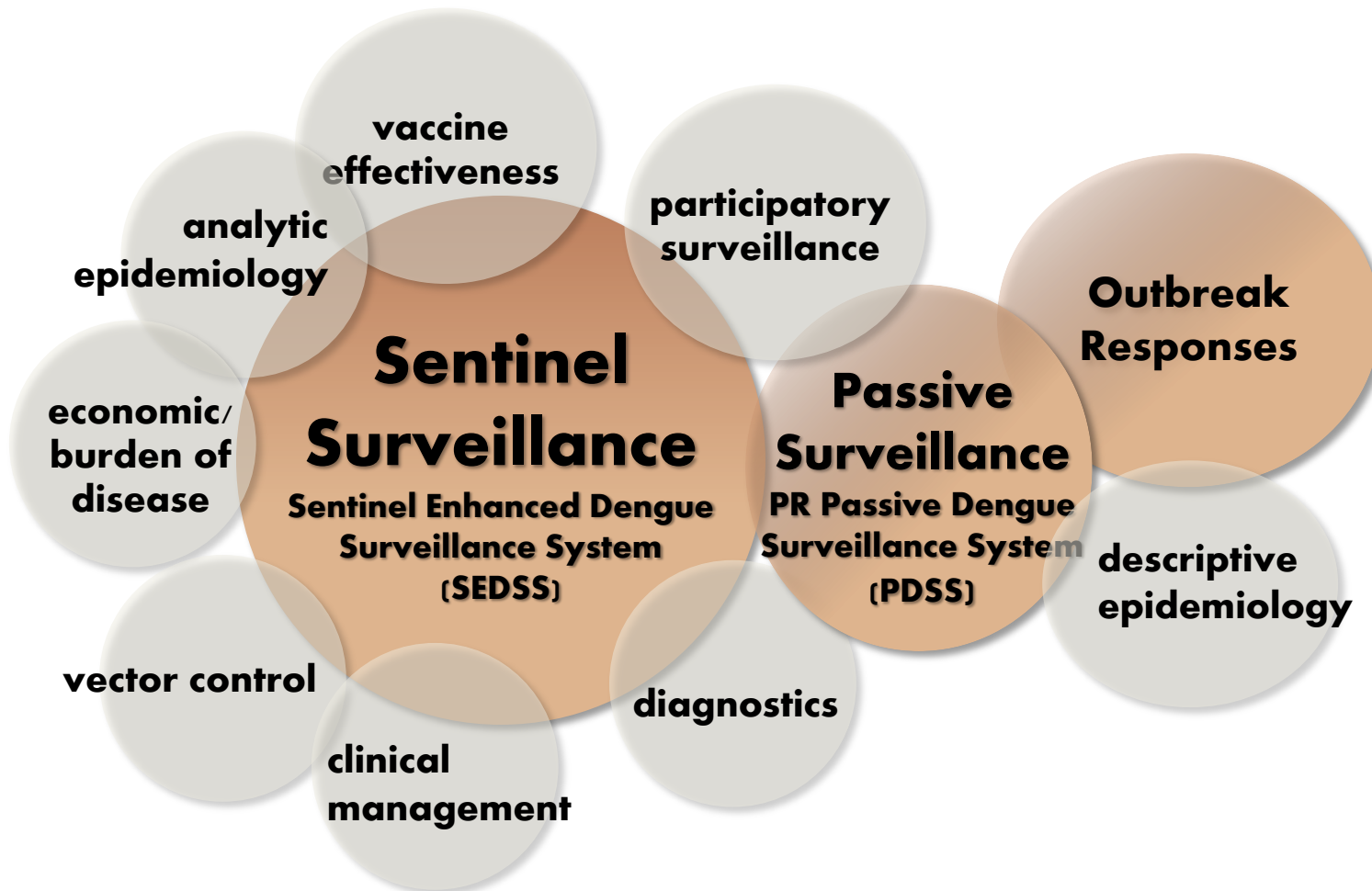
Terms of Reference - I

- TOR 1: DENV strain collection
- TOR 2: Diagnostic testing proficiency and quality assurance - provide characterized materials
- TOR 3: Evaluate dengue diagnostic tests - commercial or laboratory developed
- TOR 4: Provide technical information on dengue
- TOR 5: Conduct training in research and applications - laboratory, epidemiologic, entomologic and vector control
- TOR 6: Outbreak response and investigation
- TOR 7: Conduct research

Tools for Dengue Prevention and Control



Data Sources for CDC Dengue Program



What is Happening in our Program Areas

Vector Control and Ecology

CDC Autocidal Gravid Ovitrap (AGO trap)



Advantages

- Comparable to BG traps
- Lower cost
- Lower maintenance
- No pesticides

Evaluation of AGO Traps



Autocidal Sticky Gravid Ovitrap

- Surveillance tool

- comparable to BG traps, less expensive easier to use

- Control tool

- Shown to reduce vector density in field studies
- Demonstrate effectiveness in long-term studies

Dengue Vaccines: Preparing for Evaluation Effectiveness

Dengue Epidemiology

A Challenge to Vaccine Evaluation

- **Dengue is an acute febrile illness (AFI) syndrome**
 - Only defined by diagnostic testing
 - Other AFI's in dengue endemic areas: malaria, influenza, leptospirosis, meliodosis, hepatitis A
- **Incidence: high endemic + cyclical epidemics**
- **Highly seasonal**
- **Several circulating virus types (serotypes)**
- **Peak age of incidence varies by region**
- **Safety - severe dengue is natural progression of disease**

**Guidelines for Clinical Evaluation of Dengue Vaccine in Dengue Endemic Areas.
Vaccine 2008;26:4113-4119**

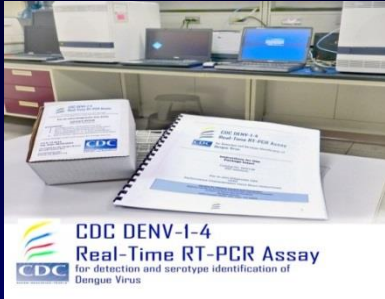
Puerto Rico Dengue Surveillance to Evaluate Vaccines and Vector Control

- **Passive Dengue Surveillance System (PDSS)**
- **Sentinel Enhanced Dengue Surveillance System (SEDSS)**
- **Enhanced Fatal Dengue Case Surveillance**

No single surveillance system can answer all the questions about dengue

Dengue Diagnostics

Dengue Diagnostic



**PCR
(DENV RNA)**

**NS1 antigen detection
(immunoassay)**

Acute (febrile) Phase

Viremia



IgM anti-DENV

0 1 2 3 4 5 6 7 8 9 10

Incubation Period

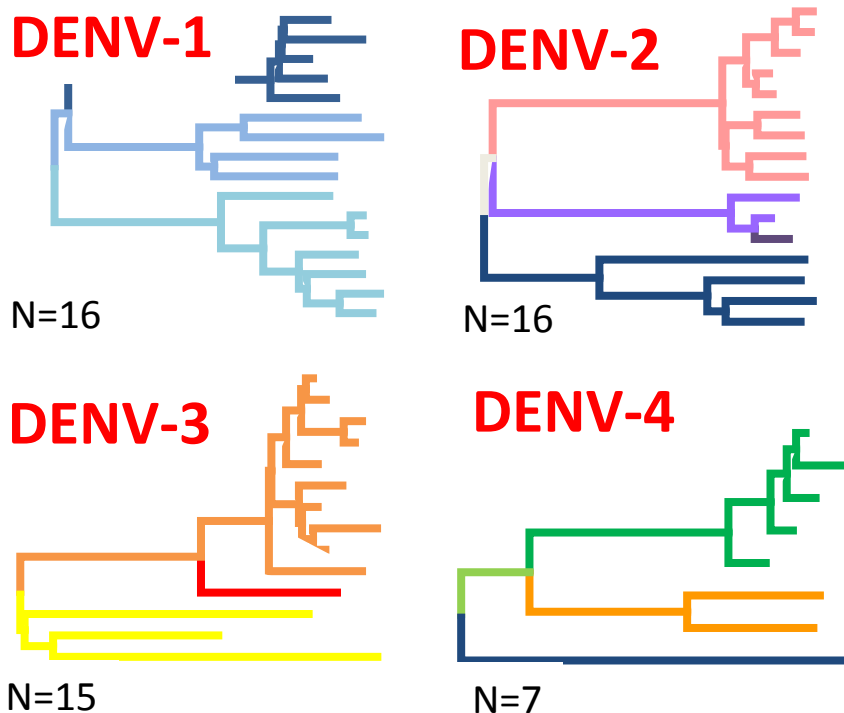
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Days Post Onset of Fever

Diagnostics Activities

- **Member of RELDA**
- **Dengue Diagnostic Testing Workshops**
 - 2013 – two workshops for public and private sector
 - 2014 – PAHO-CDC workshop for RELDA members
- **Molecular epidemiology of DENV**
- **Improved NS1 antigen detection immunoassay**
- **Prognostic tests for severe dengue**

Identification of DENV Strains Before and After Reformulation of DENV-1-4 RT-PCR Assay



Phylogenetic analysis of current strains

DENV Subtype	Old Assay	New Assay
DENV-1	20 %	100%
DENV-2	15%	90%
DENV-3	25 %	100%
DENV-4	60%	100%

Dengue Clinical Case Management

Dengue Clinical Case Management Course

- **2009-2010: classroom course taught in PR to all licensed physicians - 4 CME credits based on 2009 WHO Dengue Guidelines**
- **Course Content**
 - Clinical and laboratory diagnosis of dengue, including differential diagnosis
 - How to recognize stages of dengue, warning signs of severe dengue, and understand mechanisms of dengue pathogenesis
 - How to monitor patients and best practices in fluid management
 - Epidemiology of dengue, and dengue prevention and control
- **2013 – 2014: E-Learning Course – Launched April 2014**

Dengue Clinical Case Management Course

■ CME version:

- 4 CME AMA PRA Category 1 credits for physicians / 0.4 CEU ANSI/IACET credits for non-physicians
- Course link:
<https://cdc.train.org/DesktopModules/eLearning/CourseDetails/CourseDetailsForm.aspx?courseId=1047604>

■ Non-CME version:

- For U.S. and international healthcare providers who would like to learn about dengue but do not need U.S. CME
- Course link:
<http://www.cdc.gov/dengue/training/cme/ccm/index.html>

Dengue Surveillance

Surveillance

- **Transition of PDSS to Puerto Rico Department of Health**
- **Sentinel Enhanced Dengue Surveillance System (SEDSS) funded through Cooperative Agreement**
- **Development and validation of serologic approaches for surveillance for incident DENV infections**
- **Validation of participatory surveillance for AFI / dengue**
- **Developed and validated methodology for enhanced surveillance for fatal dengue**

Epidemic Aid Responses

- Republic of Marshall Islands (2011 – 2012)
- Federated States of Micronesia – (2012 -13)
- Leogone, Haiti (2013)
- St. Croix, Virgin Islands (2013)
- Luanda, Angola (2013)
- Mombasa, Kenya (2013)
- Dar es Salaam, Tanzania (2013)
- Fiji (2014)



CDC Dengue Branch