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## Revised Recommendations for the Treatment of Tuberculosis Disease

Revised national recommendations for the treatment of tuberculosis (TB) disease were recently issued by the Centers for Disease Control and Prevention (CDC), the Infectious Diseases Society of America (IDSA), and the American Thoracic Society (ATS). This is the first time IDSA has co-authored a TB treatment statement with ATS and CDC. The guidelines, "Treatment of Tuberculosis," were published in the *American Journal of Respiratory and Critical Care Medicine* (2003;167:603-662) and reprinted in *Morbidity and Mortality Weekly Report (MMWR)* 2003;52[No. RR-11]:1-80).

These guidelines, which replace previous recommendations published in 1994, were developed to address current issues such as the availability of new antituberculosis drugs and recent research findings on treatment regimens. The new recommendations provide updated information and guidance on several issues of particular interest to clinicians who care for TB patients in Minnesota. These issues include drug-resistant TB and extrapulmonary disease - both of which occur most frequently among foreign-born TB patients, who comprise approximately 80% of TB cases statewide.

Following are some highlights of the new guidelines:

1. **The responsibility for successful completion of an appropriate TB treatment regimen is clearly assigned to the private clinician and public health department, rather than to the patient.**

This is a significant philosophic departure from previous guidelines. Successful treatment of TB benefits both the individual patient and the larger community by rapidly rendering the patient noninfectious and thereby preventing both ongoing transmission and the emergence of drug-resistant strains of TB. A public health department or private clinician who provides treatment for a TB patient is assuming a public health function that includes not only prescribing an appropriate regimen, but also ensuring the patient's adherence to the regimen until treatment is completed.

continued....

**Table 1. Possible Components of a Multifaceted, Patient-Centered Treatment Strategy for Tuberculosis (TB) Disease**

**Enablers:** interventions to assist the patient in completing therapy

- Transportation vouchers
- Child care
- Convenient clinic hours and locations
- Clinic personnel who speak the language(s) of the population(s) served
- Reminder systems and follow-up on missed appointments
- Social service assistance (e.g., referrals for substance abuse treatment and counseling, housing assistance)
- Outreach workers (bilingual/bicultural, as needed), who may provide services related to facilitating the patient's adherence, including directly observed therapy, follow-up on missed appointments, monthly monitoring, transportation, sputum collection, social service assistance, or educational reinforcement
- Integrating TB care with care for other medical conditions

**Incentives:** interventions to motivate the patient that are tailored to each individual patient's wants and needs

- Food stamps, restaurant coupons, meals, or snacks
- Clothing or other personal products
- Books
- Stipends

Adapted from *MMWR* 2003;52(No. RR-11):1-80.

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Table 2. Drug Regimens for Culture-Positive Pulmonary Tuberculosis Caused by Drug-Susceptible Organisms

Initial phase			Continuation phase			Rating* (evidence) †	
Regimen	Drugs	Interval and doses ‡ (minimal duration)	Regimen	Drugs	Interval and doses ‡,§ (minimal duration)	Range of total doses (minimal duration)	HIV - HIV +
1	INH RIF PZA EMB	7 days per week for 56 doses (8 wks), or 5 d/wk for 40 doses (8 wks)¶	1a  1b 1c**	INH/RIF  INH/RIF INH/RPT	7 days per week for 126 doses (18 wks), or 5 d/wk for 90 doses (18 wks)¶ twice weekly for 36 doses (18 wks)¶ once weekly for 18 doses (18 wks)¶	182-130 (26 wks)  92-76 (26 wks) 74-58 (26 wks)	A (I)  A (I) B (I)
2	INH RIF PZA EMB	7 days per week for 14 doses (2 wks), then twice weekly for 12 doses (6 wks) or 5 d/wk for 10 doses (2 wks), then twice weekly for 12 doses (6 wks)¶	2a 2b**	INH/RIF INH/RPT	twice weekly for 36 doses (18 wks)¶ once weekly for 18 doses (18 wks)¶	62-58 (26 wks) 44-40 (26 wks)	A (II) B (I)
3	INH RIF PZA EMB	three times weekly for 24 doses (8 wks)¶	3a	INH/RIF	three times weekly for 54 doses (18 wks)¶	76 (26 wks)	B (I)  B (II)
4	INH RIF EMB	7 days per week for 56 doses (8 wks), or 5 d/wk for 40 doses (8 wks)¶	4a 4b	INH/RIF INH/RIF	7 days per week for 217 doses (31 wks), or 5 d/wk for 155 doses (31 wks)¶ twice weekly for 62 doses (31 wks)¶	273-195 (39 wks) 118-102 (39 wks)	C (I) C (I) C (II) C (II)

Abbreviations: EMB = ethambutol, INH = isoniazid, PZA = pyrazinamide, RIF = rifampin, RPT = rifapentine, DOT = directly observed therapy.

\* Definitions of evidence ratings: A = preferred, B = acceptable alternative, C = offer when A and B cannot be given, E = should never be given.

† Definitions of evidence ratings: I = randomized clinical trial, II = data from clinical trials that were not randomized or were conducted in other populations, III = expert opinion.

‡ When DOT is used, drugs may be given 5 days/week and the necessary number of doses adjusted accordingly. Although there are no studies that compare five with seven daily doses, extensive experience indicates that this would be an effective practice.

§ Patients with cavitation on initial chest radiograph and positive cultures at completion of 2 months of therapy should receive a 7-month continuation phase (31 weeks, either 217 doses [daily] or 62 doses [twice weekly]).

¶ Intermittent and 5 days per week administration always are given by DOT. Rating for 5 d/wk regimens is A III.

# Not recommended for HIV-infected patients with CD4+ cell counts <100 cells/µl.

\*\* Options 1c and 2b should be used only in HIV-negative patients who have negative sputum smears upon completion of 2 months of therapy and who do not have cavitation on initial chest radiograph. For patients started on this regimen and who have a positive culture for *Mycobacterium tuberculosis* from the 2-month specimen, treatment should be extended an additional 3 months.

Adapted from *MMWR* 2003;52(No. RR-11):1-80.

**2. Successful TB treatment requires close collaboration between the clinician and the public health department in order to effectively organize and supervise the treatment of individual patients.**

Patients may be managed in the private sector, the public sector, or jointly; however, the public health department has responsibility for monitoring treatment decisions and ensuring completion of therapy. An individualized, patient-centered case management strategy is strongly recommended for all patients (Table 1).

**3. Four recommended regimens are available for treatment of drug-susceptible TB (Table 2).**

Each regimen consists of an initial phase of 2 months followed by the choice of several options for a continuation phase of 4 to 7 months. Regimens are rated according to their effectiveness and the strength of scientific evidence supporting their use. Due to the high prevalence of isoniazid-resistant TB, the initial regimen for most adults should include four drugs. The guidelines describe the principles of antituberculosis therapy and contain detailed drug-specific information about first- and second-line medications (Table 3).

**4. Directly observed therapy (DOT) is strongly recommended for all TB patients, based on high completion of therapy rates associated with this approach (Table 4).**

DOT involves providing medications directly to the patient and watching him/her swallow each dose. DOT provides a strong connection between the patient and health care system and facilitates early identification of any adverse drug reactions or worsening TB symptoms. DOT may be provided daily or intermittently at any location that is mutually agreeable to the patient and DOT provider. All intermittent regimens require

DOT, due to the serious consequences of missed doses.

**5. Baseline evaluation prior to treatment should include counseling and testing for HIV infection and, if risk factors are present, serologic testing for hepatitis B and C viruses.**

Serum amino transferases, bilirubin, alkaline phosphatase, serum creatinine, and platelet count should be obtained for adults. When ethambutol will be included in the regimen, the patient should have visual acuity and red-green color discrimination monitored at baseline and during treatment.

**6. Closely monitoring the patient's response to therapy is essential; this includes obtaining sputum cultures upon completion of the initial 2-month phase of treatment (Figure 1).**

Patients with cavitory disease and whose sputum culture has not converted to negative for *Mycobacterium tuberculosis* following the initial 2-month phase of therapy are at increased risk for relapse. Such patients who initially were started on a 6-month regimen (i.e., 2 month initial phase followed by a 4 month continuation phase) require a continuation phase of 7 months, for a total of 9 months of treatment.

**7. Patients receiving treatment for TB require clinical evaluations at least monthly to monitor response to therapy, identify possible adverse drug effects, and assess adherence to the regimen.**

Patients with pulmonary TB should provide monthly (or more frequent) sputum specimens for acid-fast bacillus smear and culture until two consecutive specimens are negative on culture. The guidelines specify recommended intervals for follow-up chest radiographs in various circumstances. It is not necessary to monitor liver or renal function or platelet count routinely, unless there are baseline

results or clinical indications for repeated monitoring.

**8. Completion of treatment is defined by the number of doses of medication ingested within a specific period of time.**

Administering treatment for a defined period of time without accounting for the number of doses ingested may result in undertreatment, thereby increasing the patient's likelihood of relapse. Any missed doses should be recorded and the number of doses ingested should be documented at each follow-up visit. The use of DOT facilitates this documentation.

If nonadherence or adverse drug effects make it impossible to administer the recommended number of doses within the specific period of time, the length of treatment may be extended to allow for administration of the total number of recommended doses (Table 2). For example, if the 6-month regimen must be extended, the number of doses recommended for the initial 2-month phase of treatment should be administered within 3 months and the recommended number of doses for the 4-month continuation phase should be administered within 6 months, so that the usual 6-month regimen is completed within 9 months. If the recommended number of doses is not administered within the specified time period, therapy is considered **continued....**

**Table 3. Antituberculosis Drugs Currently Used in the United States**

First-Line	Second-Line
isoniazid	cycloserine
rifampin	ethionamide
rifapentine	levofloxacin*
rifabutin*	moxifloxacin*
ethambutol	gatifloxacin*
pyrazinamide	<i>p</i> -Aminosalicylic acid
	streptomycin
	amikacin/kanamycin*
	capreomycin

\*Not approved by the Food and Drug Administration for use in the treatment of tuberculosis.  
Source: *MMWR* 2003;52(No. RR-11):1-80.

interrupted and should be managed accordingly.

9. **Specific and practical clinical issues are addressed in detail, including: drug administration, fixed-dose combination drugs, drug interactions, interruptions in treatment, managing common adverse drug effects, treatment failure, relapse, and the treatment of TB in special situations.**

The guidelines provide special guidance regarding the treatment of drug-resistant TB, extrapulmonary sites of disease, culture-negative disease, persons with HIV infection, children and adolescents, pregnant and breastfeeding women, and persons with underlying renal or hepatic disease.

10. **Consultation with a medical expert in the treatment of TB is recommended to assist in managing specific clinical issues, including drug resistance, HIV-TB co-infection, patients with underlying unstable or advanced hepatic disease, significant interruptions in therapy, and certain types of extrapulmonary TB.**

11. **TB diagnosis and treatment practices in low-income and industrialized countries are described and compared.**

This information is especially pertinent for providers working with TB patients in Minnesota, where approximately 80% of TB cases occur among foreign-born persons.

12. **The current status of clinical research targeted to improving TB treatment is reviewed.**

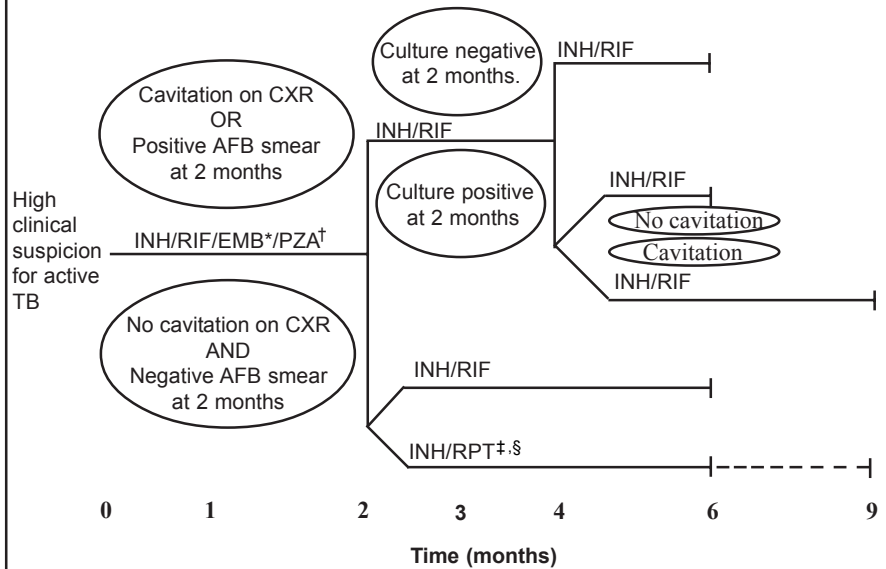
The Minnesota Department of Health (MDH) TB Prevention and Control Program collaborates with clinicians and local public health departments to ensure that patients with active TB disease receive timely, accessible, and effective treatment. Public health services include disease surveillance, free TB medications, DOT, incentives and enablers, access to expert clinical consultation,

**Table 4. Priority Situations for the Use of Direct Observed Therapy (DOT) in the Treatment of Tuberculosis (TB) Disease**

- Patients with any of the following conditions/circumstances:
  - pulmonary TB, with or without positive sputum smears
  - treatment failure
  - drug resistance (confirmed or suspected)
  - relapse
  - HIV infection
  - previous treatment for active TB disease or latent TB infection
  - current or prior substance abuse
  - psychiatric illness
  - memory impairment
  - previous non-adherence to therapy
  - lack of health insurance
  - limited English proficiency
  - poor understanding or acceptance of TB diagnosis
  - homelessness
  - incarceration in a correctional facility
- Children and adolescents
- Intermittent dosing regimen (DOT required)

Adapted from *MMWR* 2003;52(No. RR-11):1-80.

**Figure 1. Algorithm for the Treatment of Drug-Sensitive Tuberculosis Disease**



Abbreviations: TB = tuberculosis, INH = isoniazid, RIF = rifampin, EMB = ethambutol, PZA = pyrazinamide, RPT = rifapentine, CXR = chest radiograph, AFB = acid-fast bacillus  
<sup>\*</sup>EMB may be discontinued when drug susceptibility results indicate no drug resistance.  
<sup>†</sup>PZA may be discontinued after it has been taken for 2 months (56 doses).  
<sup>‡</sup>RPT should not be used in HIV-infected patients or in patients with extrapulmonary TB.  
<sup>§</sup>Therapy should be extended to 9 months if culture is positive after 2 months of initial phase of treatment.  
 Adapted from *MMWR* 2003;52(No. RR-11):1-80.

educational materials for patients and health care providers, and TB contact investigations. For additional information, contact the MDH TB Program at (612) 676-5414 or [www.health.state.mn.us/tb](http://www.health.state.mn.us/tb).

The revised TB treatment guidelines are available at the web sites of the sponsoring organizations, including: IDSA (<http://www.idsociety.org>), CDC ([www.cdc.gov/nchstp/tb](http://www.cdc.gov/nchstp/tb)), and ATS (<http://www.thoracic.org>). Continuing Medical Education and Continuing Nursing Education credits are available from CDC.

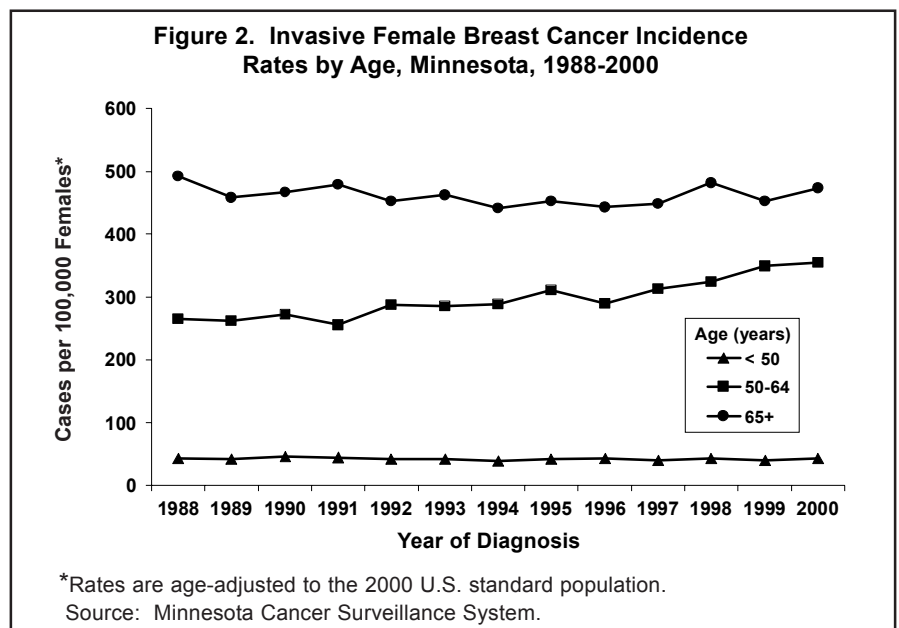
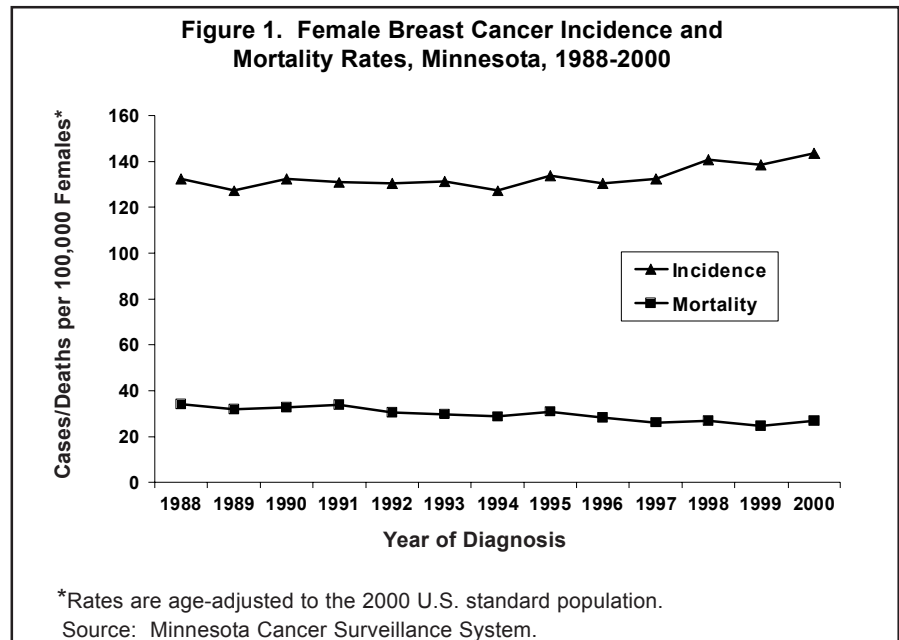
# Breast Cancer Incidence Is Increasing Among Women 50-64 Years of Age

Due to wider use of breast cancer screening and more effective treatment options, breast cancer mortality rates in Minnesota decreased by more than 20% from 1988 to 2000 (Figure 1). Breast cancer mortality rates in Minnesota and nationally decreased significantly among women of all ages.

During the same 13-year period, however, invasive breast cancer incidence rates among women in Minnesota increased approximately 9% (Figure 1). On average, breast cancer rates were 3% lower in Minnesota than in the geographic areas of the United States that participate in the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute (NCI). The rates of increasing incidence in Minnesota and SEER sites, however, were almost identical. (The nine geographic regions of the SEER program on which this comparison is based comprise approximately 10% of the U.S. population.)

Most of the increase in breast cancer in Minnesota has occurred among women 50 to 64 years of age, for whom the incidence rate increased 34% from 1988 to 2000 (Figure 2). In contrast, the breast cancer incidence rate decreased slightly or remained stable among women less than 50 years of age and among women 65 years of age or older. SEER data demonstrate a similar trend nationally.

It appears that the risk of developing post-menopausal breast cancer is higher among women born after World War II, (i.e., "baby-boomers") than among the cohort of their mothers. This finding likely is due to a combination of factors. For example, this younger cohort of women delayed having children, had fewer children, and were more likely not to have children than their mothers. Because the nutritional status of the younger cohort of women was better, their menstruation likely began, on average, at an earlier age. Each of these characteristics is a risk factor for breast



cancer. Also, the use of combination hormone replacement therapy, which has been used widely among this younger generation of women, recently has been shown to significantly increase risk for breast cancer.

A panel of over 100 international experts in pregnancy and breast cancer convened by the NCI reviewed existing studies and concluded in February 2003 that "induced abortion is not associated with an increase in

breast cancer risk," and that "recognized spontaneous abortion is not associated with an increase in breast cancer risk." These statements are excerpted from a summary of the panel's findings, entitled "Summary Report: Early Reproductive Events and Breast Cancer Workshop" (available at <http://cancer.gov/cancerinfo/ere-workshop-report>). Additional information can be found on NCI's website ([http://cis.nci.nih.gov/fact/3\\_75.htm](http://cis.nci.nih.gov/fact/3_75.htm)).

# Cancer Is the New Leading Cause of Death in Minnesota as Deaths From Heart Disease Decrease

For the first time in 2000 and again in 2001, more Minnesotans died of cancer than of heart disease, making cancer the leading cause of death in Minnesota. Cancer accounted for 24% of all deaths in Minnesota in 2001, compared to the 23% of deaths attributed to heart disease. Nationally, heart disease remained the leading cause of death, accounting for 29% percent of all deaths in 2001 (Table 1).

Cancer has become the leading cause of death in Minnesota primarily because the heart disease mortality rate decreased by 40% from 1988 to 2000, while cancer mortality decreased by only 4% (Figure 1). Cancer is likely to remain the leading cause of death in Minnesota, as preliminary mortality data indicate that cancer surpassed heart disease by an even larger margin in Minnesota in 2002.

Minnesota was the first state in which cancer became the leading cause of death, although other states recently have reported similar trends. The crossover between cancer and heart disease mortality occurred earlier in Minnesota than in other states because the age-adjusted heart disease mortality rate is approximately 30% lower in Minnesota than in the United States overall, whereas the cancer

mortality rate is only 7% lower in Minnesota. Minnesota had the lowest heart disease mortality rate in the U.S. in 2000 and 2001. The three states with the next lowest age-adjusted heart disease mortality rates in 2001 (Hawaii, 179.5 deaths per 100,00 population; Colorado, 181.0; Utah, 185.2) had considerably lower cancer mortality rates (Hawaii, 155.9 deaths per 100,000; Colorado, 169.6; Utah, 143.4) than Minnesota. Given that mortality rates for heart disease are decreasing at a faster rate than those for cancer in most of the United States, it is likely that cancer eventually will become the leading cause of death nationally (Figure 1).

These findings were presented at the "Cancer Plan Minnesota: Coming Together" conference on October 2, 2003. The conference, convened by the Minnesota Department of Health, brought together more than 200 health care professionals, advocates, planners, researchers, and insurers to begin developing a comprehensive cancer control plan for Minnesota. Objectives and strategies to reduce the burden of cancer in Minnesota will be developed during the next year. To participate or to learn more about Cancer Plan Minnesota, visit [www.cancerplanmn.org](http://www.cancerplanmn.org), e-mail [compccancer@health.state.mn.us](mailto:compccancer@health.state.mn.us), or call Elizabeth Moe at (612) 676-5220.

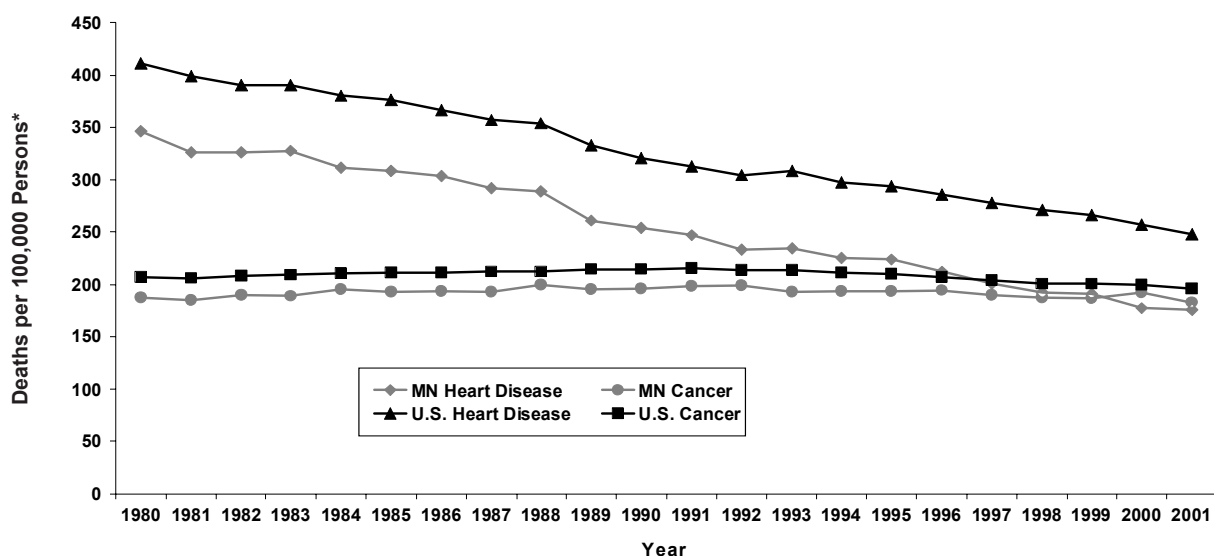
**Table 1. Heart Disease and Cancer Mortality, Minnesota and United States, 2001**

	Minnesota			United States		
	Deaths	(%)	Rate*	Deaths	(%)	Rate*
Heart Disease†	8,760	(23.2)	175.7	700,142	(29.0)	247.8
Cancer	8,967	(23.8)	183.1	553,768	(22.9)	196.0
All Deaths	37,735	(100)	744.9	2,416,425	(100)	854.5

\*Rates are per 100,000 persons and age-adjusted to the 2000 U.S. standard population.  
 †Heart disease does not include deaths due to hypertension, stroke, or other diseases of the circulatory system. All cardiovascular diseases combined accounted for 34% of deaths in Minnesota.

Source: *National Vital Statistics Report*, vol. 52, no. 3, September 18, 2003.

**Figure 1. Heart Disease and Cancer Mortality Rates, Minnesota and United States, 1980-2001**



\*Rates are age-adjusted to the 2000 U.S. standard population.

Source: National Center for Health Statistics public use all cause mortality databases and Surveillance, Epidemiology, and End Results (SEER) program. Data for 2001 are from *National Vital Statistics Report*, vol. 52, no. 3, September 18, 2003.

# Creutzfeldt-Jakob Disease and Autopsies

## Epidemiology

Creutzfeldt-Jakob Disease (CJD) is a rare, fatal transmissible spongiform encephalopathy (TSE) that occurs in humans. Initial symptoms of CJD can include insomnia, depression, confusion, personality and behavioral changes, and problems with eyesight, memory, and coordination. As the disease progresses, patients develop rapid dementia followed by myoclonic jerking. In the late stages of the disease, patients become mute and akinetic. Death usually occurs within 6 months following onset of symptoms. Diagnosis is based on symptoms, electroencephalogram, and neuropathologic examination.

In approximately 85% of CJD patients, the disease occurs sporadically with no recognizable pattern of transmission. A smaller proportion (5-15%) of patients develop CJD as a result of inherited mutations of the prion protein gene. The remaining cases of CJD are due to iatrogenic transmission from medical procedures using tainted human matter or surgical instruments contaminated by use on an infected individual.

Other TSEs that occur in humans include Gerstmann-Straussler-Scheinker Syndrome and fatal familial insomnia, both inherited disorders, and kuru, which was associated with ritualistic cannibalism in the Fore tribe of New Guinea. TSEs that occur in animals include scrapie of sheep and goats, transmissible mink encephalopathy, chronic wasting disease (CWD) of deer and elk, and bovine spongiform encephalopathy (BSE), also known as "mad cow disease." Recently, questions have been raised about the possibility of transmission of CWD to humans.

CJD occurs worldwide, with an incidence of 0.5 to 1.5 cases per million population per year. No seasonal distribution or significant change in incidence from year to year

is apparent. In the United States, most individuals who develop CJD are between 65 and 80 years of age. CJD in persons less than 55 years of age is rare.

## CJD in Minnesota

In conjunction with the Centers for Disease Control and Prevention (CDC), the Minnesota Department of Health (MDH) has been involved in national surveillance for CJD since 1996. Surveillance includes ongoing review of vital statistics data to identify deaths in which CJD is indicated as a cause of death. CJD deaths among persons less than 55 years of age are of particular importance and are investigated further as possible variant CJD (vCJD). vCJD is a newly recognized disease that has appeared in the United Kingdom and Europe and is associated with the consumption of meat from cows with BSE. One case of vCJD has been identified in the United States; however, the patient was thought to have acquired vCJD while living in the United Kingdom.

From 1991 to 2002, 75 cases of CJD were identified in Minnesota, representing an annual incidence rate of 1.2 cases per million persons. Most (84%) cases occurred in persons 60 years of age or older. Only 9% of cases occurred among persons less than 55 years of age. No cases were identified in persons less than 35 years of age.

An inherent difficulty in the current surveillance system for CJD, which relies on death certificate data, is the small number of autopsies performed on patients with suspect CJD. Autopsies were performed on only 30% of the 75 deaths attributed to CJD from 1991 to 2002. Consequently, most cases never are confirmed through postmortem neuropathologic examination of brain tissue. Better classification of persons who have died of neurodegenerative diseases is imperative. In the absence of such data, uncertainties remain regarding

the true incidence of CJD, the existence of vCJD in the United States, and the transmissibility of CWD to humans.

## Autopsy Study

MDH recently received funds from CDC to improve autopsy rates among persons with suspect CJD. Funds include reimbursement for body transport and autopsy. A medical center in Minnesota has been contracted to conduct autopsies and neuropathological examination of brain tissue to definitively confirm the diagnosis of CJD for institutions that otherwise may not have sufficient resources to do so themselves. Autopsies will be considered for cases of progressive dementia in persons less than 55 years of age with at least two of the following clinical features:

- myoclonus,
- visual or cerebellar signs,
- pyramidal/extrapyramidal signs, or
- akinetic mutism

AND:

- typical EEG during an illness of any duration, OR
- a positive 14-3-3 CSF assay,

AND:

- a clinical duration to death of less than 2 years,

AND:

- a routine investigation does not suggest an alternate diagnosis.

Autopsies also will be considered for individuals of any age who meet the above criteria and who have a history of consumption of deer or elk from CWD-endemic areas (e.g., northern Colorado, southern Wyoming, and southwestern Nebraska).

If a patient presents with the criteria described above, please contact MDH at (612) 676-5414 to make arrangements for an autopsy. All requests are evaluated by personnel at MDH and the contracted referral center that performs the autopsies.

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## Downloadable Asthma Action Plan

Health care providers who treat patients with asthma are encouraged to consult downloadable, interactive software developed by the Minnesota

Department of Health (MDH) to assist in developing an individualized Asthma Action Plan (AAP). The AAP is a tool to help patients and health care

providers manage and prevent asthma symptoms, while providing information that is critical for those who care for or  
**continued....**

have contact with patients. The AAP is based on guidelines of the National Institutes of Health and the National Heart, Lung, and Blood Institute ([www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm](http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm)).

This new AAP is similar to a web-based AAP that was launched by MDH in June 2003, although no patient data or other information entered by the user is saved when using the web-based version. The downloadable version allows providers to save

individualized AAPs and patient data on a personal computer or local intranet while maintaining confidentiality. Intranet network installation of the software is useful for providers who travel to multiple clinic sites or for sharing AAPs and pharmaceutical information with other providers in the same intranet network. The final AAP can be printed in English or Spanish. The provider can create and print a prescription for selected asthma medications. By selecting "All Medications" from the Health Plan box,

the plan is usable in any state in the United States.

The software is available at <https://www.mnasthma.org/AAP/>. You may share it with physicians or other providers in your area. To provide feedback on the AAP, contact Susan Ross at [susan.ross@state.mn.us](mailto:susan.ross@state.mn.us) or 612-676-5629. For other information regarding asthma, visit <http://www.health.state.mn.us/divs/hpcd/cdee/asthma/>.

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