

Communicable Disease Control

in California



**Division of Communicable Disease Control
California Department of Health Services**

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Introduction

The California Department of Health Services (CDHS), through the Division of Communicable Disease Control (DCDC), is responsible for investigating and controlling all communicable diseases and conditions in the state. This report describes the ways in which the DCDC is combating these diseases among California residents. Each branch of the DCDC briefly summarizes its mission, services, recent accomplishments and current disease trends. Together, these descriptions provide a detailed picture of the diseases that threaten our health and the preventive measures that protect us.

Communicable Diseases in California

From the beginning, one of the most basic functions of civil government has been the prevention and control of infectious diseases. From ancient Rome, where quarantine was required for all ships sailing into its port, to modern-day global immunization programs, government has played a critical role in containing disease and preventing the introduction of exotic plagues.

Infectious disease epidemiology has made it possible to live as we do today. Our society benefits immeasurably from public health victories such as the control of cholera in the streets of London 150 years ago, the suppression of yellow fever in Panama that allowed the completion of the Panama Canal, and the knowledge of simple sanitation practices that prevent thousands of deaths and illnesses.

The public also expects its government to protect the safety and integrity of the food supply. New pathogens, food products, packaging and international distribution patterns, and increasing quantities of wholesale and retail food facilities are creating greater numbers of preventable foodborne diseases.

Several recent health events underscore the need for a public health system ready to address whatever disease problems that might arise. For example, in 1997, an avian strain of influenza that had never before infected humans began to kill previously healthy persons in Hong Kong...In addition, researchers recently discovered that a strain of HIV, the virus that causes acquired immunodeficiency syndrome (AIDS), had been infecting humans for at least 20 years before AIDS emerged as a worldwide epidemic. (Centers for Disease Control and Prevention, 1998)

Infectious disease control is the definitive example of a “core” public health function. It requires:

- surveillance of infectious diseases to monitor their incidence, changing trends and outbreaks;
- epidemiological investigations of infectious disease cases and outbreaks;
- laboratory-based diagnostic and reference services, and applied research services;
- consultation to local health agencies, physicians, health care providers, and other government agencies;
- comprehensive prevention and control programs designed to combat specific infectious diseases;
- professional and public education and training on current infectious disease issues; and
- exercise of protective police powers of health departments to control disease spread.

Immunization, antibiotics and other prevention methods have eliminated smallpox and polio, and reduced many other infectious diseases. Many people now assume that suffering and death from infections belong to the past. However, in fact, infectious diseases have reappeared as major health threats.

In the last decade, infectious diseases have replaced stroke as the third leading cause of death in the United States. Even today, infectious diseases still account for 25% of all physician visits each year, and antimicrobial agents are the second most frequently prescribed class of drugs. In the United States, death rates due to infectious diseases other than AIDS increased 22% between 1980 and 1992. Each year, more people die from pneumococcal pneumonia than from breast cancer and AIDS combined.

In California, the human, health care, and agri-business costs of infectious diseases are staggering. West Coast outbreaks of *E. coli* O175:H7 from hamburgers in 1992, and from apple juice in 1996, caused more than 750 hospitalizations and the deaths of 5 children, and the recall of the contaminated hamburger prevented many times those numbers in illnesses, hospitalizations, and deaths. In a 4-year period, California's Central Valley was struck by a severe epidemic of "Valley Fever" that resulted in over 10,000 cases and 282 deaths.

Tuberculosis (TB), AIDS, and sexually transmitted diseases also take a heavy toll, with higher rates of tuberculosis among immigrants, higher rates of vaccine-preventable illnesses among Latino and African American children, and higher rates of HIV and sexually transmitted diseases in certain age and ethnic groups. TB in certain ages and ethnic groups, and TB in institutions are but a few examples of the high cost of infectious disease among California's growing population.

The number of new or re-emerging infectious diseases in California has increased sharply in recent years. These infections cause significant illness, hospitalizations and death, and increasingly high health care costs. Contributing to the rise in communicable diseases is California's population diversity, mobility, immigration, and three

major international ports of entry. These features make California one of the most likely regions of the country for the appearance of infectious disease threats. Now, more than ever, the Department's mission "to protect and improve the health of all Californians" requires increased effort to contain the proliferation of infectious diseases.

Population diversity, mobility, immigration, and three major international ports of entry have contributed to a sharp increase of infectious diseases in California.

The Division of Communicable Disease Control

The Division of Communicable Disease Control (DCDC) provides a key leadership role in California and the nation by evaluating and responding to new and re-emerging infectious disease threats. Each of the branches within the Division, working with local health departments, plays a vital and integral part in the continuing battle to protect California's citizens and visitors from the threats of infectious diseases.

Combating infectious diseases involves straightforward, non-controversial science-based prevention and control efforts. Seven major DCDC activities respond to current challenges:

- Improve laboratory capacity and develop more accurate and efficient diagnostic methods for new bacterial, parasitic, viral and rickettsial diseases.
- Expand and enhance infectious disease surveillance, detection and tracking, including:
 - automating and improving local and state reporting (through use of the Internet) of infectious diseases to assure timely and accurate assessment;

- working with agencies involved in food safety to implement a statewide microbiological monitoring program that will isolate, trace, and eliminate emerging pathogens in foods;
- developing electronic laboratory reporting to speed up response time to disease outbreaks.
- Improve the capacity and readiness at both state and local public health levels to assure disease crisis intervention to control outbreaks and prevent the spread of infectious diseases. DCDC experts must act as the epidemiological response team for emerging and re-emerging diseases at the regional level.
- Develop and improve systems, immunization registries and other links with private and public health care providers.
- Expand partnerships with health plans, sister agencies such as the California Department of Food and Agriculture and Department of Corrections, and agriculture-related businesses. These partnerships will improve prevention activities, adopt best-practice guidelines, and institute quality control measures to minimize the potential for deadly infectious agents to spread among the population.
- Using population-based methods and channels, inform, educate and communicate disease prevention information to health care providers, policy makers, and communities at risk of infectious diseases.
- Thoughtfully and effectively address the disparity in health status and the burdens of infectious disease in California's ethnic, age and gender groups.

The Division's 6 branches are described fully in the next chapters. Three other Division units are the Infant Botulism Treatment and Prevention Program (IBTPP), the Office of Health Communication and Education, and the Information Technology Unit.

The Infant Botulism Treatment and Prevention Program (IBTPP) is a new (1997) Division activity that was established when the multi-year clinical trial of the orphan drug, Human Botulism Immune Globulin (HBIG),

demonstrated that it was safe and effective in treating infant botulism. IBTPP is a fee-supported activity that:

- produces and distributes HBIG statewide and nationwide for the treatment of infant botulism;
- provides diagnostic and consultative medical services for infant botulism;
- investigates all cases of infant botulism;
- develops and implements prevention and control measures for infant botulism; and
- carries out applied research into improving the prevention and treatment of infant botulism and related illnesses.

The purpose and mission of the Division of Communicable Disease Control is to provide surveillance, investigation and control of more than 80 communicable diseases and conditions in California. This is accomplished by:

- immunizing the state's one million children entering school or child-care facilities each year against measles and other vaccine preventable diseases;
- testing and following up with populations at risk for tuberculosis and sexually transmitted diseases;
- ensuring that infected and exposed individuals receive proper medical care;
- protecting the public from disease outbreaks caused by environmental factors, improper food handling, or zoonotic diseases such as rabies and bubonic plague; and
- providing the necessary laboratory support to identify disease-causing organisms in a timely manner.

The **Office of Health Communication and Education** provides current and easily-accessible information to the public that promotes health and assists them in making informed decisions. In particular, the Office communicates the importance of food safety and communicable disease prevention, and the role that public health workers play in protecting the public's health. In addition, the Office:

- coordinates the Division's participation in CDHS events, such as Public Health Week;
- integrates health communication and education into existing and newly evolving Division programs (such as bioterrorism preparedness, hepatitis C prevention and control, food safety);
- represents the Division on CDHS committees that are related to health communication, social marketing, and health education.

Finally, the **Information Technology Unit (ITU)** implements broad-based information technology services across the Division and in partnership with the CDHS Information Technology Services Division. The ITU:

- guarantees the effective, efficient, accountable and innovative use of public health informatics and communication technologies;

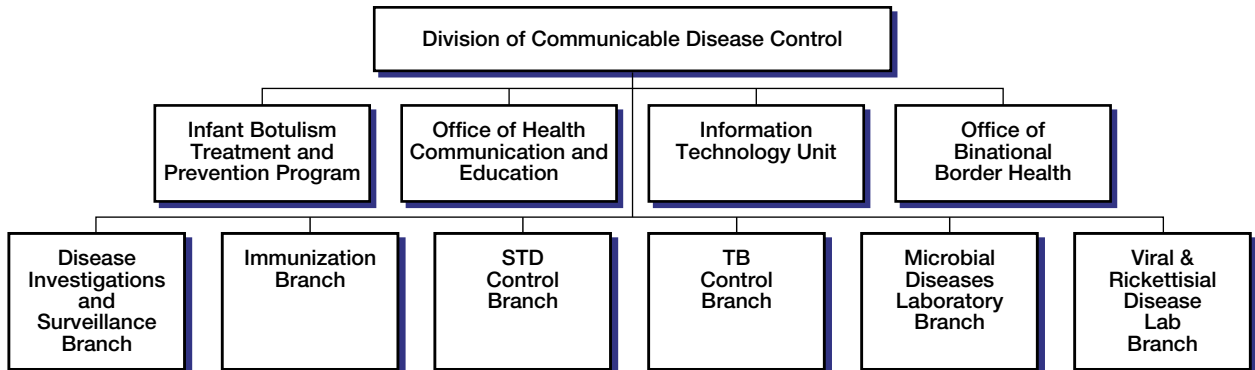
- supports updates to disease surveillance and laboratory reporting systems;
- provides administrative and business functions and services; and
- enhances information dissemination across the public health community.

Statewide Infrastructure

DCDC is organized into branches that are responsible for specific areas of disease surveillance and control (Figure 1).

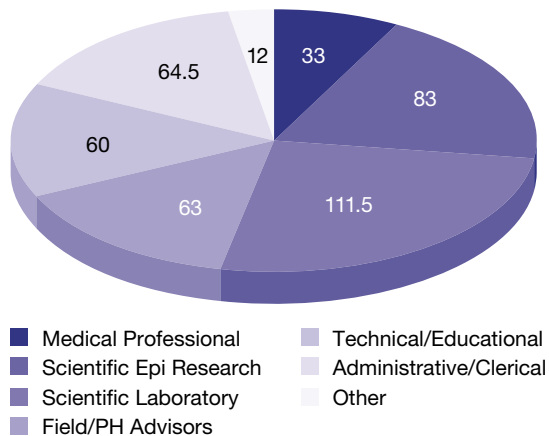
The Division has 427 staff members representing 7 categories: Scientific/Laboratory; Scientific/Epidemiology Research; Administrative/Clerical; Field/Public Health Advisors; Technical/Educational; Medical Professional; and Other (Figure 2).

Figure 1.
California Department of Health Services



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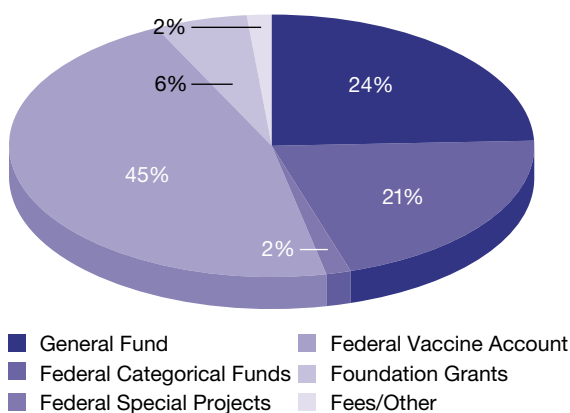
Figure 2.
Division of Communicable Disease Control Staffing Pattern
Total Staff 427



Prepared by the Department of Health Services

For Fiscal year 1999-2000, the Division's budget is \$107,516,625. Most of these funds come from the Federal Vaccine Account. Other major sources are the State's General Fund and Federal Categorical Funds. Smaller revenues come from foundation grants and Federal special projects (Figure 3).

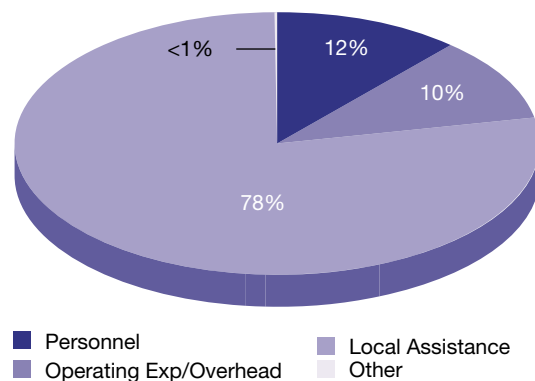
Figure 3.
Division of Communicable Disease Control, FY 1999-2000
Incoming Funds — Total \$107,516,625



Prepared by the Department of Health Services

Seventy-eight percent of DCDC expenditures are for local assistance, direct funding for communicable disease control programs in counties, cities and non-profit organizations. The remainder are for personnel, operating expenses, and other (Figure 4).

Figure 4.
Division of Communicable Disease Control, FY 1999-2000
Expenditures — Total \$107,516,625



Prepared by the Department of Health Services

The following sections describe the specific ways in which each branch of the Division of Communicable Disease Control helps to protect Californians from infectious diseases.

For further information, contact:

Division of Communicable Disease Control
 (916) 327-6989
 (510) 540-3503
www.dhs.ca.gov/dcdc

Reference: Centers for Disease Control and Prevention. Preventing emerging infectious diseases: a strategy for the 21st century. Overview of the updated CDC plan. MMWR 1998;47 (No. RR-15):1.

Disease Investigations and Surveillance

Mission

The mission of the Disease Investigations and Surveillance Branch (DISB) is to protect and promote the health of Californians through the surveillance, investigation, prevention, and control of communicable diseases of public health importance. DISB covers all diseases that are not addressed by the Tuberculosis Control, Sexually Transmitted Disease Control or Immunization Branches or by the Office of AIDS.

DISB monitors and addresses disease occurrences that impact all local health jurisdictions in California. At times, DISB activities impact public health policy on national and international levels. Four sections (Disease Investigations, Surveillance and Statistics, Vector-Borne Disease, and Veterinary Public Health) carry out branch activities.

Services

The Disease Investigations and Surveillance Branch provides:

- consultation and assistance to local health jurisdictions in the investigation, surveillance, prevention, and control of communicable diseases and outbreaks;
- education and training on communicable diseases for public health professionals through seminars, lectures, analyses, reports, and articles in scientific journals;
- information on infectious diseases to the California Department of Health Services (CDHS), local health jurisdictions, and the medical community through the Division's newsletters, *California Morbidity CD Brief*;

- information about communicable diseases of concern to the general public through press releases by the Office of Public Affairs, interviews with the news media, letters, the DISB website, and pamphlets.

The DISB also formulates recommendations, guidelines, policies, regulations and legislation on communicable disease prevention and control. Specifically,

- the **Disease Investigations Section** works with local health jurisdictions on outbreaks, general infectious diseases, and epidemiologic investigations;
- the **Surveillance and Statistics Section** collects, processes, analyzes, and disseminates infectious disease data from local health jurisdictions; conducts epidemiologic research on these and other infectious disease data sets; provides surveillance, consultations in informatics and surveillance; and evaluates new and existing surveillance strategies;
- the **Vector-Borne Disease Section**, with its 8 regional offices, provides technical consultation and assistance on such vector-borne diseases as hantavirus, plague, mosquito-borne encephalitis, and Lyme disease;



- the **Veterinary Public Health Section** assists local health jurisdictions with such zoonotic (of animal origin) diseases as rabies, psittacosis, brucellosis, Q-fever, and many food-borne infections.

Highlights

Highlights of the Disease Investigations and Surveillance Branch activities are grouped below into outbreak and disease investigations, and other accomplishments.

Outbreak and Disease Investigations

- **Several *Salmonella* outbreaks and one *E. coli* O157 outbreak were associated with alfalfa sprouts.** These outbreaks promoted recalls of seed lots that were found contaminated with those pathogens, as well as recalls of the sprouts themselves. These recalls were followed with advisories to the public about eating sprouts, especially directed at the very young, the very old, and those whose health is immune-compromised.
- **Gastroenteritis associated with Tomales Bay oysters.** Nearly 200 cases of gastroenteritis from 7 counties were identified; the source was a Norwalk-like agent that contaminated commercial shellfish beds in Tomales Bay. Harvesting was permitted to resume after laboratory studies demonstrated it was safe to do so.
- **Human granulocytic ehrlichiosis associated with woodrats.** The Branch, in collaboration with the national Centers for Disease Control and Prevention (CDC), provided the first evidence that woodrats serve as a reservoir in California for human granulocytic ehrlichiosis, an emerging tick-borne disease.
- **S. Thompson outbreak associated with cilantro.** A case-control study identified an association with eating fresh cilantro. This *Salmonella* outbreak was noteworthy because it was the first, anywhere, to be associated with cilantro. The trace-back investigation was hampered by incomplete record keeping. Follow-up studies that were recommended included testing the growth of *Salmonella* on cut and uncut cilantro at room and refrigeration temperatures. Findings could lead to recommendations on the handling of cilantro at both the retail and restaurant levels for the protection of the public's health.
- **Reuse of needles by a phlebotomist.** A "lookback" was conducted of patients who had blood drawn by a phlebotomist employed by a clinical laboratory who admitted to reusing needles. As of February 24, 2000, a total of 5,200 patients had been tested. Prevalence of infection for hepatitis B, hepatitis C, and human immunodeficiency virus (HIV) was comparable to that for the general population. Thus far, there is no evidence for infection occurring as a result of this incident.
- ***E. coli* O157:H7 outbreak associated with a chain of fast food restaurants in Northern California.** A total of 47 cases of *E. coli* were linked nationally by molecular typing ("pulsed-field gel electrophoresis"). Ten cases in California, 1 in Arizona, and 2 in Nevada were associated with eating a hard shell beef taco at several chain restaurants. Molecular comparisons of the outbreak strain revealed related cases in 12 other states, including 18 cases in Idaho during the same time period. The Idaho cases were associated with eating a game-meat pepperoni sausage mixed with beef that originated from the same supplier used by the restaurants. The investigation underscores the important role of molecular surveillance in the identification of related cases of *E. coli* O157:H7 that are geographically widespread.

Other Accomplishments

- Spearheaded the effort to address emerging infectious diseases at the state level and continued collaboration with the University of California School of Public Health, Berkeley in coordinating the California Emerging Infections Program.
- Worked with local health departments in the development of health and safety standards for tattooing, body piercing, and the application of permanent cosmetics.

The Disease Investigations and Surveillance Branch collaborated with local vector control agencies to demonstrate that birds may play a role in the ecology of Lyme disease.

- Worked with the American College of Obstetricians and Gynecologists (ACOG) to distribute joint CDHS/ACOG guidelines for preventing group B streptococcal infection in newborns.
- In collaboration with local vector control agencies, demonstrated that birds may play a role in the ecology of Lyme disease.
- In collaboration with other DCDC Branches, developed guidelines for use of the human Lyme disease vaccine and for control of head lice in schools.
- Successfully applied to the Centers for Disease Control and Prevention for funding for bioterrorism preparedness.
- Gave over 50 presentations on vectorborne, zoonotic and foodborne disease.
- Co-sponsored, with DCDC's Viral and Rickettsial Disease Laboratory and the California Association of Public Health Laboratory Directors, the 10th International Rabies in the Americas Meeting in San Diego.

- Conducted a 6-month pilot of electronic reporting of communicable disease laboratory, syndromic, pharmacy and hospitalization data with Northern California Kaiser Permanente.
- In conjunction with DCDC's Microbial Diseases Laboratory and CDHS's Information Technology Services Division, began development of the CELDAR (California Electronic Laboratory Disease and Alert Reporting) System, a model Internet-based electronic laboratory reporting (ELR) system.

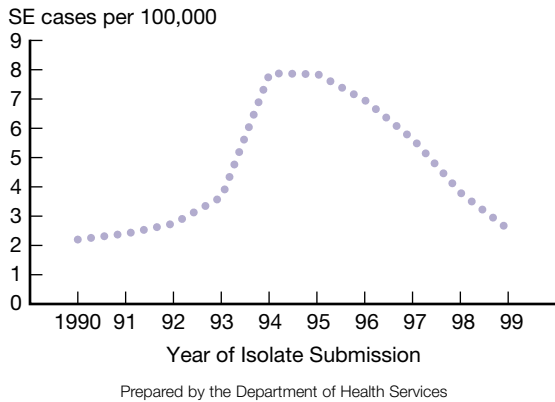
Disease Trends

There are several notable decreasing and increasing disease trends.

Decreasing Problems

- **Cryptosporidiosis:** decreased approximately 46% from 1995 to 1999.
- **Giardiasis:** decreased approximately 51% from 1992 to 1999.
- **Hepatitis A:** a 15 year low occurred in 1998 (4178 reported cases); this dropped further in 1999 (3431 cases).
- **Shigellosis:** decreased at least 58% since 1989.
- **Salmonellosis:** After steady increases for at least 15 years up to 1996, reported salmonellosis decreased 32% from 1996 to 1999. *Salmonella serotype enteritidis* (SE) first significantly impacted California in 1994. For a while, the incidence continued to increase, but the incidence of this particular problem is now diminishing (Figure 5) because of 1) public health advisories about raw and undercooked eggs; 2) the establishment of an egg task force comprised of CDHS, the California Department of Food and Agriculture (CDFA), the US Department of Agriculture (USDA), FDA, and the egg industry; and 3) the adoption of an egg quality assurance program by industry.

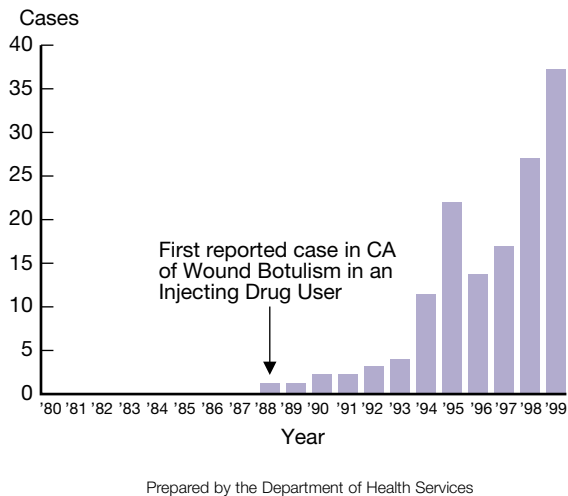
Figure 5.
Rate of *Salmonella* Enteritidis (SE) Infections by Year,
California, 1990-1999



Increasing Problems

- **Foodborne outbreaks:** there have been steady increases in the number of reported outbreaks.
- **Disease from *Vibrio* species:** reports doubled from 1995-96 to 1997-98 and remain elevated for 1998-1999.
- **Wound botulism:** California has more than 90% of the nation's cases, and these are associated with "skin popping" of black tar heroin. Despite public health advisories, the problem is worsening (Figure 6).

Figure 6.
Wound Botulism in Injecting Drug Users,
California, 1980-1999



Challenges and Emerging Issues

- **Hepatitis C:** Approximately 600,000 Californians are infected with hepatitis C and there are about 5,000 new infections each year. Hepatitis C is estimated to add more than \$84 million to health-care costs per year in California. Surveillance, prevention, control, treatment, education, and counseling are necessary to combat this emerging infectious disease.
- **Nosocomial (hospital acquired) infections and antibiotic resistance:** While these problems are increasing, resources are limited at local or state levels to address this important issue.
- **Bioterrorism:** Even though all of the recent episodes of bioterrorism (1998-1999) were hoaxes, improved local and state infrastructures are needed to deal with these increasingly real threats. The CDC funding for bioterrorism preparedness mentioned earlier was seed money, and more funding will be necessary to accomplish the goals of this program.
- **Foodborne diseases:** Many of the recent outbreaks of foodborne diseases were due to emerging pathogens (cyclospora, *E. coli* O157, *Salmonella* Typhimurium DT 104, etc.) and involved raw fruit and vegetables from abroad. There is an ever-increasing need for prompt, thorough investigation, and for educating the public on ways to reduce their risk of exposure to potential foodborne pathogens.
- **Tick-borne diseases:** While Lyme disease continues to be the primary tick-borne disease in California, newer tick-borne diseases such as babesiosis and ehrlichiosis have emerged. Additional surveillance is needed to delineate which vector species and reservoirs are important in the disease transmission cycle.

- **Africanized Honey Bees (AHB) and Red Imported Fire Ants (RIFA):** The area in southern California colonized by AHB tripled in 1998, and the number of stinging incidents increased 10-fold. RIFA, highly aggressive ants with a very toxic sting, were first detected in southern California in 1998. Extensive assessment on the public health impacts of these stinging insects is needed.

Infectious diseases continue to emerge and re-emerge to challenge the public health in California. Disease investigation and surveillance must expand to address these problems and to develop effective control and prevention measures.

For further information, contact:

Your local health department or
Disease Investigations and Surveillance Branch
(510) 540-2566
www.dhs.ca.gov/dcdc/disbindex.htm

Immunization

Mission

The mission of the Immunization Branch is to provide leadership and support to public and private sector efforts to protect California's population against vaccine-preventable diseases.

The key strategy for eliminating vaccine-preventable diseases is universal childhood immunization. The national objectives, as stated in *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*, include adequately immunizing at least 95% of schoolchildren and 90% of all children by 2 years of age, and immunizing 60% of California's non-institutionalized seniors (65+) each year against influenza and pneumococcal pneumonia. These objectives have been adopted as the target for California's continuing efforts to improve childhood and adult immunization levels.

According to the Centers for Disease Control and Prevention (CDC), for every \$1 spent on immunizations, up to \$16 is saved in medical costs. In California, the 1989-91 measles epidemic resulted in over \$31 million in direct medical care and outbreak control costs.

Services

The major functions of the Immunization Branch are to:

- provide technical guidelines and consultation on immunization practices and standards;

- assure adequate vaccine distribution to public immunization clinics and to healthcare providers participating in the federal Vaccines for Children Program;
- assess immunization levels of the population;
- monitor enforcement of school and child care immunization requirements;
- inform and educate the public and health care providers about immunizations;
- direct vaccine-preventable disease surveillance and outbreak control; and
- provide federal and state funds to local health departments and non-profit community health centers to enhance local immunization services, outreach, assessment and evaluation.

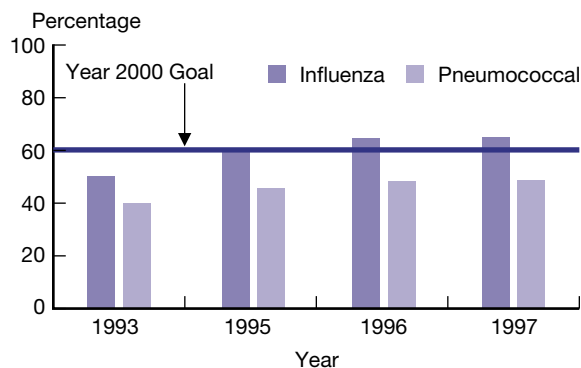
Highlights

- Immunization rates for California's infants and toddlers have increased steadily over the last 10 years. In the most recent National Immunization Survey (1999), California had a 75% rate for the full immunization series (excluding hepatitis B).
- Immunization rates for California's seniors have also increased markedly in recent years for both influenza and pneumococcal pneumonia. The 1997 Behavioral Risk Factor Survey found that 65% are immunized against influenza (exceeding the Year 2000 goal by 5%), and 50% are immunized for pneumococcal pneumonia (short of the Year 2000 goal by 10%).

Immunization rates for Californian infants and toddlers have steadily increased over the last ten years. Currently about 75% of California's 2-year-olds are up-to-date on immunizations.

- California's Immunization Initiative provides funds for non-profit community health centers (\$3.5 million), for collaborative community grants (\$4 million), and for automated information systems (\$3.3 million). In 1999, this Initiative increased access to care by providing local assistance funds to support 800 immunization clinics.
- The Vaccines for Children Program (the federal program providing free vaccines for eligible children) has been a great success in California since its introduction in 1995. Over 7.6 million doses of vaccine were distributed in 1999 to 4,000 private practices, community clinics, and local health departments.
- Over 730,000 doses of flu vaccine were provided for community flu shot clinics for Fall 1999.
- The Immunization Branch collaborates with the Health Care Financing Administration and their quality assurance organization, California Medical Review, Inc., to raise immunization levels of seniors.

Figure 7.
California Senior (65+) Immunization Levels



Source: BRFSS, 1993/1996

Prepared by the Department of Health Services

- The Immunization Branch implemented a new influenza surveillance system in collaboration with the CDC Viral and Rickettsial Disease Laboratory and Kaiser Permanente. The system provides more timely data on disease activity throughout the state

based on hospital admissions, pharmacy orders, and laboratory findings.

- Recent regulatory changes will help raise California immunization levels and keep them high. Hepatitis B vaccine was added to child care and kindergarten entry requirements in 1997 and has been required for entry to 7th grade since July 1999. The state's 50,000 licensed family day care homes now require immunizations, and an innovative welfare reform immunization requirement for preschoolers in assisted households was incorporated into CalWORKS, effective January 1998. Extensive campaigns were launched to introduce these new requirements to families, health care providers, schools and child care providers.

In 1997, Hepatitis B vaccine was added to kindergarten entry requirements. Beginning in 1999, this requirement also applied to students entering 7th grade.

- California has very high (90+%) immunization levels for children in schools and child care centers, thanks to continued enforcement of the California School Immunization Law.
- The results of the first ever 7th grade assessment show 65.1% of seventh graders fully immunized for the 3 hepatitis B and 2 Monthly Morbidity Report series.
- Although significant disparities exist, immunization levels are improving for all ethnic groups. The annual California Kindergarten Retrospective Survey shows that African American and Latino children continue to be less immunized. However, through education and outreach efforts, Latino rates of immunization have increased by 11% during the past 5 years.

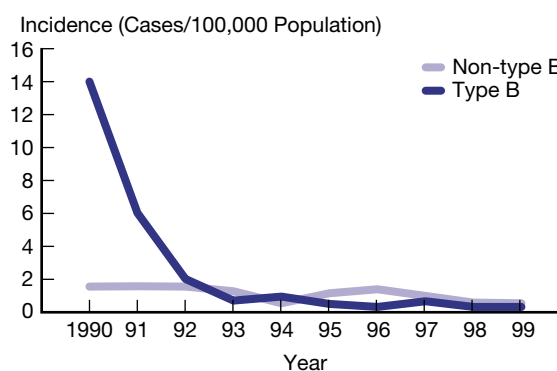
- In 1998, the State General Fund provided \$17.3 million and the Centers for Disease Control and Prevention (CDC) provided \$22.6 million (down from \$29.1 million in 1997) for activities aimed at achieving the Year 2000 goal of fully immunizing 90% of children by their second birthday.
- With funds targeted for information systems from the Immunization Initiative, CDC, foundations, and national organizations, community registry development is underway in 19 California counties.
- Effective partnerships with community organizations, health plans, and other agencies are in place, including Assess and Refer projects in nearly 55 WIC (Women, Infants, and Children Supplemental Nutrition Program) sites, and an Immunization Partnership with the American Academy of Pediatrics and the California Academy of Family Physicians.
- The Branch's media and outreach campaigns—including targeted campaigns to minority/vulnerable populations such as Latinos, African Americans, and Southeast Asians—have received numerous awards and recognition.
- The Immunization Branch has been a force for change in the area of distance learning and has built a satellite downlink infrastructure and capacity in local health departments. The September 1999 "Immunization Update" provider education satellite course was downlinked by 85 health department and other sites reaching 1,240 health care professionals.
- The Branch has won several recent awards:
 - Blocks of Life Campaign: 1998 Banner Award, Society for Healthcare Strategy and Market Development of the American Hospital Association;
 - African American Campaign: 1998 Honorable Mentions, 2 from Southern California Public Relations Society of America; 1998 National Silver Microphone Award;

- Ethnic Wall Calendars: 1997 Gold Award for Excellence, National Public Health Information Communication;
- California Coalition for Childhood Immunization: 1998 Every Child by Two Coalition Award.

Disease Trends

The reduction in the incidence of infectious diseases is the most significant public health accomplishment of the past 100 years. Due to the development and widespread use of vaccines, deadly diseases such as polio, diphtheria, and tetanus have entirely or almost entirely disappeared in the United States. Smallpox, a highly infectious and often fatal disease, was completely eradicated from the world, thanks to vaccinations.

Figure 8.
Incidence of Reported *Haemophilus influenzae* Cases, California, 1990-1999

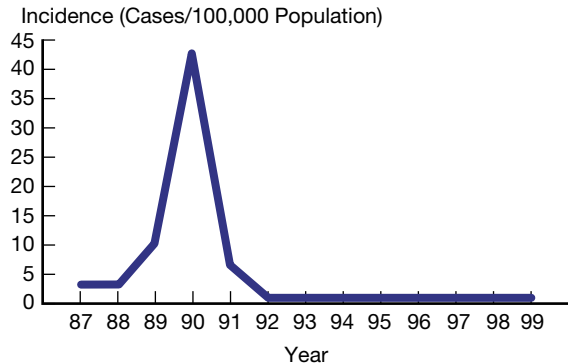


Prepared by the Department of Health Services

Another success of immunizations is the dramatic reduction in the incidence of *Haemophilus influenzae* type-B cases among infants and young children. Since the introduction of the vaccine, the incidence of this disease decreased from over 600 cases to just a few cases a year in California. The incidence of measles also continues to decrease with only 17 cases reported in California in 1999. Although an increasing number of cases are imported by persons living or travelling overseas, maintaining high immunization coverage remains

very important. Timely immunizations are necessary to prevent a repeat of the measles epidemic that resulted in over 17,000 cases in California between 1989-1991.

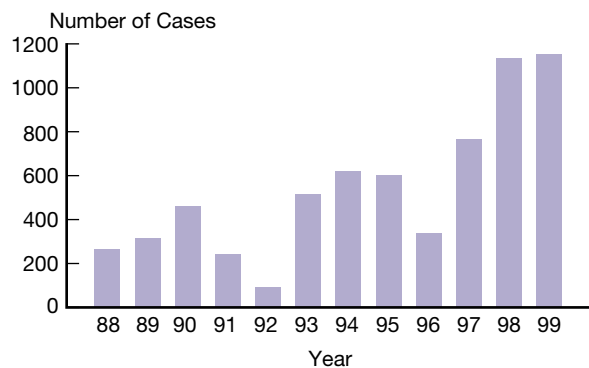
Figure 9.
Incidence of Reported Measles Cases,
California, 1987-1999



Prepared by the Department of Health Services

Despite these successes, certain vaccine-preventable diseases continue to cause illness and death in California. Pertussis (whooping cough), especially among infants, school-aged children and young adults, has been of particular concern. Often the disease is transmitted from older household members to infants and young children, those most susceptible and most likely to be hospitalized due to complications. The number of cases reported in 1999 was 1,106 (preliminary), the highest since 1963.

Figure 10.
Number of Reported Pertussis Cases,
California 1988-1999



Prepared by the Department of Health Services

Challenges and Emerging Issues

- **New vaccines:** Biotechnology has led to major advances in vaccine development, and the immunization schedule changes every year as new vaccines are introduced. New vaccines will mean marked reductions in hospitalizations and deaths from newly preventable diseases, and will save millions of dollars in health coverage and societal costs. Vaccines for hepatitis A, Lyme disease, and pneumococcal diseases in infants (including *otitis media*) are now available. Surveillance will be needed to monitor the impact of the new immunizations on disease levels.



- **Information systems:** High-tech solutions have great potential for improving immunization rates. Designing and implementing community-wide immunization information systems will continue to be an exciting but expensive challenge. Current focus is on regional systems and use of the Internet. The statewide hub to link local registries electronically with each other, the CDHS, and private sector health plans is the next step in the process.
- **Public awareness:** Anti-immunization groups have mobilized and pose a threat to public confidence in vaccines. Proactive response to the misinformation in the media and on the Internet will be essential.

With growing concern about antibiotic resistance, bio-terrorism, emerging infectious diseases, and an influenza pandemic, maintaining the public's confidence in vaccines is of paramount importance.

- **Health care provider knowledge and practice:**
Most immunizations are given by private physicians. Efforts must expand to ensure that all providers of immunizations have a technical understanding of immunization fundamentals, current schedules, and new vaccines. Quality assurance areas include vaccine handling and storage, administration techniques, staff training, needle safety, and risk communication with parents and patients.

- **Funding:** CDC funding cuts in 1999 and 2000 have limited state and local programs.

For further information on immunization, contact:

Your local health department or
Immunization Branch
(510) 540-2065
www.dhs.ca.gov/dcdc/imminindex.htm

Sexually Transmitted Disease Control

Mission

The mission of the Sexually Transmitted Disease (STD) Control Branch is to provide statewide leadership, guidance, training and technical assistance for the prevention and control of sexually transmitted diseases (STDs), and reduction of their complications and adverse outcomes such as pelvic inflammatory disease, infertility, ectopic pregnancy, neonatal infections, and sexual transmission of HIV. This mission is carried out in collaboration with local health jurisdictions and other public and private stakeholders.

Services

The STD Control Branch is responsible for sexually transmitted disease surveillance, investigation, prevention and control activities throughout California. The Branch assists and collaborates with local health departments, health care providers, non-governmental organizations, and other partners to develop, translate, and disseminate timely, science-based information and policy to develop and support effective clinical and community prevention programs.

Specifically, the STD Control Branch:

- assesses STD prevention needs locally and throughout California, identifies priority areas that have the greatest impact on services and programs, and develops recommendations to address these concerns;
- conducts statewide surveillance to identify high-risk populations, define STD trends and monitor program impact and effectiveness;
- provides statewide training for persons serving at-risk populations in the clinical management of

STDs, behavioral interventions, partner management, and other prevention activities;

- provides assistance to local health jurisdictions in managing reported syphilis, gonorrhea and chlamydia cases, including STD outbreaks;
- develops and implements cost-effective and comprehensive STD control programs and strategies to reduce the spread of and complications caused by STDs by detecting cases as early as possible.

STDs remain one of today's most critical public health challenges because of their consequences for women and infants, their impact on the health of adolescents and young adults, and the role they play in the sexual transmission of HIV infection.

Highlights

A great deal of progress in STD control has been made in California. Recent advances in diagnostic tests and new treatment and prevention methods have significantly enhanced the effectiveness of STD prevention strategies. Some highlights of successful efforts of the STD Control Branch are outlined below.

- **Chlamydia.** In collaboration with the California HealthCare Foundation and the California Conference of Local Health Officers, the Branch developed a five-year action agenda for Chlamydia Prevention and Control in California. It calls upon stakeholders in both the public and private sectors to join together to realize targeted goals and concrete action steps in screening and clinical services; partner management; awareness among providers, policymakers and the public; and health information systems.

- **Syphilis.** In California, the syphilis control program has nearly eliminated infectious syphilis through outreach screening, rapid case identification and treatment, partner follow-up, and sexual network and community interventions.
- **Gonorrhea.** The Gonococcal Isolate Surveillance Project in California monitors antimicrobial resistance and has recently detected quinolone-resistant gonorrhea. The quinolones are a class of antibiotics and one of the currently recommended treatments for gonorrhea infections.
- **Surveillance.** The STD Control Branch utilizes a number of innovative approaches to survey sexually transmitted diseases in the state, including case-based reporting from laboratories, prevalence monitoring at representative managed care, family planning, teen and correctional facilities, and population-based surveys. Case-based surveillance data have helped identify geographic areas with high rates of STDs (see Figures 11, 14, and 15). Prevalence data have assisted clinical facilities in designing cost-effective screening programs for chlamydia. A population-based survey of women (in collaboration with the Office of Women’s Health) has provided valuable information about chlamydia awareness and infertility problems.
- **Training.** The California STD/HIV Prevention Training Center (a CDC-funded national training center) was moved from San Francisco to the STD Control Branch. The Center provides training in STD clinical care and management, individual and community level behavioral interventions, STD and HIV partner counseling and referrals, and STD program management.
- **Partnerships:**
 - **Family planning.** The STD Control Branch provides technical assistance to the Office of Family Planning in the provision and evaluation of STD services as part of the Family Planning,

Access, Care, and Treatment (PACT) program. This program enables eligible individuals to access affordable, high-quality STD medical care as part of family planning services.

- **Managed care.** The STD Control Branch provides technical assistance to managed care organizations in the provision of STD services in the private sector and in the measurement of the Chlamydia HEDIS (Health Employer Data Information Set) indicator. A STD prevention strategic plan is being developed with Health Net, and an outreach intervention for adolescents to increase chlamydia screening is being evaluated with Kaiser Permanente.

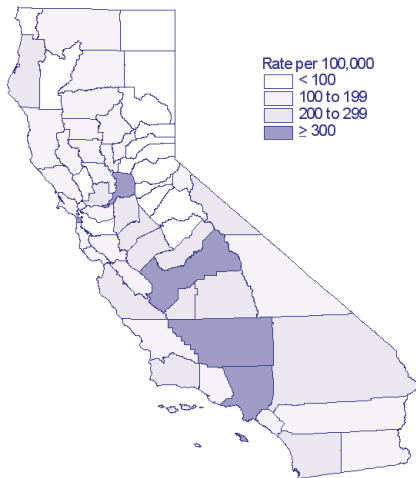
Disease Trends

In the last few years, California has made progress in the prevention of sexually transmitted infections and their associated adverse health outcomes. Rates of gonorrhea and syphilis are at historic lows. Still, there are an estimated 1.2 million new cases of STDs in California each year, and of these approximately 250,000 occur among teenagers. In 1999, 5 sexually transmitted diseases (chlamydia, gonorrhea, AIDS, hepatitis B, and syphilis) accounted for more than 77% of the reportable infectious diseases in the state.

Approximately 250,000 of the 1.2 million new cases of STDs annually in California occur among teenagers.

- **Chlamydia:** Chlamydia is one of the critical public health challenges in California today. It crosses all ethnic, social, and economic lines. Fifty-seven percent of all California’s counties reported at least 100 cases of chlamydia among women of reproductive age (Figure 11).

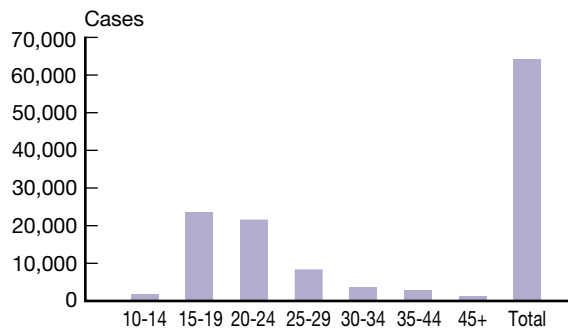
Figure 11.
Chlamydia
California, 1999



Prepared by the Department of Health Services

While most cases of chlamydia go undetected, in 1999 more than 85,100 cases were reported; 66,316 were in women. Adolescents have the highest rates of infection (Figure 12); approximately 5-10% of sexually active girls are infected. High prevalence is also found in patients in a wide variety of health care settings (Figure 13).

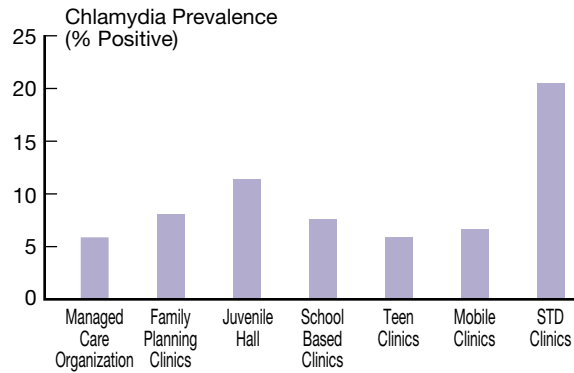
Figure 12.
California Reported Chlamydia Cases Among
Females by Age, 1999



Prepared by the Department of Health Services,
STD Control Branch, Provisional Data

Figure 13.

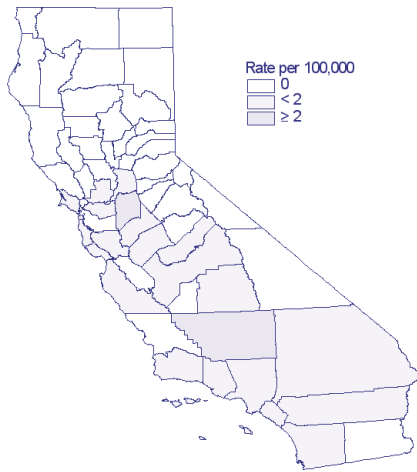
Prevalence of Chlamydia Infections in 15-19 Year Old
Girls by Health Care Setting, California 1999



Prepared by the Department of Health Services,
STD Control Branch, Provisional Data

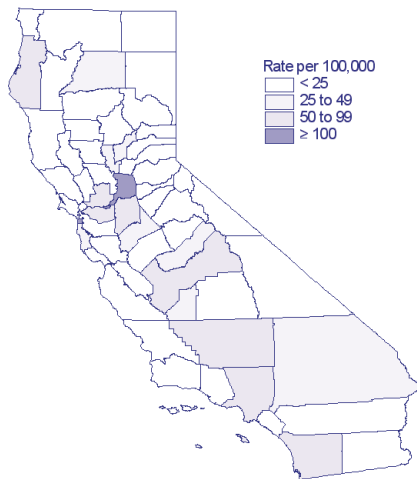
- Syphilis:** Syphilis rates in California are at historic lows, and 57% of counties have not reported a case of infectious syphilis in the past 2 years (Figure 14). However, outbreaks continue to occur and cases among men who have sex with men are increasing. Four jurisdictions reported more than 20 cases each and accounted for 60% of the total. Syphilis has a disproportionate impact on minority population groups in both urban and rural areas. The rate of primary and secondary syphilis among African Americans was 3.3 per 100,000 — a decrease of 37% from 1998, but still 3 times the incidence among Hispanics (1.1 per 100,000) and over 8 times the incidence among whites (0.4 per 100,000).
- Gonorrhea:** In 1999, gonorrhea rates were also at historic lows (Figure 15), but emerging antimicrobial resistance is a growing concern.

Figure 14.
Primary & Secondary Syphilis
California, 1999



Prepared by the Department of Health Services

Figure 15.
Gonorrhea
California, 1999



Prepared by the Department of Health Services

Challenges and Emerging Issues

Shrinking public health dollars, the closure of dedicated STD clinics, the growth of managed care organizations, and the rapid conversion rate of the state Medicaid programs to prepaid managed care plans have made the past five years a time of challenge and opportunity for the STD program.

The STD Control Branch is working to increase awareness and integrate STD programs into existing infrastructures through a public-private collaborative effort. The challenge of STD prevention is to raise the visibility of both the problems and solutions and to make better use of the tools we already have. When effective STD prevention services such as outreach and screening, rapid case detection and treatment, partner follow-up, prevention counseling, and community-based prevention interventions are provided, there are multiple benefits to individuals, families, and communities.

For further information on control and prevention of sexually transmitted diseases, contact:

Your local health department's STD control officer
 or the California Department of Health Services
 Sexually Transmitted Disease Control Branch
 (510) 540-2657

www.dhs.ca.gov/ps/dcdc/html/stdindex.htm

California STD/HIV Prevention Training Center
 (510) 883-6600

Tuberculosis Control

Mission

As the lead agency for tuberculosis (TB) prevention and control in California, the Tuberculosis Control Branch provides leadership at the local, state, and federal level to control TB in California's diverse communities and institutions. The Branch has 6 goals:

- Ensure that sufficient resources are available and used effectively to support a public health infrastructure capable of eliminating TB.
- Ensure early identification and reporting of all persons with TB.
- Ensure timely completion of appropriate therapy for all persons with TB.
- Ensure that those in contact with someone with infectious TB are promptly identified, examined, and, if appropriate, treated.
- Reduce the risk of progression to TB in high-risk persons infected with the bacteria that cause TB.
- Reduce the risk of acquiring TB infection in high-risk settings.

Tuberculosis (TB) is a contagious disease transmitted through the air when a person with active TB disease coughs or talks. Anyone inhaling air containing the TB bacteria may become infected.

Services

In carrying out its mission, the Tuberculosis Control Branch conducts the following activities and services:

- Collects, analyzes, and disseminates information on TB in California so that control strategies can be planned, implemented, and evaluated on an ongoing basis.
- Develops and distributes fiscal resources to support TB prevention and control activities.
- Provides technical assistance, training, and advocacy at the federal, state, and local levels.
- Defines and promotes adherence to minimum standards for TB control.
- Identifies model TB control practices and promotes their replication statewide.
- Fosters collaboration and coordination among public and private organizations concerning TB.
- Strengthens local TB control programs' capacity to directly provide (or ensure provision of) comprehensive TB services.

Highlights

In response to the 1985-92 resurgence of TB in California and the threat of multidrug-resistant TB (MDR-TB), California's Director of Health convened a statewide task force that developed the *Strategic Plan for TB Control and Elimination in California*. The Governor's 1994-95 and 1997-98 TB Initiatives, along with additional federal support, provided funds directed toward accomplishing the Plan's most urgent priority: ensuring that every active TB case completes therapy. By strengthening the public health infrastructure and by expanding directly observed therapy (DOT) for TB cases, California has reduced TB transmission and prevented a rise in drug-resistant tuberculosis.

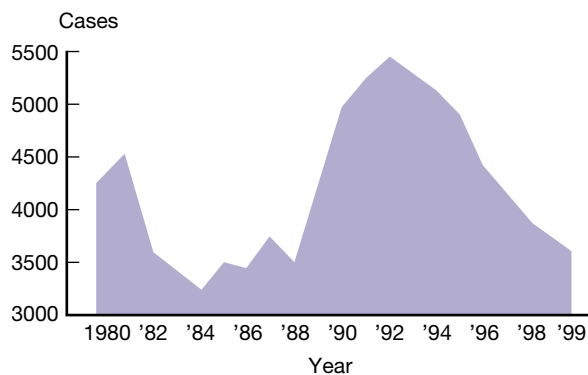
Further improvements are needed in the core TB control activities of finding and treating TB patients and their contacts. In 2000, the TB Control Branch is working with local health departments and other partners to:

- ensure prompt diagnosis and treatment of TB cases and their contacts to prevent TB transmission;
- expand the use of DOT to ensure TB patients are cured and do not develop or spread MDR-TB;
- improve the identification and follow-up of immigrants suspected of having TB at the time they were screened overseas;
- strengthen the interface between health departments and correctional facilities, managed care and other providers, as well as TB programs in Mexico;
- expand housing and detention capacity so homeless or non-adherent TB patients can complete treatment and avoid criminal TB detention;
- implement performance indicators to improve program accountability;
- halt and prevent TB transmission in institutions and communities.

Disease Trends

Tuberculosis made a dramatic resurgence in California in the late 1980's, with the number of new cases rising 54% from 1985 to the peak of 5,382 cases in 1992 (Figure 16).

Figure 16.
Tuberculosis Cases, California
1980-1998



Prepared by the Department of Health Services

At that time, the public health infrastructure was inadequate to contain the factors fueling the TB epidemic: increased immigration from countries with a high incidence of TB, homelessness, incarceration, and the appearance of the strongest risk factor for TB ever identified—the human immunodeficiency virus (HIV). MDR-TB rose sharply in some areas outside California, due in part to large outbreaks in prisons and hospitals. MDR-TB markedly increases the public health risks and treatment costs of TB.

Active TB usually takes 6 or more months to cure.

Multi-drug resistant TB (MDR-TB)—active TB caused by bacteria resistant to our most powerful drugs—is much more difficult and costly to treat.

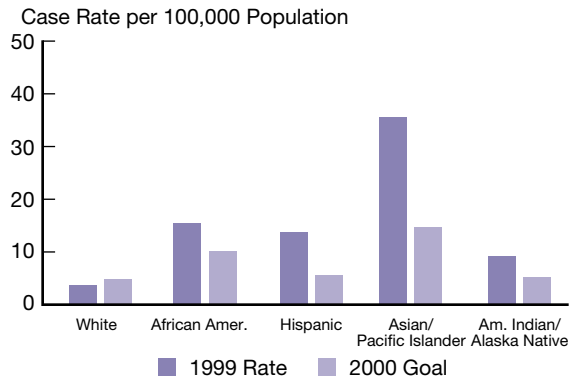
It can be incurable.

In 1999 there were 3,608 TB cases reported from local jurisdictions to CDHS. This is the seventh consecutive year of decline since the number of cases peaked in 1992. This decline reflects major accomplishments in the fight against tuberculosis in California.

Despite these promising statistics, TB remains a serious public health threat in California.

- California has the highest number and the second highest rate of TB cases in the US.
- TB rates among California's Hispanics, African Americans, Asians, and American Indians are 3-14 times higher than for non-Hispanic whites. Only non-Hispanic whites have achieved the Year 2000 objective of 3.5 cases per 100,000 population (Figure 17).

Figure 17.
Rates of TB and Year 2000 Goal
by Racial/Ethnic Groups, California, 1999



Prepared by the Department of Health Services

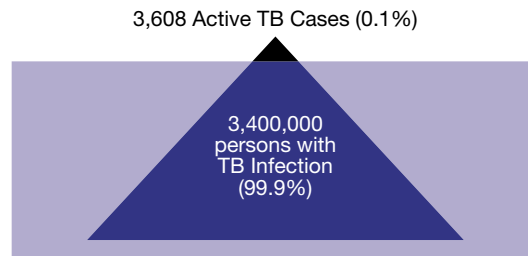
- Over 15% of TB cases are resistant to at least one commonly used TB drug, and 1-2% are MDR-TB.
- More than two-thirds of cases are in persons born outside the US, which illustrates the impact of the global TB epidemic on our state.
- Hot spots of TB transmission continue to occur, such as the recent outbreaks in prison, inner city, and drug using populations.
- Each year, more than 300 patients died before completing TB treatment.

Ten percent of Californians are infected with TB bacteria. Each of these persons has on average a 5% risk of progressing to active TB during his or her lifetime. This would result in approximately 3,000 new active TB cases per year for the next 60 years.

- The 3,608 cases of active TB disease in 1999 are only the tip of the iceberg of persons with latent TB infection (Figure 18). An estimated 3.4 million Californians (10%) are infected with TB bacteria.

Each of these persons has on average a 5% risk of progressing to active TB during his or her lifetime. This would result in approximately 3,000 new active TB cases per year for the next 60 years, each of which can in turn spread TB to others.

Figure 18.
Active TB Cases as a Proportion of All Persons
with TB Infection, California, 1999



Prepared by the Department of Health Services

Challenges and Emerging Issues

The recently rebuilt TB control infrastructure provides minimum maintenance for TB control. If funding falls below this threshold, the gains of the past 7 years would be reversed. Worse, the number of drug resistant cases would rise, and would greatly complicate the control of TB, escalate the human and fiscal costs, and render our current TB drugs and other control measures ineffective.

Further improvements are needed in the core TB control activities of finding and treating TB patients and their contacts. Intensification of these efforts will help halt transmission, prevent the development of MDR-TB, and begin to diminish persistent disparities in TB risk among racial/ethnic groups. These are the necessary first steps in regaining control of the TB epidemic, but they are not sufficient for eliminating TB.

In order to eliminate TB, we need to target our testing to help identify the 1 in 10 Californians with TB

infection. Then they can be treated, so they do not progress to active TB. Reducing the estimated 3,000 cases per year that arise from TB infection will require expansion of the TB control infrastructure. Both private and public payers will realize the cost savings of prevention, and all Californians will benefit from reducing transmission of this airborne disease.

For more information about TB control, contact:

Your local health department or
Tuberculosis Control Branch
(510) 540-2973
www.dhs.ca.gov/dcdc/tubindex.htm

www.ctca.org (California TB Controllers Association)
www.nationaltbcenter.edu (Curry National TB Center)
www.cdc.gov (US Centers for Disease Control and Prevention)

Refugee Health

Mission Statement

The mission of the Refugee Health Section (RHS) is to improve the health status of refugees in California through leadership and oversight of culturally and linguistically competent health care services, and the promotion of a coordinated, seamless system of care through advocacy and policy formulation and recommendation to enable refugees to achieve successful resettlement and self-sufficiency.

The RHS has been building a foundation to fully support incoming refugees in need of medical attention, acculturation, and language interpretation services to improve their quality of life and promote economic self-sufficiency. To address these needs, the RHS has established the following goals:

- Improve the general health status of the refugee populations in California.
- Prevent and control health problems of public health significance among populations.
- Improve general health services for refugees through follow-up of medical conditions identified in the health assessment, health education, and preventive health services, emphasizing those health problems that may impede effective resettlement and hinder economic self-sufficiency.
- Promote and facilitate a better understanding of and access to California's health care system by improving cultural and linguistic competency of services and eliminating barriers to utilization common to refugee communities.

Services

California has been and continues to be the largest recipient of official newly arriving refugees. The Federal Office of Refugee Resettlement data indicates that historically California has received over 25% of all refugees entering the United States. Actual data obtained from the California Department of Social Services (CDSS) for the period of 1990 – 1998 reveals that approximately 679,000 refugees reside in California. However, due to the secondary migration factor, it is more than likely that over 850,000 refugees reside in California. The enormous number and diversity of refugees residing in California, coupled with the fact that they are geographically dispersed throughout the state in both rural and urban areas, presents a significant need for resources to identify and improve their health status, and to ensure their effective resettlement and economic self-sufficiency.

The RHS seeks to address the health care needs of refugees in the following ways:

- Provide financial assistance to local health departments for screening, referral, education, and outreach services to newly arrived refugees.
- Provide financial assistance to local health departments and non-profit organizations to promote innovative health promotion programs; encourage healthier lifestyles with interventions specific to refugee communities; and improve access to care by educating newly arriving refugees on how to navigate within California's health care system.
- Provide health education consultation to enhance the capacity of local communities to better serve refugees by conducting a statewide needs assessment of local refugee health programs; developing and maintaining a clearinghouse of health educational materials for local health departments serving refugees; and developing program policies, priorities and prevention

education strategies and standards related to female circumcision/female genital mutilation.

- Advocate and participate in the development of national medical interpreter standards to improve access to and quality of health care services to refugees through the delivery of linguistically competent services.
- Provide technical assistance, training and advocacy at the federal, state, and local levels.
- Foster collaboration and coordination among public and private organizations to improve community capacity to provide comprehensive services for refugees.

Highlights

A primary function of the RHS is to provide federal funding to local refugee health clinics for health assessments on newly arriving refugees, people fleeing persecution and probable death in their native country. During fiscal year 1998-99, health assessments were given to 90.5% of the more than 11,200 newly arrived refugees by program-supported refugee health clinics. Well trained, culturally sensitive interpreters facilitated the health assessment process, delivered important education messages, provided necessary outreach, and made appropriate and timely referrals for other health conditions.

The major findings of the 1998/99 health assessments are summarized below.

- 9,177 refugees were tested for tuberculosis and 53.9% had positive findings. Of those testing positive, 43% were recommended for six months treatment of latent TB infection. Of the 43%, 89.7% initiated the recommended six-month treatment protocol, with 77% treatment completion.

- 1,545 refugees with symptoms of or at risk for hepatitis B were tested and 6.9% were reported as being positive. Targeted screening, effective health education, and appropriate use of vaccines are credited with preventing the further spread of this disease among other family members.
- Forty percent of the 4,628 refugees tested for parasites were positive and placed on curative medications.
- 6,831 refugees were tested for anemia; and 9% were determined to be anemic. This condition is of particular concern for women of childbearing age who could develop complications that may affect the fetus.
- Seventy percent of the 9,493 refugees evaluated for dental problems required dental treatment.
- Fifty-five percent of the 3,601 refugees tested had conditions that required immediate medical attention, such as hypertension, diabetes, heart disease, liver disorders, skin diseases, eye and hearing impairments and injuries.
- 8,116 refugees (80%) receiving a health assessment had one or more health conditions.

In addition, the RHS:

- disseminated the study, "Forced Migration and Health: Refugee Well-being in America," a project of the Human Rights Center at the University of California, Berkeley that was funded by the RHS;
- collaborated on the development of a domestic violence pamphlet for refugee women and funded its translation into 12 languages. The brochures were field tested with the target populations.

Challenges and Emerging Issues

The greatest barriers to California's diverse refugee populations in receiving adequate health care are the lack of culturally and linguistically competent services, misunderstanding by refugees about how to access health care services, and transportation issues.

Local health departments face the ongoing challenge of providing quality health care services with minimal resources. Unlike other health programs that may focus on a specific health condition, such as smoking cessation, drug abuse, etc., refugee health providers are faced with the daunting task of providing medical, laboratory, dental, mental health, family planning, domestic violence, language translation and numerous other services in one setting. To meet this challenge, California health providers have reached out to their communities for in-kind services and collaborations to improve the refugees health and economic status.

The RHS will pursue program activities that positively impact TB, STDs and other communicable diseases that disproportionately affect refugees. The Section will continue to develop and further refine prevention strategies and explore opportunities to collaborate with partner agencies such as the Office of Women's Health, Office of Multicultural Health, State Refugee Forum, California Advisory Committee on Refugee Health, the National Association of Refugee Health

Coordinators, the Office of International and Refugee Health, the National Centers for Disease Control, the Federal Office of Refugee Resettlement, and the California Department of Social Services. In the next year, the RHS will work to:

- improve its current health assessment to allow for statewide consistency, early diagnosis, intervention, referral and health education for chronic and communicable diseases; assessment and intervention for immunizations for children and adults; comprehensive data collection; and continuity of care through medical record transfer;
- develop an on-line electronic reporting system to allow local health departments to input health assessment data for electronic transmission via the Internet to RHS. The new database will provide detailed refugee health data and profiles to assist with health planning and policy-making decisions toward improving the health status and access to care among California's diverse refugee populations.

For further information about refugee health, contact:

Your local health department or
Refugee Health Section
(916) 327-1037

www.dhs/ca/gov/ps/dcdc/refugeehealth/index/htm

Microbial Diseases Laboratory

Mission

The mission of the Microbial Diseases Laboratory (MDL) is to provide reference, diagnostic and applied research, training, and laboratory oversight activities essential for the detection, identification, epidemiological investigation, control, and prevention of diseases caused by bacteria, fungi, and parasites in humans, foods, water, medical devices, and biologicals in California.

Services

The MDL is the reference microbiology laboratory for all local and county public health laboratories in California, as well as the support laboratory for the Division of Communicable Disease Control (DCDC) for the diagnosis of bacterial, parasitic, and fungal infections. Its highly trained laboratory scientists provide expert consultation, training, and direct state-of-the-art laboratory studies related to the most critical microbial threats to the public's health. Unique services for the detection, definitive identification, and strain differentiation of highly virulent human pathogens are parts of an ongoing surveillance program. This system for early detection of disease clusters and outbreaks that otherwise would go undetected reduces the human and economic costs associated with these diseases.

The **Environmental Microbial Diseases Section (EMDS)** of the laboratory supports the Environmental Laboratory Accreditation Program by providing the essential reference foundation for the evaluation and monitoring of all water and shellfish testing laboratories in the state. The clinically-oriented sections, **Enterics and Special Pathogens**, **Mycobacteriology and Mycology**, and **Immuno-serology** of the Laboratory also serve as a high level resource to the Laboratory Field Services Branch, which regulates all clinical laboratories in the State.

The MDL is a center for state-of-the-art training in microbiology. Training is provided for Public Health Microbiologist Interns, Food and Drug Investigators, Sanitarians, Clinical Laboratory Scientists, and other public health and safety professionals. The MDL collaborates with the National Laboratory Training Network in creating and presenting advanced courses and workshops in microbiology for medical and public health professionals nationwide.

Highlights

- During 1999-2000, the **Special Pathogens Unit** of MDL participated in investigations of suspected bioterrorism incidents involving anthrax and plague, and is preparing for an increased supportive role as DCDC works with threats of this kind. The Federal Bureau of Investigation (FBI) is working with the MDL as a special regional reference laboratory to support rapid bioterrorism investigations.
- The **Enterics Unit** identified and performed strain typing for 35 major California outbreaks of emerging and re-emerging pathogens such as *E. coli* O157:H7, *Salmonella* Enteritidis, *Shigella* and *Vibrio cholerae*. The Enterics Unit detected and provided the first notification to the Division for 10 of the 15 outbreaks. In addition, the section coordinated phage type testing with the Centers for Disease Control and Prevention (CDC) for another 17 clusters or outbreaks. These efforts were essential to limiting the amount of disease and to developing the information needed to prevent future problems. As a result, there was a huge savings in human suffering and economic losses.
- Both the **Enterics Unit** and the **Mycobacteriology and Mycology Section** performed DNA fingerprinting on bacterial pathogens. This fingerprinting was converted to digital images which were shared through electronic transmission with CDC as part of a nationwide network designed to rapidly pinpoint and control outbreaks. DNA fingerprinting

of *Mycobacterium tuberculosis* by the Mycology and Mycology Unit has resulted in the discovery of a number of unrecognized outbreaks, leading to rapid intervention and prevention of further transmission of tuberculosis to susceptible persons.

- Supported by a grant from the Centers for Disease Control and Prevention (CDC), the **Mycobacteriology and Mycology Section** provided rapid, up-to-date tuberculosis laboratory services to 9 rural California counties through the "BACTEC by Mail" program.
- Both **EMDS** and the **Enterics Unit** provided microbiological support for outbreaks of illness linked to food items. The hottest food item linked to illness was again alfalfa sprouts. The EMDS analyzed alfalfa seeds and the Enterics Unit conducted serotyping and DNA separation to determine if the *Salmonella* from seeds matched that from human sources. In addition to analyses of alfalfa and clover seeds, the EMDS processed and tested pond water for *Vibrio cholerae*, oysters for *Vibrio vulnificus*, hamburger for *E. coli* O157:H7, ice cream for Staphylococcal enterotoxin, pig ears for *Salmonella*, and a variety of prepared foods for *Listeria* or *Salmonella*. Greg Inami received a Superior Accomplishment Award for his diligence and quality work regarding the alfalfa seed outbreaks.
- The **EMDS** provided daily service to the **Environmental Management Branch** for surveillance of paralytic shellfish poisoning (PSP) in oysters and mussels at commercial growers and along the coast. This amounts to more than 900 samples per year processed for the presence of the toxin, which can cause respiratory failure within hours after ingestion. The laboratory investigated the feasibility of using cell culture and enzyme assays for backup detection of PSP. One innovative cell culture technique to quantify the toxin shows promise and research into its use will continue.
- Extensive monitoring of water for sewage-like organisms was ongoing throughout the year. Water runoff into bodies of water with commercial shellfish operations often caused closure to harvesting due

to high levels of fecal coliforms. Similarly, the water quality testing services for the City of Berkeley showed numerous problems where coliform organisms were high due to sewage leakage or water runoff into creeks, lakes, bays or estuaries. The EMDS was asked to referee the water quality of a few samples submitted by the Division of Drinking Water where inconclusive results were obtained from previous testing.

- A significant change in organizational structure took place in early December, when botulism diagnostic testing was split into two groups. The MDL retained responsibility for adult botulism testing. Again in 1999, there were a large number of positive cases of botulism associated with black tar heroin injection. A few cases were also tied to the consumption of home-canned foods. Procedures for specimen submittal were changed reinforcing the importance of specimens being transmitted through proper public health channels. Proper medical review of all potential cases is required before a specimen will be tested.
- The **Biologics Unit** prepares biologic reagents such as microbial antigens, antisera, monoclonal antibodies, and other specialized test components that are not available commercially. During 1999, Biologics developed monoclonal antibody reagents for serotyping of *Salmonella* cultures that are being evaluated for nationwide use. Section Chief, Dr. Paul Duffey, was honored with the Department's 1999 Superior Accomplishment Award for this important contribution to public health.
- The **Immunoserology Unit** continues to provide serological tests for bartonellosis (cat scratch disease, bacillary angiomatosis). Immunoserology is now validating an enzyme immunoassay to detect antibodies to *E. coli* O157 in human serum. This testing is available in only a small number of laboratories nationwide.
- The **Molecular Diagnostic Unit** is the newest addition to MDL. The unit was established to develop and implement molecular technologies for

the rapid detection and identification of microbial pathogens. The acquisition of an ABI 377 DNA sequencer has provided the foundation upon which the Molecular Diagnostic Unit has been built. Currently, the Molecular Diagnostic Unit features a variety of services including 16S rRNA sequencing for bacterial identification, *rpoB* sequencing for speciation and detection of rifampin-resistant mycobacteria, and *porA* sequencing for typing of *Neisseria meningitidis* strains. The Molecular Diagnostic Unit is also developing rapid PCR assays for the detection of *E. coli*, *C. diphtheriae*, *B. pertussis*, and *Y. pestis*. In addition to its role as a core molecular biology facility, the Molecular Diagnostic Unit will also provide support for assay development for other units within MDL.

Disease Trends

Trends in emerging and re-emerging infectious diseases and the need for responses to new microbial threats present diagnostic challenges to the MDL as we enter the 21st century. While the responsibility for keeping track of trends in infectious diseases resides with the Disease Investigations and Surveillance Branch of DCDC, the relative numbers of tests performed within the MDL provides a baseline regarding services across the field of public health.

Since 1993, the MDL has witnessed increasing requests for the detection of enteric pathogens, including *Escherichia coli* O157:H7. In that period, the number of O157:H7 cultures received by the MDL has risen from 85 in 1993 to 163 in 1999, a 191% increase. Similarly, requests to perform direct detection of Shiga toxin in stools of infants suspected of having hemolytic uremic syndrome (HUS) due to O157:H7 has increased 18-fold over the same time frame. Children under 8 years of age with hemolytic uremic syndrome have a high fatality rate.

Many other bacterial pathogens are demonstrating similar increases. *Bordetella pertussis*, the causative agent of whooping cough, has re-emerged as a

serious life-threatening disease in children. The number of cultures received by the MDL has doubled over the last five years, with a six-fold increase recorded from 1997 to 1998. Sexually-transmitted diseases including tests performed to detect chlamydia and *Neisseria gonorrhoeae* have continued to increase. In 1998, the MDL screened samples from 5,204 patients, an increase of 20% over 1997. In 1999, that figure rose to 5,539.

The Microbial Diseases Laboratory is responsible for the detection and identification of 4 of the 5 major infectious agents that are potentially usable by bioterrorists—anthrax, plague, tularemia and botulism.

Major new public health threats that MDL must respond to include bioterrorism and foodborne diseases. Of the 5 major infectious agents thought to represent potentially usable vehicles for bioterrorist activities, MDL has the laboratory responsibility for 4 of these (anthrax, plague, tularemia, botulism). Foodborne diseases are another national concern, as is the emergence of drug-resistant bacteria such as *Salmonella* Typhimurium DT104 in foods (eggs, chickens). Continuing threats include tuberculosis, since the disease is increasing in many developing nations and the proportion of cases in foreign born (versus US born) in California has increased to nearly 70%.

Challenges and Emerging Issues

For the near future, the challenges for the MDL involve balancing increased demands and competing needs to achieve multiple critical goals. Major challenges include:

- The need for newer molecular techniques to rapidly detect and identify infectious agents. One such molecular method, sequencing of ribosomal RNA,

can work with a broad range of bacteria to rapidly identify them to the species level and provide information about the strains present in clinical, food, or environmental samples. Other molecular methods, nucleic acid amplification methods and molecular fingerprinting could prove beneficial.

- The potential for bioterrorism. A world-class state laboratory will be needed for the rapid detection and identification of bioterrorism agents that require a specialized type of testing. Highly reliable reagents such as fluorescent antibodies to *Yersinia pestis* (plague) or *Francisella tularensis* (tularemia) are not commercially available, and currently must be made “in-house” by the Biologics Unit. MDL must be able to evaluate, validate, and implement new molecular (DNA) methods for rapid detection of bioterrorism agents, rather than being dependent on the culture and culture-based identification methods that are slow. Microbiologists, physicians, and other clinicians throughout the state must also be trained in identification of these organisms and the diseases they cause.
- The development of a new *in vitro* (“hollow fiber”—i.e., test tube) culture method for making antisera, which does not require animal use. If the *in vitro* method can be successfully implemented, it will greatly reduce the number of mice (and the cost) needed for immunoglobulin production.

- Implementation of a new, fluorescent high performance liquid chromatography method for the rapid detection of *M. tuberculosis*.
- Development and implementation of toxin detection methods that do not rely on animal inoculation. At present, tests for *Clostridium botulinum* toxin (botulism) and saxitoxin (paralytic shellfish poisoning) require animal inoculation. Faster and more sensitive methods for the detection of parasites such as *Cyclospora* and *Cryptosporidium* are also needed.

As the demands on public health laboratories increase, their role is being re-evaluated. By statute, all but the smallest California counties must provide laboratory services to public health medical facilities, many of which are being replaced with managed care contracts. Many of the functions of public health laboratories are therefore threatened, including the ability to respond quickly to public health emergencies. It is not clear whether statutory laboratory responsibilities could be met if public health laboratory functions were privatized. This trend may lead to decreased opportunity for public health consultation, and specialized testing such as strain typing, which cannot be maintained or cost-justified in a commercial laboratory.

**For further information on the
Microbial Diseases Laboratory, contact:**

Your local health department or
Microbial Diseases Laboratory
(510) 540-2242
www.dhs.ca.gov/dcdc/mdlindex.htm

Viral and Rickettsial Disease Laboratory

Mission

The mission of the Viral and Rickettsial Disease Laboratory (VRDL) is to promote and protect the public health of Californians by providing state-of-the-art diagnostic, reference laboratory leadership, applied research, and training services in the field of viral and rickettsial diseases.

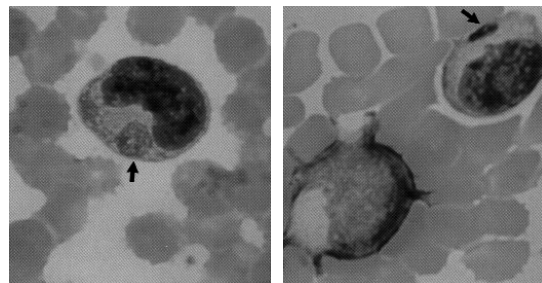
Services

The Viral and Rickettsial Disease Laboratory is the reference microbiology laboratory for all local and county public health laboratories, as well as the support laboratory for the Division of Communicable Disease Control for the diagnosis of viral and rickettsial diseases.

There are 5 sections in VRDL that serve the following functions:

- The **Viral Immunoserology Section** performs antibody testing and antigen detection for over 20 different infectious diseases such as influenza, HIV, hepatitis (A, B, and C), herpes simplex, measles, mumps, rubella, rickettsia, parvovirus-B109, Q-fever, and arboviruses.
- The **Viral Isolation Section** is responsible for over 80 diagnostic tests including the isolation of enteric, respiratory and central nervous system viruses and also provides rapid detection of agents such as rabies virus, adenovirus, and gastroenteritis virus.
- The **Epidemiology Support Section** provides testing services on all aspects of the diagnosis, treatment, virology, immunology, and epidemiology of HIV infection. Proficiency evaluation, consultation, and reference testing for flow cytometry and viral load testing is also provided to local public health laboratories.

- The **Retrovirus Diagnostic Section** serves as a statewide reference laboratory for HIV and other retroviruses and provides extensive consultation to local public health laboratories and clinicians throughout the state. Research activities include the development of new viral assays and monitoring of HIV vaccine trials.
- The **Respiratory Disease/AIDS Support Section** coordinates all diagnostic specimens received by VRDL for testing and answers over 100 phone consults per month from local public health laboratories, clinical laboratories, and physicians throughout the state about diagnostic testing and results. The Section is responsible for compliance with state and federal regulations for laboratory certification, proficiency, and safety standards and coordinates statewide training of public health microbiologists in virology. Statewide influenza laboratory surveillance is coordinated by this section as well.



Highlights

During 1998-1999, the VRDL accomplished a number of statewide, national and international projects:

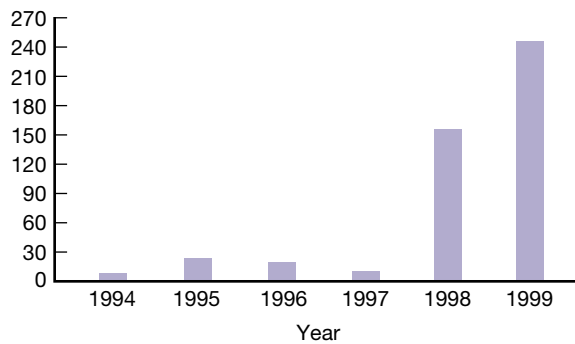
- Expanded the statewide viral load testing program, in collaboration with the State Office of AIDS, to coordinate the testing efforts of 12 local public health laboratories.
- Expanded the a statewide encephalitis project to provide rapid, state-of-the-art diagnostic testing for human encephalitis throughout California.

- Initiated testing of tick-borne diseases (e.g., ehrlichia) in ticks throughout California.
- Collaborated with Chiron Corporation on national and international influenza vaccine research.
- Collaborated with CDC, the Office of AIDS and Genetic Diseases Branch to determine the seroprevalence of HIV among childbearing women in California.
- Expanded the enhanced statewide surveillance for influenza in cooperation with the Immunization Branch, the Disease Investigations and Surveillance Branch, and Kaiser Permanente.
- Developed a new method for identifying HIV infected women at high risk of transmitting the virus to their offspring during pregnancy.
- Developed a rapid inexpensive method for identifying HIV subtype variants.
- Collaborated on multiple vaccine-preventable disease projects with the CDC, National Institutes of Health (NIH), and the University of California, Los Angeles.
- Initiated seroprevalence studies of hepatitis A, B, C and HIV in 6 state correctional facilities, in collaboration with the Office of AIDS, the Department of Corrections, the STD Control Branch, University of California, San Francisco (UCSF) and several county health departments.
- Completed a molecular epidemiologic study of adenoviruses 4 and 7 for the US military, including development of rapid PCR diagnostic assay for acute respiratory disease caused by these viruses.
- Awarded a 7-year grant from National Center of Statistics and the CDC for antibody testing of measles, rubella and varicella as a part of the Fourth National Health and Nutrition Examination Survey.
- Entered the fifth year as the central reference laboratory for NIH-sponsored HIV Network for prevention trials (HIVNET).
- Completed a Phase II HIV vaccine trial and initiated planning for a Phase III efficacy trial in collaboration with HIVNET.
- In collaboration with HIVNET, made final preparations for the very first HIV vaccine trial in Africa, which began in Kampala, Uganda, in 1999.
- VRDL was credited with the most sensitive HIV neutralizing antibody assay in a blinded comparison of laboratories throughout the United States—a test of critical importance in evaluating AIDS vaccines and monitoring the natural history of HIV disease.
- Awarded approximately \$1 million from NIH to study HIV assays and immunotherapy for HIV.
- Awarded a 4-year grant from NIH, in conjunction with UCSF Department of Epidemiology and Biostatistics, on the possible sexual transmission and natural history of human herpesvirus 8 (HHV-8) and its association with Kaposi's Sarcoma.
- Developed and applied molecular epidemiologic techniques for rabies virus.

Disease Trends

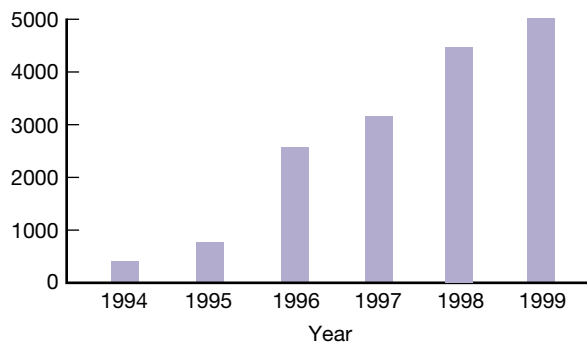
At least 30 new infectious diseases have emerged in the last 20 years and many old diseases have re-emerged as a threat to public health. The VRDL has adopted new tests for novel agents as well as more sophisticated tests for “older” diseases. At the same time, VRDL has experienced an increase in volume of testing in a number of areas. Figures 19 and 20 illustrate the change in testing levels.

Figure 19.
Influenza Testing
Viral & Rickettsial Disease Laboratory, 1994-1999



Prepared by the Department of Health Services

Figure 20.
HIV Testing*
Viral & Rickettsial Disease Laboratory, 1994-1999



*Includes culture, PCR, viral load, assays, etc.

Prepared by the Department of Health Services

Challenges and Emerging Issues

- Assure laboratory capability for bioterrorism events.
- Track influenza activity statewide and collaborate on pandemic preparedness planning.
- Establish statewide surveillance for the new variants of HIV that are likely to occur in California.
- Adopt rapid diagnostic methods for outbreaks of gastrointestinal illnesses.
- Further develop the state and local laboratory network.
- Recognize new strains of rabies (e.g., Eastern raccoon strain or Texas coyote strain) by molecular epidemiology.
- Develop capabilities to monitor the emergence of HIV and other viruses resistant to antiviral drugs.
- Develop HIV assays which are able to distinguish HIV vaccine responses from infection.
- Through heightened laboratory surveillance, determine the burden of tick-borne disease in California.
- Study the feasibility of using “killed HIV” as a vaccine candidate.
- Develop databases for electronic disease reporting and surveillance.

For further information about the Viral and Rickettsial Disease Laboratory, contact:

Your local health department or
Viral and Rickettsial Disease Laboratory
(510) 540-2573
www.dhs.ca.gov/dccdc/vrdindex.htm

Office of Binational Border Health

Mission

The California Office of Border Health was established in 1993 to provide coordination and liaison between California and Mexico health officials. It was institutionalized by statute (AB63) in January 2000 as the Office of Binational Border Health (OBBH). Its mission is to facilitate cooperation between health officials and health professionals in California and Mexico to improve the health of communities affected by border or binational conditions and activities.

Services

The California Office of Binational Border Health plays an important role in information gathering and networking activities, and brokering resources for cooperative public health activities. In recent years, significant progress has been made to increase the visibility of border health issues, and to engage stakeholders in specific plans and activities to improve the health of border and binational communities. The Office:

- coordinates planning and program development focusing on infectious diseases, food safety, environmental/occupational health, migrant and immigrant health, emergency medical services and other current issues;
- actively exchanges public health information with Mexico's health officials;
- organizes meetings relating to US–Mexico Border Health issues;
- maintains a directory of health officials and stakeholders on both sides of the border;
- facilitates linkages for large foundations and government grants for San Diego and Imperial

Counties, and border impact counties such as Los Angeles, Orange, Riverside, San Bernardino, and Fresno, which have large Latino, migrant or immigrant populations from Mexico;

- initiates, facilitates and/or implements projects or programs such as the Binational Infectious Disease Surveillance Project (BIDS) led by the CDC; the Ten Against Tuberculosis (TATB), consisting of the 4 U.S. and 6 Mexico border states; and Improving Border Health: Outreach and Education to Policy Makers, funded by the Alliance Healthcare Foundation;
- organizes training and networking for professional and lay health promotion workers in partnership with government and non-government organizations;
- assists Imperial County with epidemiologic and surveillance expertise;
- assists in coordinating activities of a CDC-funded diabetes study in border communities.

Highlights

- The Office of Border Health led a strategic planning effort that resulted in the identification of important California border health issues and key funding priorities.
- The Office supports the three California members of the US–Mexico Border Health Commission.

Disease Trends

Disease rates along the border are in many cases higher than in the rest of California. For example:

- Although the total number of tuberculosis cases reported in California has decreased since 1992, the percentage of tuberculosis cases in foreign-born persons has increased significantly over the last 5 years. Of the 3,608 total reported cases in

California in 1999, 1,341 (37%) were Latinos. Of these Latinos with TB disease, 61% percent were born in Mexico. In 1999, 33 people in California had newly diagnosed Multiple Drug Resistant TB disease; of these, 6 (18%) were born in Mexico. Approximately 30% of TB patients in Southern California are persons born in Mexico. A recent Centers for Disease Control and Prevention (CDC) study documented a 7-times higher rate of multiple drug resistance in foreign-born Latino TB patients than among US-born non-Latino patients. Drug resistant TB cases are costly (more than \$100,000 per case) and difficult to medically manage.

- Environmental health problems also fail to respect national boundaries. Imperial and San Diego counties do not meet California EPA standards for ambient ozone levels, due to increasing population pressures and motor vehicle traffic along the border. Truck border crossings at the Calexico/Mexico border increased 44% between 1991 and 1995.
- Imperial County has the highest childhood asthma hospitalization rate in the state for non-Latino whites (924) and the second highest rate for Latinos (522).

Challenges and Emerging Issues

The health of Californians is increasingly at risk due to inadequate infrastructure to engage in cooperative public health measures along the California–Mexico border. Problems include:

- environmental risks associated with untreated sewage, air pollution, impure water supplies, and toxic exposures;
- communicable diseases such as tuberculosis (TB), HIV, hepatitis A, diarrheal diseases, rabies, and vaccine preventable diseases;
- illnesses from the illegal importation of unapproved food, drugs, and consumer products;

- alcohol- and drug-associated health problems;
- non-communicable diseases, such as injuries and chronic disease;
- cross-border medical emergency services.

The border region poses unique public health challenges because of the frequent movement of people across the border; increased economic activity associated with NAFTA, the added challenge of the economic disparity between the two countries, as well as obvious language, and cultural, health care services and political differences.

There have been past difficulties in early notification from the Mexican industry on contaminated commercial products. Recent examples are beauty cream containing mercury, candy wrappers containing lead, and hepatitis A-tainted strawberries that created illnesses on the US side. The Health Resources Services Administration, CDC and Pan American Health Organization have small start-up projects to improve information systems infrastructure and early warning of disease problems.

Border health workers need to improve coordination of government programs among federal, state and local agencies, and binationally.

For further information about California border health, contact:

Your local health department or the California Office of Binational Border Health (619) 692-8472.

Websites of interest:

www.dhs.ca.gov/dcdc
www.borderhealth.gov
www.saludfronteriza.gov
www.paho.org/

Publications, 1998-1999

Disease Investigations and Surveillance Branch

Angulo FJ, Voetsch AC, Vugia DJ, Hadler JL, Farley M, Hedberg C, et al. Determining the burden of human illness from foodborne diseases. In Tollefson L, Guest Ed. *The veterinary clinics of North America: food animal practice; microbial food borne pathogens*, March 1998. Philadelphia, PA: WB Saunders Company 1998; 14(1):165-72.

Baer JT, Vugia DJ, Reingold AL, Aragon T, Angulo FJ, Bradford WJ. HIV infection as a risk factor for shigellosis. *Emerging Infect Dis* 1999; 5:820-823.

Campbell GL, Fritz CL, Fish D, Nowakowski J, Nadelman RB, Wormser GP. Estimation of the incidence of Lyme disease. *Amer J Epid* 1998;148:1018-26.

Catlos EK, Cantwell MF, Bhatia G, Gedin S, Lewis J, Mohle-Boetani JC. Strategic public health interventions to encourage Tuberculosis class A/B1/B2 immigrants to present for tuberculosis screening and treatment. *Am J Respir Crit Care Med* 1998;158:1037-41.

Centers for Disease Control and Prevention. False-positive laboratory tests for *Cryptosporidium* involving an enzyme-linked immunosorbent assay—United States, November 1997-March 1998. *MMWR* 1999;48:4-8.

Centers for Disease Control and Prevention. Geographic variation in penicillin resistance in *Streptococcus pneumoniae*—Selected sites, United States, 1997. *MMWR* 1999;48:656-661.

Centers for Disease Control and Prevention. Incidence of foodborne illnesses: Preliminary data from the Foodborne Diseases Active Surveillance Network (FoodNet) - United States, 1998. *MMWR* 1999;48:189-194.

Centers for Disease Control and Prevention. Nosocomial group A streptococcal infections associated with asymptomatic health-care workers—Maryland and California, 1997. *MMWR* 1999;48:163-166.

Centers for Disease Control and Prevention. Outbreak of Salmonella Serotype Muenchen infections associated with unpasteurized orange juice—United States and Canada, June, 1999. *MMWR* 1999; 48 (27): 582-585.

Centers for Disease Control and Prevention. Update: Hantavirus pulmonary syndrome—United States, 1999. *MMWR* 1999; 48:521-5.

Chang C, Yamamoto K, Chomel BB, Kasten RW, Simpson DC, Smith CR, Kramer VL. Seroepidemiology of Bartonella visonii subsp. *Berkhoffii* infection in California coyotes, 1994-1998. *Emerg Infect Dis* 1999; 5:711-5.

Cody SH, Abbott SL, Marfin AA, Schulz B, Wagner P, Robbins K, Mohle-Boetani JC, Vugia DJ. Two outbreaks of multidrug-resistant *Salmonella* serotype Typhimurium DT104 infections linked to raw-milk cheese in Northern California. *JAMA* 1999; 281:1805-1810.

Cody SH, Glynn MK, Farrar JA, Cairns KL, Griffin PM, Kobayashi J, Fyfe M, Hoffman R, King AS, Lewis JH, Swaminathan B, Bryant RG, Vugia DJ. An outbreak of *Escherichia coli* O157:H7 infection from unpasteurized commercial apple juice. *Ann Intern Med* 1999;130:202-209.

Davis R. Use of orally administered chitin inhibitor (lufenuron) to control flea vectors of plague on ground squirrels in California. *J Med Entomol* 1999;36(5): 562-567.

Frenzen PD, Riggs TL, Buzby JC, Breuer T, Roberts T, Voetsch D, Reddy S, and the FoodNet Working Group. Salmonella cost estimate updated using FoodNet data. *Food Review* 1999; 22(2):10-15.

- Fritz CL. Feline plague in California. *Calif Vet* 1999;May/June.
- Fritz CL, Glaser CA. Ehrlichiosis. In Hughes JM, Conte JE, eds. *Inf Dis Clinics of No Amer* 1998;12(1):123-36.
- Herwaldt BL, Beach MJ, and the Cyclospora Working Group. The return of *Cyclospora* in 1997: another outbreak of cyclosporiasis in North American associated with imported raspberries. *Ann Intern Med* 1999; 130(3):210-220.
- Hui LT, Husted SR, Reisen WK, Myers CM, Ascher MS, Kramer VL. Summary of reported St. Louis encephalitis and western equine encephalomyelitis virus activity in California from 1969-1997. *Proc. Calif Mosq Vector Control Assoc* 1999.
- Hui LT, Pontiflet E, Scott HA. Habitat and seasonal abundance of ticks in urban recreation areas of Alameda County, California, 1992-1996. *Proc Calif Mosq Vector Control Assoc* 1999; 66:56-66.
- Kitsutani PT, Denton RW, Fritz CL, Murray RA, Todd RL, Pape WJ, Frampton JW, Young JC, Khan AS, Peters CJ, Ksiazek TG. Acute Sin Nombre hantavirus infection without pulmonary syndrome, United States. *Emerg Infect Dis* 1999; 5:701-5.
- Klausner JD, Passaro DJ, Rosenberg J, Thacker WL, Talkington DF, Werner SB, Vugia DJ. Enhanced control of an outbreak of *Mycoplasma pneumoniae* pneumonia with azithromycin prophylaxis. *J Infect Dis* 1998; 177: 161-6.
- Kramer VL, Randolph MP, Hui LT, Irwin WE, Gutierrez AG, Vugia DJ. Detection of the agents of human ehrlichioses in Ixodid ticks from California. *Am J Trop Med Hyg* 1999; 60:62-5.
- Lieu TA, Mohle-Boetani JC, Ray GT, et al. Neonatal group B streptococcal infection in a managed care population. *Obstet Gynecol* 1998;92:21-7.
- Lindsay KL, Rosenberg J. Hepatitis C. Epitomes in preventive medicine and public health. *West J Med* 1998;169:372-3.
- Louie L, Ng S, Hajjeh R, Johnson R, Vugia D, Werner SB, Talbot R, Klitz W. Influence of host genetics on the severity of coccidioidomycosis. *Emerg Infect Dis* 1999; 5:672-80.
- Macher J, Rosenberg J. Evaluation of exposure to infectious agents. In *Handbook of occupational safety and health*. Second Edition. DiBerardinis L (ed). New York, NY: John Wiley and Sons 1998.
- Macher JM, Rosenberg J. Evaluation and management of exposure to infectious agents. In DiBerardinis LJ (Ed). *Handbook of occupational safety and health*, 2nd ed. New York: John Wiley and Sons, Inc. 1999.
- Mohle-Boetani JC, Lieu TA, Ray TG, Escobar G. Preventing neonatal group B streptococcal disease: cost-effectiveness in a health maintenance organization and the impact of delayed hospital discharge for newborns who received intrapartum antibiotics. *Pediatrics* 1999;103(4):703-710.
- Mohle-Boetani JC, Werner SB, Abbott S, Bendana N, Bryant R, Fenstersheib M, Ginsberg M, Gresham L, Koehler J, Mascola L, and the investigation team. *Salmonella enteritidis* infections from shell eggs: outbreak in California. *West J Med* 1998;169:299-301.
- Mohle-Boetani JC, Reporter R, Werner SB, Abbott S, Farrar J, Waterman S, Vugia DJ. A California outbreak of *Salmonella* serogroup Saphra due to cantaloupes from Mexico. *JID* 1999; 180:1361-4.
- Monson SE, Bronson LR, Tucker JR, Smith CR. Experimental and field evaluations of two acaricides for control of *I. pacificus* (Acari: Ixodidae) in Northern California. *J Med Entomol* 1999; 36:660-5.
- Nicholson WL, Castro MB, Kramer VL, Sumner JW, Childs JE. Dusky-footed wood rats (*Neotoma fuscipes*) as reservoirs of granulocytic Ehrlichiae (*Rickettsiales: Ehrlichieae*) in northern California. *J Clin Microbiol* 1999; 37:3323-7.

Passaro DJ, Werner SB, McGee J, Mac Kenzie WR, Vugia DJ. Wound botulism associated with black tar heroin among injecting drug users. *JAMA* 1998; 279:859-63.

Passaro DJ, Werner SB, Vugia DJ. Wound botulism associated with black tar heroin. *JAMA* 1998;280:1480.

Rodriguez-Lainz A, Fritz CL, McKenna WR. Animal and public health significance of Africanized honeybees. *J Am Vet Med Assoc* 1999; 215:1799-1804.

Rosenberg J. Hepatitis C in healthcare workers. In *Proceedings of Conference on Healthcare Worker Health and Safety*, W. Chareny (ed). CRC Press, Boca Raton, FL 1998.

Savage HM, Fritz CL, Rutstein D, Yolwa A, Vordham V, Gubler DJ. Epidemic of dengue- 4 virus in Yap State, Federated States of Micronesia, and implication of *Aedes hensilli* as an epidemic vector. *Amer J Trop Med & Hyg* 1998;58:519-24.

Swift P, Fritz CL. Raccoons and *Baylisascaris* infection. *California Council for Wildlife Rehabilitators newsletter*. 1999; 6(2):1-2.

Waterman SH, Fritz CL. New vaccines for infectious diseases. *West J Med* 1998;169:370-1.

Werner SB. Food Poisoning. In *Maxcy-Rosenau-Last: Public health and preventive medicine*, 14th edition, 1998;263-71.

Yamada EG, Mohle-Boetani JC, Olson KR, Werner SB. Mushroom poisoning due to Amatoxin - Northern California, Winter 1996/1997. *West J Med* 1998; 169:380-4.

Immunization Branch

Glik D, Berkanovic E, Stone K, Ibarra L, Schriebman M, Rosen B, Tanner L, Jones MC, Richardes D. Health education goes to Hollywood: working with prime-time and day-time entertainment television for immunization promotion. *Health Comm* 1998;3(3):263-282.

O'Malley CD, Smith NJ, Braun R., Prevots DR. Letter to the Editor: Tetanus associated with body piercing. *Clin Infect Dis* 1998; 27:1343-4.

O'Malley CD, White E, Schechter R, Smith NJ, Waterman S. Tetanus among injecting drug users, California, 1997. *MMWR* 1998; 47:149-151.

Rothrock R, Reingold A, Alexopolous N, O'Malley CD, Smith NJ, Waterman S. *Haemophilus Influenzae* invasive disease among children aged <5. California, 1990-1996. *MMWR* 1998; 47:737-40.

Sexually Transmitted Disease Control Branch

Flood JM, Weinstock HS, Bolan G, Bayne L. Neurosyphilis in San Francisco during the AIDS epidemic, 1985-1989. *J Infect Dis* 1998; 177: 931-940.

Kamb ML, Peterman TA, Fishbein M, Mallotte CK, Douglas JM, Spitalny K, Rhodes F, Bolan G, Zenilman JM, Graziano S. Designing a multi-center, randomized trial to evaluate the efficacy of HIV prevention counseling: Project RESPECT. *JAMA* 1998; 380: 1161-1167.

Kimball AM, Lafferty W, Hundt A, MacCornack R, Bolan G. The impact of health care market changes on local decision making and STD care: Experiences in three counties. *Am J Prev Med* 1998; 13: 75-84.

Klausner JD, Barrett DC, Dithmer D, Boyer CB, Brooks GF, Bolan G. Risk factors for repeated gonococcal infections: San Francisco, 1990-1992. *J Infect Dis* 1998; 177: 1766-1769.

Korn AP, Hessol NA, Padian NP, Bolan G, Donagan E, Landers DV, Schachter J. Risk factors for plasma cell endometritis among women with cervical *Neisseria gonorrhoeae*, cervical *Chlamydia trachomatis* or bacterial vaginosis. *Am J Obstet Gyn* 1998; 178: 987-990.

Tuberculosis Control Branch

California Legislative Analyst's Office. State recovering from tuberculosis epidemic. Update California July, 1999: 1-4.

Catlos E, Cantwell M, Bhatia G, et al. Strategic public health interventions to encourage TB Class A/B1/B2 immigrants to present for TB screening and treatment. Am J Respir Crit Care Med 1998; 158: 1037-1041.

Centers for Disease Control (CDC). Tuberculosis outbreaks in prison housing units for HIV-infected inmates – California, 1995 – 1996. MMWR 1999;48: 79-82.

Chin DP, DeRiemer K, Small PM, de Leon AP, Steinhart R, Schechter GF, Daley CL, Moss AR, Paz EZ, Jasmer RM, Agasino CB, Hopewell PC. Differences in contributing factors to tuberculosis incidence in US-born and foreign-born persons. Am J Respir Crit Care Med 1998; 158: 1797-1803.

Chin DP, Crane CM, Ya Diul M, et al. Spread of *Mycobacterium tuberculosis* in a community implementing recommended elements of tuberculosis control. JAMA 2000; 283: 2968-2974.

DeRiemer K, Chin DP, Schechter GF, Reingold AL. Tuberculosis among immigrants and refugees. Arch Intern Med 1998; 158: 753-760.

Flood J, Chin D. New Guidelines: Prevention and treatment of tuberculosis among patients infected with the human immunodeficiency virus. California Morbidity, February 1999.

Lobato MN, Cummings K, Will D, Royce S. Tuberculosis in children and adolescents: California, 1985-1995. Pediatr Infect Dis J 1998; 17:407-12.

Medical Board of California. New Tuberculosis Guidelines. Action Report July 1999:7.

Sciortino S, Mohle-Boetani J, Royce S, et al. B notifications and the detection of TB among foreign born recent arrivals in California. Int J Tuberc Lung Dis 1999; 3(9):778-785.

Snyder D, Chin D. Cost-effectiveness analysis of directly observed therapy for patients with tuberculosis at low risk for treatment default. Am J Respir Crit Care Med 1999; 160:582-586.

Snyder D, Paz EA, Mohle-Boetani J, Fallstad R, Black RL, Chin D. Tuberculosis prevention in methadone maintenance clinics. Am J Respir Crit Care Med 1999; 160: 178-185.

Tulsky, J., White, M., & Young, J. Street talk: knowledge and attitudes about tuberculosis and tuberculosis control among homeless adults. Int J Tuberc Lung Dis 1999; 3(6): 528-533.

Microbial Diseases Laboratory

Abbott, SL. *Klebsiella*, *Enterobacter*, *Citrobacter* and *Serratia*. In Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC, Tenover RH (Eds.) Manual of clinical microbiology, 7th ed. Washington, DC: American Society for Microbiology 1999.

Abbott, SL, Portoni BA, Janda JM. Urinary tract infections associated with nontyphoidal *Salmonella* serogroups. J Clin Microbiol 1999;37:4177-4178.

Abbott, SL, Seli LS, Catino Jr M, Hartley MA, Janda JM. Misidentification of unusual *aeromonas* species as members of the genus vibrio: a continuing problem. J Clin Microbiol 1998;36:1103-1104.

Brenner, DJ, O'Hara CM, Grimont PAD, Janda JM, Falsen E, Aldova E, Ageron E, Schindler J, Abbott SL, Steigerwalt AG. Biochemical identification of *Citrobacter* species defined by DNA hybridization and description of *Citrobacter gillenii* sp. nov. (formerly *Citrobacter* genomospecies 10) and *Citrobacter murlinae* sp. nov. (formerly *Citrobacter* genomospecies 11). J Clin Microbiol 1999; 37:2619-2624.

Brown, J, McNeil MM, Desmond EP. *Nocardia*, *Rhodococcus*, *Gordona*, *Actinomadura*, *Streptomyces*, and other actinomycetes of medical importance. In Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC (Eds.) Manual of clinical microbiology, 7th ed. Washington, DC: American Society for Microbiology 1999.

Cody, SH, Abbott SL, Marfin AA, Schulz B, Wagner P, Robbins K, Mohle-Boetani JC, Vugia DJ. Two outbreaks of multi-drug resistant *Salmonella* serotype Typhimurium DT104 infections linked to raw-milk cheese in northern California. JAMA 1999;281:1805-1810.

Cody, SH, Glynn MK, Farrar, JA, Cairns KL, Griffin PM, Kobayashi J, Fyfe M, Hoffman R, King AS, Lewis JH, Swaminathan B, Bryant RG, Vugia DJ. An outbreak of *Escherichia coli* O157:H7 infection from unpasteurized commercial apple juice. Ann Intern Med 1999;130:202-209.

Dolter J, Wong J, Janda JM. Association of *Neisseria cinerea* with ocular infections in pediatric patients. J Infect 1998;36:49-52.

Inami, GB, Moler SE. Detection and isolation of *Salmonella* from naturally contaminated alfalfa seeds following an outbreak investigation. J Food Prot 1999;62:662-664.

Janda JM. *Vibrio*, *aeromonas*, *pleisiomonas*. In Collier L, Balows A, Sussman M (Eds) Topley & Wilson's microbiology and microbiology infections, 9th ed, vol 2. London: Edward Arnold 1998.

Janda, JM, Abbott SL. *The enterobacteria*. Philadelphia, PA: Lippincott-Raven 1998.

Janda JM, Abbott SL. Evolving concepts regarding the genus *aeromonas*: an expanding panorama of species, disease presentations, and unanswered questions. Clin Infect Dis 1998; 27:332-344.

Janda, JM, Abbott SL. Unusual food-borne pathogens. Clin Lab Med 1999;19:553-582.

Janda JM, Abbott SL, Albert MJ. Prototypal diarrheagenic strains of *Hafnia alvei* are actually members of the genus *Escherichia*. J Clin Microbiol 1999;37:2399-2401.

Janda JM, Abbott SL, Khashe S. Identification and initial characterization of elastase activity associated with *Vibrio cholerae*. Curr Microbiol 1999;39:73-78.

Janda JM, Abbott SL, Woodward D, Khashe S. Invasion of Hep-2 and other eukaryotic cell lines by *Providencia*: further evidence supporting the role of *Providencia alcalifaciens* on bacterial gastroenteritis. Curr Microbiol 1998;37:159-165.

Khashe S, Janda JM. Biochemical and pathogenic properties of *Shewanella alga* and *Shewanella putrefaciens*. J Clin Microbiol 1998;36:783-787.

Mohle-Boetani JC, Reporter R, Werner SB, Abbott S, Farrar J, Waterman SH, Vugia DJ. An outbreak of *Salmonella* serogroup Saphra due to cantaloupes from Mexico. J Infect Dis 1999; 180:1361-1364.

Overman TL, Janda JM. Antimicrobial susceptibility patterns of *Aeromonas jandaei*, *A. schubertii*, *A. trota*, and *A. veronii* biotype *veronii*. J Clin Microbiol 1999;37:706-708.

Peterson EM, Nakasone A, Platon-DeLeon JM, Jang Y, De La Maza LM, Desmond E. Comparison of direct and concentrated acid-fast smears to identify specimens culture positive for *Mycobacterium* spp. J Clin Microbiol 1999;37:3564-3568.

Schreckenberger PC, Janda JM, Wong JD, Baron EJ. Algorithms for identification of aerobic gram-negative bacteria. In Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC (Eds.) Manual of clinical microbiology, 7th ed. Washington, DC: American Society for Microbiology 1999.

Shapiro DS, Wong JD. *Brucella*. In Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC (Eds.) Manual of clinical microbiology, 7th ed. Washington, DC: American Society for Microbiology 1999.

Trejevo RT, Abbott SL, Wolfe MI, Meshulam J, Yong D, Flores GR. An untypeable *Shigella flexneri* strain associated with an outbreak in California. *J Clin Microbiol* 1999;37:2352-2353.

Wong JD, Shapiro DS. *Francisella*. In Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover RH (Eds.) *Manual of clinical microbiology*, 7th ed. Washington, DC: American Society for Microbiology 1999.

Viral and Rickettsial Disease Laboratory

Anderson RW, Ascher MS, Sheppard HW. Direct HIV cytopathicity cannot account for CD4 decline in AIDS in the presence of homeostasis: A worst-case dynamic analysis. *J Acq Imm Def Syn and Hum Retrovirol* 1998; 17:245-252.

Betts MR, Krowka JF, Kepler TB, Davidian M, Christopherson C, Kwok S, Louie L, Eron J, Sheppard H, Frelinger JA. Human immunodeficiency virus type-1 (HIV-1) specific cytotoxic T lymphocyte activity is inversely correlated with HIV-1 viral load in HIV-1 infected long-term survivors. *AIDS Res Human Retrovirus* 1999;13:1219-1228.

Buchacz KA, Wilkinson DA, Krowka JF, Koup RA, Padian NS. Genetic and immunological host factors associated with susceptibility to HIV-1 infection. *AIDS* 1998, 12 (suppl A): S87-S94.

Casseb J, Hong MA, Gonzalez C, Brigido LF, Duarte AJS, Hendry RM. Two variants of HIV-1 B serotype are transmitted heterosexually in Sao Paulo, Brazil. *Braz J Med Res* 1998;31:1243-1246.

Caterino-de-Araujo A, Casseb J, Hendry RM. Use of V3 peptide-specific antibody evaluation for subtyping HIV-1: Results of a vertical transmission study from Sao Paulo, Brazil. *J Trop Peds* 1999; 45: 265-270.

Cody SH, Bolding AF, Fenstershieb M, Olivas GS, O'Malley C, Smith N, Hendry RM, Waterman SH. Update: Influenza activity – United States, 1998-99 season. *MMWR* 1999; 48:177-181.

Crawford-Miksza LK, Wadford DA, Schnurr DP. Molecular epidemiology of enzootic rabies in California. *J Clin Virol* 1999;14:207-219.

Crawford-Miksza LK, Nang RN, Schnurr DP. Molecular Surveillance of Strain Variation in Adenoviruses Causing Acute Respiratory Disease, AV 4 and AV 7a. *J Clin Microbiol* 1999;37:1107-1112

Dunnebacke TH, Walen KH. A protein from naegleria amoebae causes apoptosis in chick embryo and CHO cells after they become confluent. *In Vitro Cell Dev Biol* 1999;35:252-261.

Feldman SA, Hendry RM, Beeler JA. Identification of a linear heparin binding domain for human respiratory syncytial virus attachment glycoprotein G. *J Virol* 1999; 73: 6610-6617.

Fleming HE, Little FA, Schnurr D, Avila PC, Wong H, Liu J, Yagi S, Boushey HA. Rhinovirus-16 colds in healthy and in asthmatic subjects. *Am J Respir Crit Care Med* 1999;160:100-108.

Fritz C, Glaser CA. Ehrlichiosis. *Infectious Disease Clinics of North America* 1998;12:123-136.

Gadkari DA, Moore D, Sheppard HW, et al. Transmission of genetically diverse strains of HIV-1 in Pune, India. *Indian J Med Res* 1998;107:1-9.

Hanlon CA, Childs JE, Nettles VF. Special Series, recommendation of a national working group on prevention and control of rabies in the United States, Article III: Rabies in wildlife. *JAVMA* 1999;215:1612-1619.

Henderson DA, Inglesby TV, Bartlett JG, Ascher, MS, et al. Smallpox as a biological weapon. *JAMA* 1999;281:2127-2137.

Inglesby TV, Henderson DA, Bartlett JG, Ascher MS, Eitzen E, et al. Anthrax: Civilian medical and public health management following use of a biological weapon. *JAMA* 1999;281:1735-1736.

Lee TH, Stromberg RR, Heitman JW, Sawyer L, Hanson CV, Busch MP. Distribution of HIV-1 in blood components: Detection and significance of high levels of HIV-1 associated with platelets. *Transfusion* 1998;38:580-588.

Ludwig SL, Brundage JF, Kelley PW, Nang R, Towle C, Schnurr DP, Crawford-Miksza L, Gaydos JC. Prevalence of antibodies to adenovirus, serotypes 4 and 7, among unimmunized US Army trainees: Results of a retrospective nationwide seroprevalence survey. *J Inf Dis* 1998;178:1776-8.

Martin MP, Carrington M, Dean M, O'Brien SJ, Sheppard HW, Wegner SA, Michael NL. CXCR4 Polymorphisms and HIV-1 pathogenesis. *J Acq Imm Def Syn* 1998;19:430-432.

McCutchan FE, Sanders-Buell E, Salminen MO, Carr JK, Sheppard HW. Diversity of the human immunodeficiency virus type 1 (HIV-1) envelope glycoprotein in San Francisco Men's Health Study participants. *AIDS Research and Human Retroviruses*. 1998;14(4):329-337.

Oberste MS, Maher K, Kennett ML, Campbell JJ, Carpenter MS, Schnurr D, et al. Molecular epidemiology and genetic diversity of echovirus type 30 (E30): Genotypes correlate with temporal dynamics of E30 isolation. *J Clin Micro* 1999;37:3928-3933.

Pickering JW, Forghani B, Shell GR, Wu L. Comparative evaluation of three recombinant antigen-based enzyme immunoassays for detection of IgM and IgG antibodies to human parvovirus B19. *Clin Diag Virology* 1998;9:57-63.

Ruiz JD, Molitor F, Sun RK, Mikanda J, Facer M, Colford JM, Rutherford GW, Ascher MS. Prevalence and correlates of hepatitis C virus infection among inmates entering the California correctional system. *West J Med* 1999;170:156-160.

Sadler R, Wu L, Forghani B, Renne R, Zhong W, Herndier B, Ganem D. A complex translational program generates multiple novel proteins from the latently expressed Kaposin (K12) locus of Kaposi's sarcoma-associated herpesvirus. *J Virol* 1999;73:5722-5740.

Wang CY, Sawyer LSW, Fang X, Murthy KK, Fang X, Walfield AM, Ye J, Wang JJG, De Chen P, Li ML, Salas M, Shen M, Gauduin MC, Boyle RW, Koup RA, Montefiori DC, Mascola JR, Koff WC, Hanson CV. Postexposure immunoprophylaxis of primary isolates by an antibody to HIV receptor complex. *PNAS(USA)* 1999;96:10367-10372.

Zoetewij JP, Eyes ST, Orenstein JM, Kawamura T, Wu L, Chandran B, Forghani B, Blauvelt A. Identification and rapid quantification of early- and late-lytic human herpesvirus 8 infection in single cells by flow cytometric analysis: characterization of antiherpesviral agents. *J Virol* 1999;73:5894-5902.