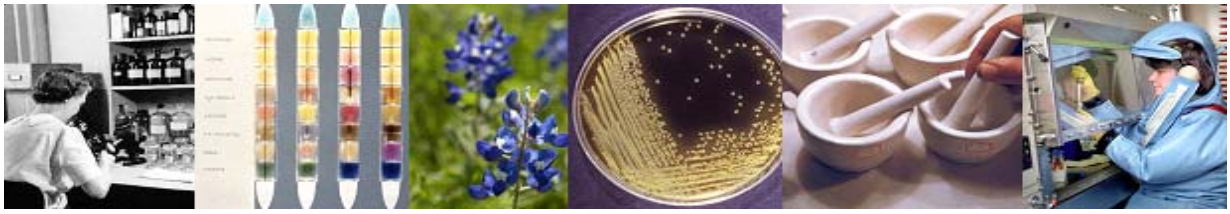
The EpiLink

A public health news bulletin from the Texas Department of State Health Services
Infectious Disease Control Unit



Volume 64/Number 4/April 30, 2007

Texas Newborn Screening Lab Expansion

The mission of the Department of State Health Services (DSHS) Newborn Screening (NBS) Program is to decrease the morbidity and mortality of infants born in Texas by providing a customer-oriented, accurate, fast, high-quality newborn screening laboratory analysis for practitioners; follow-up and case management services for identified clients; a statistical review of the program; and outreach education.

NBS is a public health program which screens for a specific set of inherited disorders that may show no outward signs at birth. If left untreated, the cost of these conditions is enormous in terms of human morbidity and mortality, suffering, and economic burden. Identification of these disorders and timely interventions can lead to the elimination or reduction of the associated mortality, morbidity, and disabilities. What began as a simple, inexpensive screen for one metabolic disorder has grown into a 6-part system involving screening, short term follow-up, diagnosis, treatment and management, evaluation, and an education process encompassing all stages. With new technology and national guidance, screening programs in Texas now have the capability to test for more than 40 disorders.

Texas rules (Texas Administrative Code 25; Chapter 37.56) require 2 screenings per newborn. The first screening is recommended at 24-48 hours of life and the second at 1-2 weeks of age. DSHS Laboratory receives approximately 750,000 newborn specimens annually and analyzes each specimen for 27 disorders. This translates into the NBS laboratory performing more than 4.5 million tests per year, making it the largest program in the country. Approximately 16,000 abnormal results will be identified and each will require the NBS case management staff to provide initial contact and guidance to physicians. After follow up evaluation, over 600 infants are expected to be diagnosed with one of the 27 disorders annually.

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History of the Newborn Screening Program

Newborn screening began in the early 1960's when a simple test for phenylketonuria (PKU) was developed through the work of Dr. Robert Guthrie. Texas implemented a pilot to screen for the disorder in 1963. In 1965, the Texas Legislature adopted a statute (Chapter 262, Vernon's Ann. Civ. St.) requiring population-wide newborn screening for PKU. In 1977, the statute was expanded to include testing for congenital hypothyroidism (CH), galactosemia (GAL), and homocystinuria (HCY), which were all added to the screening panel by 1980 as funding became available. In 1983, screening for HCY was discontinued and replaced with screening for sickle cell diseases (SCD). Congenital adrenal hyperplasia (CAH) was added in 1989. In addition to the blood specimen screenings done in Texas since 1991, more than 95% of newborns have been screened for hearing loss.

Through the years, the NBS Laboratory has sought to expand and enhance the screening process through new analytical technology and integrated software applications. In 2001, the laboratory changed from bioassay and radiological testing methods to fluorometric microassay systems. The new testing methods provided automation to previously manual tests and more technically advanced equipment for testing already automated. These advances allowed for increased efficiencies in production and monitoring of the test systems.

In 2004, the computer system that handles the specimen results, patient data, and result reporting was updated. The updated system provides positive specimen identification and has the ability to track a specimen collection kit throughout the entire screening process. The system captures and documents information on the receipt of the specimen at the DSHS laboratory; ensures accurate placement in the initial 96-well micro-titer testing plate; coordinates all of the subsequent analytical testing stages and the reporting of all specimen results; and archives an image of the final result report mailed to the specimen provider.

DSHS Laboratory receives approximately 750,000 newborn specimens annually and analyzes each specimen for 27 disorders. This translates into...more than 4.5 million tests per year, making it the largest program in the country.

NBS laboratory services also include monitoring dietary specimens from children diagnosed with PKU to assist them in adjusting the dietary phenylalanine intake to maintain appropriate levels. Molecular genetic testing is also performed for patients diagnosed with PKU, as a second tier test for galactosemia, and for certain types of hemoglobinopathies. The molecular testing provides additional information to the physician managing the child's healthcare to optimize follow up and treatment for the disorders.

In the late 1990's, tandem mass spectrometry (MS/MS) was introduced as a method to screen for a battery of more than 30 newborn screening disorders from a single drop of blood.

Table 1. Disorders Included in the DSHS Newborn Screening Panel:
December 6, 2006

AMINO ACID DISORDERS:
Argininosuccinic Acidemia (ASA)
Citrullinemia (CIT)
Homocystinuria (HCY)
Maple Syrup Urine Disease (MSUD)
Phenylketonuria (PKU)
Tyrosinemia Type I (TYRI)

FATTY ACID DISORDERS:
Medium Chain Acyl-CoA Dehydrogenase Deficiency (MCAD)
Very Long Chain Acyl-CoA Dehydrogenase Deficiency (VLCAD)
Long Chain Hydroxyacyl-CoA Dehydrogenase Deficiency (LCHAD)
Trifunctional Protein Deficiency (TFP)
Carnitine Uptake Deficiency (CUD)
Carnitine Palmitoyl Transferase Deficiency1 (CPT1)

ORGANIC ACID DISORDERS:
Glutaric Acidemia I (GA-I)
3-OH 3-Methyl Glutaric Aciduria (HMG)
Isovaleric Acidemia (IVA)
Multiple Carboxylase Deficiency (MCD)
3 -Methylcrotonyl-CoA Carboxylase Deficiency (3-MCC)
Methylmalonic Acidemia (MMA)
Propionic Acidemia (PA)
Beta-Ketothiolase Deficiency (BKT)

GALACTOSEMIA

BIOTINIDASE DEFICIENCY

ENDOCRINE DISORDERS:
Congenital Hypothyroidism (CH)
Congenital Adrenal Hyperplasia (CAH)

HEMOGLOBINOPATHIES including:
Hb S/S
Hb S/C
Hb S-Beta thalassemia

MS/MS laboratory methods were refined and standardized over the years, and have become state of the art technology recommended by many national organizations and agencies, including the American College of Medical Genetics (ACMG), the Centers for Disease Control and Prevention (CDC), and the March of Dimes (MOD). In January 2005, in addition to supporting MS/MS technology, the ACMG developed guidelines ("Newborn Screening: Toward a Uniform Screening Panel and System") recommending 28 "core" blood test screens be performed on every newborn. The guidelines became a national standard of practice for newborn screening programs.

In 2005, the Texas Legislature adopted House Bill 790, which mandated screening for the 28 recommended disorders as allowed with the available funding. The NBS Laboratory was tasked with implementing a new and technologically challenging analytical system. The expansion required significant changes including remodeling the laboratory, procuring and installing 10 MS/MS instruments, and hiring and training 17 laboratory analysts and support staff. By December 6, 2006, the laboratory had successfully added screening for 20 disorders detectable by MS/MS (6 amino acid disorders, 5 fatty acid disorders, and 9 organic acid disorders) and was finalizing the testing process for biotinidase deficiency. On January 8, 2007, biotinidase screening was also successfully implemented. A complete list of all disorders currently screened is presented in Table 1.

To provide follow-up services on the additional 4,000 abnormal and 70 confirmed cases anticipated each year, the Case Management Program increased their staff with the addition of 3 nurses, 3 public health technicians, 2 program specialists, an administrative assistant, and a manager. Extensive planning and effort went into educating health care providers, metabolic consultants, and parents/consumers prior to program expansion. Educational efforts included mailing informational letters and postcards to more than 4,000 direct care providers, providing periodic updates to all

providers through mail out of a quarterly newsletter, distributing more than 75,000 parent brochures to prenatal care providers and birthing centers, and providing direct training to more than 1,160 health care personnel involved in the screening process.

The current expanded newborn screening program was officially implemented on February 8, 2007 with the completion of software upgrades enabling full reporting and mailing of laboratory results and full case management patient coordination and follow-up modules.

Prepared by Donna C. Williams, Laboratory Services Section, Texas Department of State Health Service.

Editor's note: at the request of the contributors, this article was modified and republished on May 2, 2007.

Molecular Diagnostic Testing

The Department of State Health Services (DSHS) Molecular Diagnostic Laboratory (MDL) is responsible for the development and performance of molecular diagnostic tests for nucleic acid targets in a variety of infectious agents. Molecular testing allows the detection of viruses, such as norovirus or avian influenza virus, and bacteria, such as those that cause pertussis, more quickly and accurately than traditional methods. Along with the improvement of detection methods, the need for molecular testing for viruses and bacteria is rapidly increasing, particularly for infectious organisms that are difficult or dangerous to culture. The Laboratory is able to develop or validate molecular tests as new infectious diseases emerge, such as Severe Acute Respiratory Syndrome (SARS), as known infectious agents threaten to cause epidemics, such as influenza or West Nile virus.

There is strong growth in the utilization of molecular diagnostic testing across the country. A survey conducted in 2003 revealed a 14% increase in overall testing volume for 2002 and a 19% increase for 2003. Infectious disease tests represent 78% of all molecular diagnostic tests performed. In the year before this survey, 76% of laboratories said they have added new tests to their menus and 83% planned to add new tests in 2003.

Molecular testing in the DSHS Laboratory is done using polymerase chain reaction (PCR). PCR allows the amplification of a specific bacterial or viral nucleic acid sequence of interest. The PCR is done by using an instrument called a LightCycler, which permits real-time PCR analysis. This reduces the amount of time required for specimen analysis from days to 3-4 hours. The Laboratory is currently using this method for detecting *Bordetella pertussis,* the bacteria that causes whooping cough. Validation studies in the DSHS Laboratory and studies published in scientific journals demonstrate that molecular diagnostics for pertussis are much more sensitive than culture and more sensitive and specific than direct fluorescent antibody (DFA) detection (sensitivity of 50-62%, and specificity of 75-90%). The real-time-PCR test sensitivity is about 93.2% with a specificity of 97-99%. Molecular diagnostic methods are also being used for parapertussis, norovirus (Norwalk-like virus), West Nile virus and St. Louis encephalitis virus. Other arboviruses (arthropod-borne viruses) can also be detected, including Eastern Equine Encephalitis, Western Equine Encephalitis and the California (La Crosse) viruses. All these viruses can cause brain swelling in those infected, and this can lead to death.

Molecular microbiology testing provides rapid results that can be used to prevent and/or stop outbreaks and epidemics. Since the implementation of real-time PCR testing for *B. pertussis*, DSHS MDL has identified more cases of the infection than were identified by conventional bacteriological culture techniques. In addition, using the assay for norovirus, the Laboratory has identified several outbreaks, including one in a shelter for victims of Hurricane Katrina. The laboratory has also developed methods for detection of influenza A and B, and for subtyping influenza A viruses, including H1, H3, and H5 types. This real-time testing aids in the prevention of the spread of the disease and permits more rapid treatment of ill patients. This will be of

particular importance in mounting a rapid response to pandemic influenza.

The DSHS MDL is a “charter” member of PulseNet, the international public health laboratory network for molecular typing of foodborne bacterial pathogens. Texas, Minnesota, Massachusetts, and Washington were the 4 original public health laboratories selected competitively by the Centers for Disease Control (CDC) and the Association of Public Health Laboratory Directors (APHL) in 1995. As a PulseNet participant, the DSHS Laboratory performs Pulsed-Field Gel Electrophoresis (PFGE), molecular fingerprinting standard, on all isolates of shiga toxin producing *Escherichia coli* (Shiga-Toxin Escherichia Coli STEC), non-typhoidal *Salmonella, Listeria monocytogenes,* and *Shigella* species. PFGE laboratory analysis is used as a tool in disease surveillance and epidemiological investigations, particularly investigations into food-borne illnesses such as the recent outbreaks caused by contaminated spinach and peanut butter.

As more techniques are developed for molecular diagnostics, the DSHS Molecular Diagnostic Laboratory will continue to expand the menu of available assays. As more protocols for molecular testing become available from different sources, such as CDC, the Laboratory will include these new tests.

Prepared by Elizabeth Delamater, PhD, Laboratory Services Section, Department of State Health Services.

Shifting Paradigms in Epidemiology:
The Expanded Role of the Public Health Laboratory

The classic scenario of an outbreak investigation typically begins with a phone call from someone at a healthcare facility to the health department providing notification of a group of people with the same type of illness who attended the same event. Today, this scenario is often replaced with one that begins with notification by a health department laboratory that they have identified a cluster of the same genetic strain of an organism. The steps of an investigation, as well as an outbreak's significance, are often very different in these two scenarios. As we adjust to working in the new paradigm, we welcome the ability to link cases of illness to a common exposure in a way that was often not possible just a decade or two ago.

The Old Paradigm: The Picnic Supper
On a Sunday in June 2001, the infection control coordinator from a central Texas hospital reported to a Texas Department of Health (now the Texas Department of State Health Services) regional office by approximately 30 people with gastrointestinal symptoms had presented to the emergency department of a local hospital. These ill persons had all been at the same camp over the weekend. This phone call triggered an investigation that began by collecting illness and food histories from the known ill persons, collecting names and contact information on all attendees at the camp event, inspecting the camp's kitchen, collecting stool specimens from a number of ill persons, and collecting leftover food items from the camp for testing at the state laboratory.

Within a day of the initial call, laboratory testing confirmed the presence of *Salmonella* bacteria, serotype Panama, in stool specimens from 24 camp visitors who had eaten the picnic supper the previous Saturday evening. Over 100 of nearly 300 guests who ate the supper had become ill, and some employees at the camp were ill as well. Leftover barbecue chicken and barbecue sauce also yielded *S.* Panama, though the chuck wagon beans that many ill persons reported eating were not available for testing.

Health department staff next conducted a case-control study, which involved interviewing the 109 ill persons and 81 non-ill persons who also attended the picnic supper. The questionnaire used in these interviews included all of the food items served at the picnic supper. Analysis of the data yielded a very high association between illness with *S.* Panama and consumption of the chuck wagon beans at the supper.

The conclusions drawn from the investigation of this outbreak were 1) 109 persons developed salmonellosis following consumption of a bean dish and/or chicken served at a camp picnic supper; 2) either raw chicken, which commonly contains *Salmonella*, or an ill foodhandler could have been the source of the bacteria; and 3) the bean dish was cross-contaminated with the bacteria in the kitchen.

The New Paradigm: Typhoid Fever Strain 309
Epidemiologists in 2 different local health departments in the greater Houston area were each investigating a case of typhoid fever during the summer of 2003 when they called the Texas Department of State Health Services foodborne Illness epidemiologist in Austin. Both epidemiologists had determined that

their case-patients did not have a history of recent international travel. This was cause for concern because typhoid fever is not endemic in the United States. During the call, it was also noted that the *Salmonella* Typhi bacteria isolated from the case-patients' specimens had been analyzed by the Molecular Biology team at the DSHS laboratory in Austin. This team determined that the two specimens contained the same strain of *S.* Typhi, strain 309. The epidemiologists had not found any commonalities between the two case-patients; they did not live or work in the same area, they had not eaten at any of the same restaurants, and they did not seem to have any common exposures.

> With the new molecular biology tools and techniques, however, we are able to have stronger indications of a common exposure. This greatly enhances our ability to detect and confirm outbreaks, and helps us target investigational activities.

The initial telephone call was followed by additional interviews to ask the case-patients about any unusual foods they might have eaten, particularly any normally eaten raw that could have been distributed to multiple restaurants. Notification was also sent to nearby hospitals and other health departments to put them on alert for cases of typhoid fever.

Over the following 3 weeks, 4 additional cases of typhoid fever strain 309 were identified. One of these case-patients also lived in the Houston area, but the other 3 lived in 2 different central Texas cities. None had traveled internationally in the recent past. No common exposure was identified for any of the 6 case-patients with typhoid fever. It was noted that all reported eating raw oysters at some time in their lives. Only 3 reported having done so recently.

An in-depth questionnaire was then administered to all 6 case-patients. The case-patients were asked to collect appointment books, trip records, credit card receipts, and any other information that might help them recall the food items they ate during their potential exposure period for typhoid fever. This strategy identified raw oyster consumption for all 6 case-patients during the month prior to their illness onset. Tracebacks on the oysters pointed to a single harvest area in Galveston Bay.

The conclusions drawn from the investigation of this outbreak were 1) 6 cases of typhoid fever were linked to raw oyster consumption; 2) the implicated oysters were harvested from the same area of Galveston Bay; and 3) the source of the oyster contamination was not identified, but it could have happened either at the lease site or during harvesting. Without the molecular microbiology analysis of the patients' specimens, epidemiologists would not have been alerted to determine whether the case-patients had a common exposure.

Outbreak Investigations Now and in the Future

The new paradigm in epidemiology, in which laboratory staff identify a common strain of an organism and epidemiologists investigate to determine a likely exposure, is not replacing the old paradigm of identifying a common pathogen and vehicle for transmission following a common event or other exposure. Instead, epidemiologists continue to conduct both kinds of investigations. With the new molecular biology tools and techniques, however, we are able to have stronger indications of a common exposure. This greatly enhances our ability to detect and confirm outbreaks, and helps us target investigational activities. It also can enable us identify a specific strain of a pathogen in a vehicle as well as in clinical specimens, which provides tremendous support for epidemiologic findings implicating a specific exposure as the cause of an outbreak. As with the oyster-associated typhoid fever cluster in Texas, molecular microbiology subtyping greatly enhanced the power of traditional epidemiology methods during the investigations of the multi-state, spinach-associated *Escherichia coli* O157:H7 outbreak in 2006 and the multi-state, peanut butter-associated *Salmonella* Tennessee outbreak in 2007.

Prepared by Linda Gaul, PhD, MPH, Infectious Disease Surveillance and Epidemiology Branch, Texas Department of State Health Services

The Human Papilloma Virus

The Women's Health Laboratories perform about 250,000 cervical cancer screenings (Pap smears) a year. Cervical cancer is caused almost entirely by sexually transmitted types of human papilloma virus (HPV). Advances in molecular biology have lead to the development of DNA based tests for HPV and, more recently, vaccines against the most common HPV types that cause cervical cancer and genital warts. This article reviews the development of HPV vaccines.

Human papilloma virus is the most common sexually transmitted virus in the United States. About 70% of sexually active people become infected at some time in their lives, usually during their teens or 20s. There are over 100 known types of HPV with 30-40 types that are sexually transmitted (they infect mucosal epithelium of the anogenital region). Infection with high-risk HPV types is present in 99% of cervical cancers. Two of the HPV genes, E6 and E7, are known to inactivate normal tumor suppressor proteins, thereby allowing excessive growth and potentially cancer. Preventing infection by HPV with a vaccine should eventually decrease the incidence of cervical cancer and high-grade dysplasias.

Vaccines for HPV have been under development for over 10 years. Traditional vaccines contain whole killed or attenuated virus. If viral genes reactivate, there is a very small chance that such vaccines can cause the disease they are designed to prevent. A vaccine that does not contain any DNA or RNA is not capable of causing disease. Scientists at the National Cancer Institute developed a way of producing viral-like particles (VLPs) that could be used for vaccines (Figure 1). VLPs contain only the protein shell of the virus, which is what normally stimulates the immune response. National Institutes of Health licensed this technology to Merck and GlaxoSmithKline Biologicals (GSK) in the mid-1990s. Since then, these two companies have been developing and testing HPV vaccines.

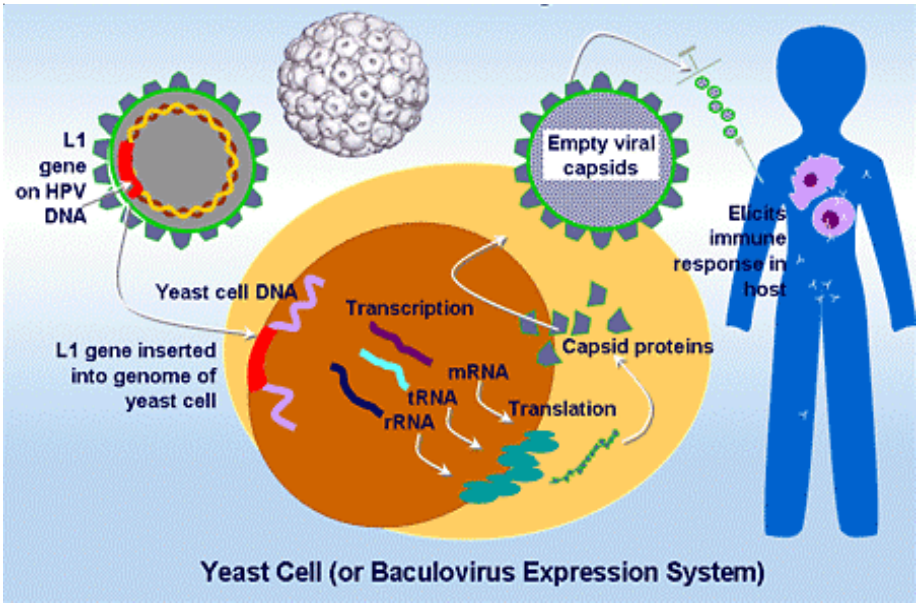

Figure 1. HPV L1 VLP vaccine synthesis. The L1 gene from HPV is inserted into an expression system. The synthesized proteins are purified and processed into a vaccine. Each L1 gene is specific for an HPV type. Diagram from Medscape.

HPV types 16 and 18 have been associated with about 70% of cervical cancers, so these would be the types most important to include in a vaccine. HPV types 6 and 11 are low-risk types, but are the most frequent cause of genital warts. GSK has produced and tested a divalent vaccine which includes VLPs of HPV types 16 and 18, called *Cervarix* (nearing approval by the Food and Drug Administration [FDA]). Merck's product is a quadrivalent vaccine (HPV types 6, 11, 16, and 18) called *Gardasil*. It received FDA approval in June 2006 and is recommended for females 9-26 years of age. Both vaccines are prophylactic; they work by stimulating antibody production that protects the person from infection. The antibodies will coat and inactivate virus before it infects cells. The vaccines would have little or no effect on cells that are already infected. The vaccines produce a stronger antibody response than what occurs in a natural infection. They are also well tolerated; side effects are minor and generally no worse than that of the placebo vaccine. Clinical trials showed that there was nearly 100% protection from the HPV types included in the vaccines.

Because these are new vaccines directed against a sexually transmitted disease, there remain a number of questions about their long-term efficacy and who should receive them. The vaccines would be most effective when given to girls well before they become sexually active. On February 2, 2007, Governor Rick Perry signed an executive order making HPV vaccination mandatory for girls entering the sixth grade. The state legislature is considering rescinding the governor's order. Some people are concerned that this would encourage promiscuity. There is also concern that such a vaccine should be a parent's decision, not mandatory. Parents may elect to exempt their children from required vaccinations.

Who will pay for the vaccine (Merck's costs $360 for the three doses)? Since it has been recommended by the FDA and should prevent later illnesses that are more costly to treat, private insurers and government health programs have stated that they will cover the cost.

What about women over 26 years and males? Why were they not included in the FDA recommendations? Females 9-26 were the primary target group in clinical trials, because they have the most to benefit from the vaccine. Clinical trials are continuing on older women and men. As adequate data become available the FDA will add recommendations.

How long will the vaccine last? This question awaits longer-term follow up of patients. Booster vaccines may be necessary.

What about the 30% of cervical cancers caused by other HPV types? Research continues into the addition of more HPV types to the vaccine. Vaccines are unlikely to include all types of HPV that have been linked to cancer.

Will Pap smears still be needed? Pap smears and ancillary HPV testing will be necessary for the foreseeable future, although perhaps at less frequent intervals.

Resources

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Quick*Links*

CDC HPV main page

Quadrivalent vaccine recommendations

Cervical cancer screening guidelines

HPV provider survey results

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Safe Drinking Water

Overview

The public drinking water systems regulated by the Environmental Protection Agency (EPA) and delegated states and tribes provide drinking water to approximately 90% of Americans. In Texas, rules and regulations for public drinking water systems are established by the Texas Commission on Environmental Quality (TCEQ) and are based on the EPA regulations. These public drinking water systems, which may be publicly or privately owned, serve at least 25 people or 15 service connections for at least 60 days per year. Texas has over 6,500 active public drinking water systems.

Drinking water can come from either groundwater sources (wells) or surface water sources (such as rivers, lakes, and streams). Nationally, most large metropolitan areas tend to use surface water while small and rural areas generally use groundwater. Additionally, 10-20% of the population use private wells for drinking water. These wells are not subject of federal regulations.

The federal Safe Drinking Water Act (SDWA) gives EPA the responsibility for establishing national drinking standards that protect the health of people who receive water from the public drinking water systems. The SDWA establishes standards for more than 80 contaminants in drinking water. The EPA has established a legal limit called the Maximum Contaminant Level (MCL) or requires a certain treatment for each contaminant. Water suppliers are required to provide drinking water that does meets these standards. Bottled water standards are set by the Food and Drug Administration and are based on the EPA drinking water standards.

The SDWA requires EPA to review each National Primary Drinking Water Regulation (NPDWR or primary standards) at least once every 6 years and revise as appropriate. Any revision must maintain or increase public health protection.

The contaminants are classified as:

- Microorganisms
- Disinfectants
- Disinfection Byproducts
- Inorganic Chemicals (includes metals)
- Organic Chemicals
- Radionuclides

The National Secondary Drinking Water Regulations are non-enforceable guidelines for agents that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color). The EPA recommends secondary standards for water systems but do not require compliance.

Laboratory services

The Laboratory Services Section of the Texas Department of State Health Services (DSHS) has been designated as the principal state drinking water laboratory for Texas. The Environmental Sciences Branch of the Laboratory Services Section performs the chemical analyses required by the SDWA and TCEQ.

The laboratory analyzes drinking water samples for organic chemicals using gas

chromatography, gas chromatography-mass spectrometry, and high performance liquid chromatography. Organic chemicals are compounds that contain carbon and can be from either man-made or naturally occurring sources. Levels of organic chemicals typically determined are:

- Volatile Organic Chemicals (VOCs) – These are organic chemicals that evaporate or vaporize readily. VOCs include petroleum products such as benzene, industrial solvents and degreasers, such as methylene chloride, and dry cleaning solvents such as tetrachloroethylene.

- Synthetic Organic Chemicals (SOCs) – These are man-made organic compounds that are used for industrial or agricultural purposes. Examples are pesticides, herbicides, and polychlorinated biphenyls.

- Disinfection Byproducts – These are chemical byproducts produced during the treatment of drinking water with chlorine. These include trihalomethanes and haloacetic acids.

Inorganic chemicals such as minerals and salts are identified and qunatifiedusing ion chromatography, auto-analyzers, and other instruments. Analyses determinations of chloride, fluoride, nitrate, sulfate, and perchlorate levels are also included. Physical properties such as conductance, pH, and total dissolved solids are also determined.

The typical radionuclide analyses include the determination of gross alpha and gross beta, radium-226, radium-228, and uranium.

Metal concentrations in drinking water samples are determined using cold vapor atomic absorption, inductively coupled plasma spectroscopy, and inductively coupled plasma-mass spectroscopy. Metals typically assesses in drinking water samples include aluminum, arsenic, barium, cadmium, chromium, copper, manganese, mercury, nickel, lead, antimony, selenium, silver, thallium, and zinc. Samples collected at customer taps as part of the lead and copper rule are also analyzed. Lead and copper enter the drinking water primarily through plumbing materials.

The DSHS Laboratory provides the results of the drinking water sample analyses to the appropriate public drinking water system and the TCEQ. Immediate notifications are provided when a chemical's MCL is exceeded in any sample.

Additional public drinking water information can be found at the EPA website, www.epa.gov/safewater or the TCEQ website, www.tceq.state.tx.us/nav/util_water.

Prepared by Dwight Schaeper, PhD, Laboratory Services Section, Texas Department of State Health Services.

2005 Plague Surveillance Report

Each year the Texas Department of State Health Services (DSHS), in conjunction with Texas Cooperative Extension/Wildlife Services, Texas Parks and Wildlife Department, and other agencies, collects samples from wildlife for plague (*Yersinia pestis*) testing. Samples are collected primarily from carnivores using Nobuto blood filter strips. Although most carnivores are resistant to plague, they develop antibodies when exposed to the organism, thereby making them good indicators of local plague activity.

Plague, which occurs naturally in Texas, can cause severe human disease and death. Surveillance for plague enables DSHS to alert physicians and veterinarians to be vigilant for signs of the disease in their patients when increased plague activity is detected in wildlife. *Yersinia pestis* is also an organism that can be used as a bioterrorism weapon. Unusual disease activity related to its use as a weapon can be recognized more easily if usual disease occurrence and risk is well known. Although the last reported human case of plague in Texas occurred in 2006, surveillance results indicate that there are natural reservoirs for the organism in much of the state.

The DSHS Laboratory Services Section and the Centers for Disease Control and Prevention-Division of Vector-Borne Infectious Disease (CDC) tested 2,842 animal and arthropod samples (2,399 animal samples were tested at DSHS; 443 arthropod samples were tested at CDC) from 106 counties during calendar year 2005. Plague antibodies at a titer of 1:32 or greater, which indicates probable exposure to plague, were reported for 107 samples (3.8% of all samples tested) from 14 counties (Table 1). Note that Table 1 includes only positive results and lists only those animal species for which there was at least 1 positive result. Table 2 shows the complete listing by county and species of samples that tested negative for plague in 2005. Note that the bulk of the arthropod samples, all of which were negative for plague, are listed in Table 2 under “county unknown” because the exact county from which each was collected is unknown; however, these samples represent collections from Culberson, Jeff Davis, Pecos, Presidio, and Terrell counties.

Figure 1 illustrates the geographic distribution of specimens collected and specimens testing positive for 2005.

Comparing the percent of surveillance samples positive for plague during 2005 to the percent positive in previous years indicates a noticeable increase in 2004 and 2005 compared to activity since 1995, which has been a period of relatively low plague activity in Texas (Figure 2). Factors such as climate, changing ecosystems, predator activity, and host population size and dynamics may all affect the potential for plague transmission within wildlife populations.

Figure 3 shows the historic distribution of plague surveillance and detection in Texas. While plague is considered endemic in far west Texas, the surveillance results demonstrate that there may be naturally occurring risk in all but the extreme eastern part of the state.

By using educational materials, news releases, a public access website, and conference presentations, DSHS personnel keep veterinarians,

physicians, and the general public aware of the plague risk in Texas. Even in areas with historically low plague activity, infections may occur in hunters or campers who visit plague-endemic areas or in pets and wildlife transported from those areas. There is also a risk that new areas of infection may be established by moving animals across the state.

Prepared by Eric Fonken, DVM, MPAff, Infectious Disease Control Unit, Department of State Health Services

Figure 1. Counties Sampled and Counties Positive for Plague, 2005

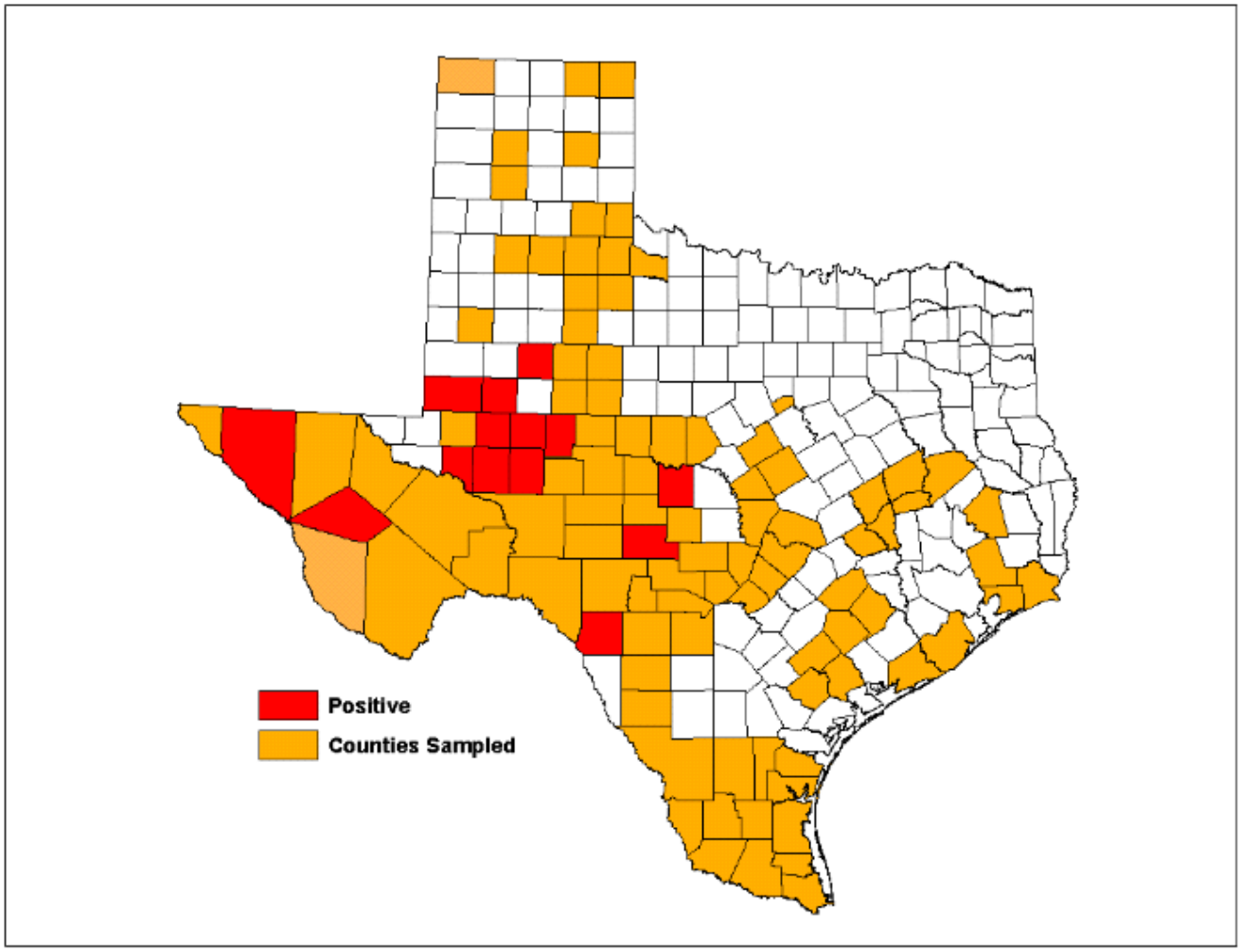

Figure 2. Percent of Surveillance Samples Positive for Plague, 1986-2005

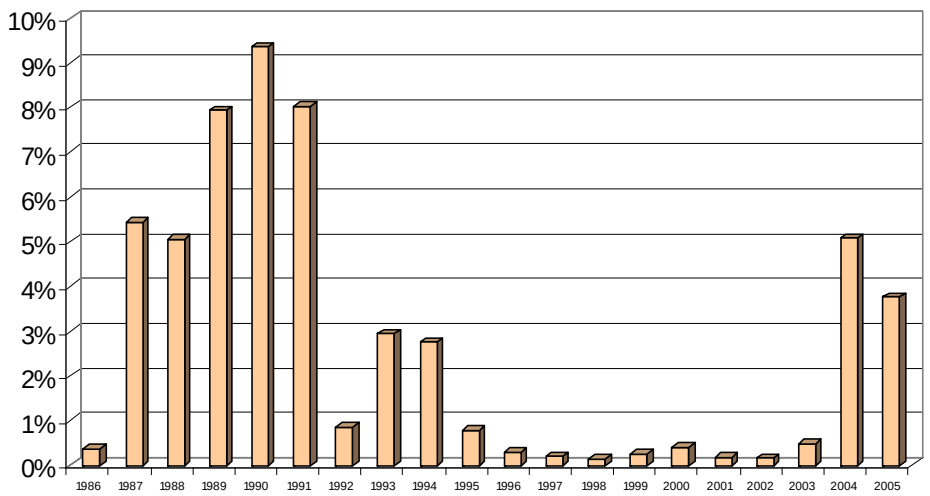

Figure 2. Percent of Surveillance Samples Positive for Plague, 1986-2005

Figure 3. Counties Sampled and Counties Positive for Plague, 1976-2005

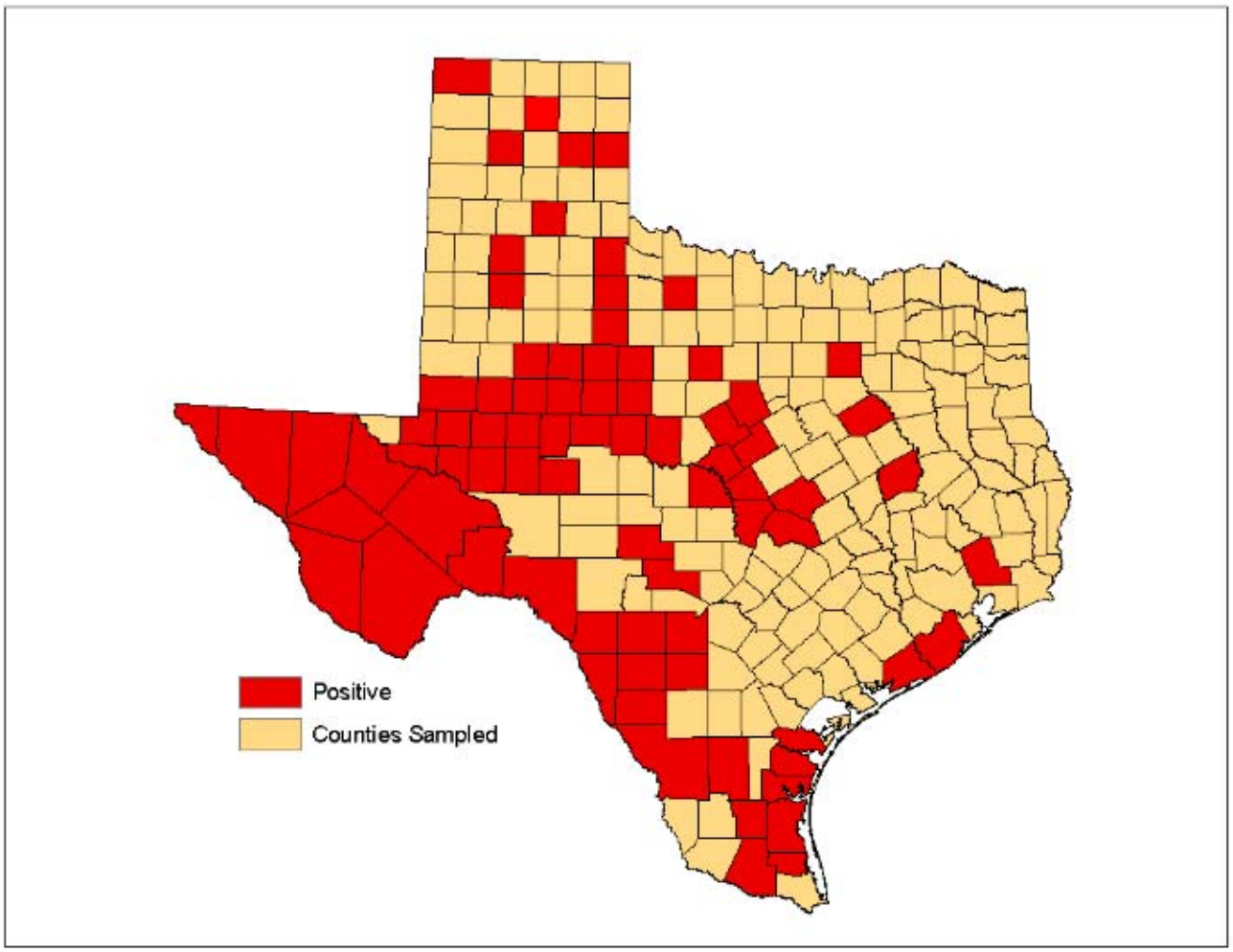

Table 1. Animals Positive for Plague by County and Result, 2005

County	Result	American Badger	Bobcat	Coyote	Eastern Cottontail	Feral pig	Gray Fox	Raccoon	Red Fox	Striped Skunk	Thirteen-lined Ground Squirrel	Total
Andrews	1:2048			1								**1**
Borden	1:64					1						**1**
	1:128			2								**2**
	1:256			3			1					**4**
	1:512			1								**1**
	1:1024		1			1						**2**
	1:2048		1	8								**9**
Crane	1:64			1								**1**
	1:128			4								**4**
	1:256			1								**1**
	1:1024	1		5								**6**
	1:2048			5								**5**
Glasscock	1:32							1				**1**
	1:64		1				1					**2**
	1:128			1								**1**
	1:256			1					1			**2**
	1:512			3			1	1				**5**
	1:1024			2			1		1			**4**
	1:2048			6				1				**7**
Hudspeth	1:512			1								**1**
Jeff Davis	1:64			1								**1**
	1:1024			1								**1**
	1:2048			1								**1**
Kimble	1:64			1								**1**
	1:128						1					**1**
Kinney	1:128		1									**1**
Martin	1:1024			1								**1**
McCulloch	1:64									1		**1**
Midland	1:64				1							**1**
	1:256			2							1	**3**
	1:512			6								**6**
	1:1024		1	4				1				**6**
	1:2048			7				2				**9**
	1:4096			1								**1**

County	Result	American Badger	Bobcat	Coyote	Eastern Cottontail	Feral pig	Gray Fox	Raccoon	Red Fox	Striped Skunk	Thirteen-lined Ground Squirrel	Total
Reagan	1:512			1								**1**
	1:2048						1					**1**
Sterling	1:512			1								**1**
	1:2048			1								**1**
Upton	1:32			1								**1**
	1:256			2								**2**
	1:512		1	1			1					**3**
	1:1024			2								**2**
	1:2048			1								**1**
Number Positive		**1**	**6**	**80**	**1**	**2**	**7**	**6**	**2**	**1**	**1**	**107**
Number Tested		**3**	**287**	**1400**	**3**	**4**	**351**	**279**	**24**	**18**	**1**	**2370**
Percent of Listed Species Testing Positive		**33.3%**	**2.1%**	**5.7%**	**33.3%**	**50.0%**	**2.0%**	**2.2%**	**8.3%**	**5.6%**	**100.0%**	**4.5%**

Table 2. Animals Negative for Plague by County, 2005[1]

County	American Badger	Black-tailed Prairie Dog	Bobcat	Coyote	Eastern Cottontail	Feral Pig	Flea	Gray Fox	Mountain Lion	Raccoon	Red Fox	Striped Skunk	Tick	Virginia Opossum	Grand Total
Andrews				5											**5**
Bandera			1												**1**
Blanco				4				1							**5**
Borden			5	52				2		6		1		1	**67**
Brazoria			1	51											**52**
Brazos										4					**4**
Brewster			7	15				9	1	1					**33**
Brooks				1											**1**
Brown								3							**3**
Burleson				4											**4**
Burnet				10											**10**
Cameron			3	11						18		4		10	**46**
Chambers				51		1				3					**55**
Childress				3											**3**
Coke			34	12				25		1	1				**73**
Coleman				1											**1**
Colorado				1						13		1			**15**
Comal				7											**7**
Concho				1											**1**
Coryell				9											**9**
Cottle				1											**1**
Crane	1		3	138											**142**
Crockett			5					15			3				**23**
Culberson				1											**1**
Dallam							1								**1**
De Witt				1											**1**
Dickens			2	6											**8**
Dimmit				23											**23**
Duval				13											**13**
Ector				2											**2**
Edwards			9	1				14		45	1				**70**
El Paso				2											**2**
Fayette				3											**3**
Fisher				1											**1**
Floyd				1											**1**

County	American Badger	Black-tailed Prairie Dog	Bobcat	Coyote	Eastern Cottontail	Feral Pig	Flea	Gray Fox	Mountain Lion	Raccoon	Red Fox	Striped Skunk	Tick	Virginia Opossum	Grand Total
Foard			1							1					**2**
Gillespie			2	24				3		1	1				**31**
Glasscock			11	30				12		13	8				**74**
Goliad				11											**11**
Gray				6											**6**
Hale				1											**1**
Hall				2											**2**
Hamilton				24				1		2					**27**
Hays			1	26											**27**
Hidalgo			5	60										1	**66**
Houston				10											**10**
Hudspeth				6											**6**
Irion			3	4				5							**12**
Jeff Davis				7											**7**
Jefferson				105											**105**
Jim Hogg				7											**7**
Jim Wells				1											**1**
Kendall				5				1		1					**7**
Kenedy			2												**2**
Kent				6											**6**
Kerr				5											**5**
Kimble			15	24				15		43	1			2	**100**
King				2											**2**
Kinney			8	19				6		3					**36**
Kleberg										1					**1**
Lampasas			3	34				2		7		2			**48**
Lavaca				4											**4**
Leon				2											**2**
Liberty				5						1					**6**
Lipscomb				9											**9**
Madison				5											**5**
Martin				1											**1**
Mason										1					**1**
Matagorda				8											**8**
McCulloch				1				10		1					**12**
Medina				2						1					**3**
Menard			4	15				11		3					**33**

County	American Badger	Black-tailed Prairie Dog	Bobcat	Coyote	Eastern Cottontail	Feral Pig	Flea	Gray Fox	Mountain Lion	Raccoon	Red Fox	Striped Skunk	Tick	Virginia Opossum	Grand Total
Midland		1	2	37				3		1					**44**
Mitchell				11											**11**
Motley				14						1					**15**
Nolan				11				1			1				**13**
Nueces				4						3		7		2	**16**
Ochiltree			1												**1**
Pecos			33	50		1		40	1	10					**135**
Polk				3											**3**
Potter				3											**3**
Randall				3	2					1					**6**
Real			7	5				2							**14**
Reeves				1											**1**
Robertson				1											**1**
Runnels				2											**2**
Schleicher			7												**7**
Scurry			3	31						6		2		8	**50**
Somervell				1											**1**
Starr			1	22											**23**
Sterling			11	21				12		25	2				**71**
Sutton			1	1				1		8					**11**
Terrell	1		42	8				32	1	24	1				**109**
Terry								1							**1**
Tom Green			6	3				23		4	2			1	**39**
Travis				5						1					**6**
Upton			6	13				24							**43**
Uvalde			1	10				2			1				**14**
Val Verde			31	8				66		18					**123**
Victoria			1	6											**7**
Webb			1	71											**72**
Willacy				4											**4**
Williamson				15				2							**17**
Zapata			2	47						1					**50**
Zavala				7											**7**
County Unknown							138						304		**442**
Total Negative	**2**	**1**	**281**	**1320**	**2**	**2**	**139**	**344**	**3**	**273**	**22**	**17**	**304**	**25**	**2735**

[1]**NOTE:** The bulk of the arthropod samples, all of which were negative for plague, are included under “County Unknown” in Table 2 because the exact county from which each was collected is unknown; however, these samples represent collections from Culberson, Jeff Davis, Pecos, Presidio, and Terrell counties.

National Viral Hepatitis Awareness Month

May 2007 is National Viral Hepatitis Awareness Month. During National Hepatitis Awareness Month, the Texas Department of State Health Services urges Texans to learn about the risks, prevention, and treatment methods of viral hepatitis. The 3 most common forms of acute viral hepatitis in the United States and Texas – hepatitis A, B, and C - have declined notably over the last 10 years and are one of the big public health success stories of the last decade. The main factor behind the declines in new cases of hepatitis A and B is the availability of vaccines and immunization programs.

Viral hepatitis is an inflammation of the liver. Once the virus enters the body it attacks the liver, which performs many functions essential to life. The liver's functions include detoxification, making proteins that fight infection, storing minerals and vitamins used for energy, and metabolizing fat, protein and various substances and medicines into a form the body can use.

Signs and symptoms of viral hepatitis infection may include jaundice, fatigue, dark urine, abdominal pain, loss of appetite, or nausea. Many people with viral hepatitis may be unaware of their infection because they have no signs or symptoms. A blood test is the only way to diagnose viral hepatitis.

Hepatitis B and C can become chronic infections that lead to liver cancer or liver failure, but early detection can help avoid long-term complications. An estimated 115,000 Texans have chronic hepatitis B and 295,000 have chronic hepatitis C. Liver failure due to hepatitis C is the most common indicator for liver transplants. Ensuring that people with chronic hepatitis are aware of their infection and knowing how to protect their health and prevent transmission to others is an important public health goal.

For more information on viral hepatitis, contact your local health department or the Texas Department of State Health Services at 888-963-711. Information is also available at the following web sites:

www.texasdisease.org

www.cdc.gov/ncidod/diseases/hepatitis/

To view the Morbidity and Mortality Weekly Report, *Surveillance for Acute Viral Hepatitis — United States, 2005*, go to: http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5603a1.htm.

Influenza Virus Vaccine 2007-2008 Season

The Food and Drug Administration (FDA) Vaccines and Related Biological Products Advisory Committee (VRBPAC) met in Gaithersburg, Maryland, on February 28, 2007, to select the influenza virus strains for the composition of the influenza vaccine for use in the 2007-2008 U.S. influenza season. During this meeting, the advisory panel reviewed and evaluated the surveillance data related to epidemiology and antigenic characteristics, serological responses to 2006/2007 vaccines, and the availability of candidate strains and reagents.
The panel recommended that vaccines to be used in the 2007-2008 influenza season in the U.S. contain the following:

- an A/Solomon Islands/3/2006 (H1N1)-like virus;
- an A/Wisconsin/67/2005 (H3N2)-like virus;
- a B/Malaysia/2506/2004-like virus

The influenza vaccine composition to be used in the 2007-2008 influenza season in the U.S. is identical to that recommended by the World Health Organization on February 14, 2007.

Rabies Monthly Update Through January 2007

During January, there were no cases of canine rabies in South Texas. To date, no cases of canine rabies have been reported north of the South Texas Oral Rabies Vaccination Program (ORVP) drop-zone for coyotes.
In West-Central Texas, there were 6 cases of gray fox rabies in the following counties: Concho (1 fox), Kimble (1 fox), McCulloch (1 fox), Menard (1 bobcat), Upton (1 fox), and Val Verde (1 fox). To date, no cases of gray fox rabies have been reported beyond the boundaries of the original ORVP drop-zone for gray foxes.
There were 51 reported cases of rabies in animals, including:

31 skunks
9 bats
5 foxes
3 raccoons
1 bobcat
1 cat
1 horse

These cases were reported from the following counties:
Anderson (1 skunk)
Austin (1 skunk)
Bexar (1 skunk)
Brazos (2 bats, 1 skunk)
Burnet (1 raccoon)
Collin (3 skunks)
Comanche (1 raccoon)
Concho (1 fox)
Coryell (1 raccoon)
Crockett (1 skunk)
Denton (4 skunks)
Ellis (1 skunk)
Erath (1 skunk)
Freestone (1 skunk)
Galveston (1 bat)
Harris (2 bats)
Hunt (1 skunk)
Johnson (1 cat)
Kaufman (2 skunks)
Kimble (1 fox)
Kleberg (1 bat)
Lamar (1 skunk)
Limestone (1 skunk)
McCulloch (1 fox)
Menard (1 bobcat)
Milam (1 skunk)
Morris (1 skunk)
Navarro (2 skunks)
Tarrant (1 skunk)
Travis (2 bats)
Upton (1 fox, 1 horse, 1 skunk)
Val Verde (1 fox)
Washington (1 skunk)
Wharton (1 bat, 1 skunk)
Wilbarger (1 skunk)
Wise (2 skunks)

Reporting Controlled Substance Overdoses

Although reporting poisonings to poison centers in Texas is generally voluntary, in 1999 the 76th Texas Legislature passed Senate Bill 43 (Texas Health and Safety Code 161.042), which requires physicians to report overdoses of controlled substances in Penalty Group 1 of the Texas Controlled Substances Act to the Texas Department of State Health Services:

Sec. 161.042. MANDATORY REPORTING OF CONTROLLED SUBSTANCE OVERDOSES
(a) A physician who attends or treats, or who is requested to attend or treat, an overdose of a controlled substance listed in Penalty Group 1 under Section 481.102, or the administrator, superintendent, or other person in charge of a hospital, sanitorium, or other institution in which an overdose of a controlled substance listed in Penalty Group 1 under Section 481.102 is attended or treated or in which the attention or treatment is requested, shall report the case at once to the department.
(b) A physician or other person who reports an overdose of a controlled substance under this section shall include in the report information regarding the date of the overdose, the type of controlled substance used, the sex and approximate age of the person attended or treated for the overdose or for whom treatment was sought, the symptoms associated with the overdose, the extent of treatment made necessary by the overdose, and the patient outcome. The physician or other person making the report may provide other demographic information concerning the person attended or treated or for whom treatment was sought but may not disclose the person's name or address or any other information concerning the person's identity.
(c) A hospital, sanitorium, or other institution that makes a report under this section is not subject to civil or criminal liability for damages arising out of the report. An individual who makes a good faith report under this section is not subject to civil or criminal liability for damages arising out of the report.

The Texas Department of State Health Services decided that this information should be reported through the Texas Poison Center Network. However, information on the identity of the person involved in the overdose is not provided to the Texas Poison Center Network. To report a controlled substance overdose meeting these criteria, either call your local poison center at 1-800-222-1222 or fax the form at the following link to your local poison center.

SB43 Reporting Form: http://www.dshs.state.tx.us/epidemiology/publications/SB43ReportSheet.pdf
Fax numbers:

- Texas Panhandle Poison Center in Amarillo: 806-354-1667
- North Texas Poison Center in Dallas: 214-590-5008
- West Texas Regional Poison Center in El Paso: 915-534-3809
- Southeast Texas Poison Center in Galveston: 409-772-3917
- South Texas Poison Center in San Antonio: 210-567-5718
- Central Texas Poison Center in Temple: 254-724-7408

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DSHS Publication Number E59-12544

How to submit manuscripts for publication

The *EpiLink* welcomes the submission of articles on a variety of public health and medical topics for publication. In addition, the newsletter will focus on a different health topic each month, such as maternal and child health and border health issues. If you are interested in contributing articles for the monthly health focus, please read the chart for topics and deadlines.

Issue	Topic	Articles due by
July	Maternal and Child Health	July 2, 2007
August	Chronic Diseases	July 30, 2007
September	Mental Health	August 28, 2007
October	Influenza	October 1, 2007
November	Border Health Issues	October 29, 2007
December	Communication and Information Technology in Public Health	December 3, 2007
January	Environmental Issues and Occupational Diseases	January 2, 2008
February	Social Marketing in Public Health	January 25, 2008

TEXAS Department of State Health Services