# INFECTIOUS DISEASES[1]

## I. INTRODUCTION

### A. OUTLINE OF HIGHLIGHTED CONDITIONS

1) HIV

2) Chronic Viral Hepatitis

3) Tuberculosis

### B. IMPLICATIONS FOR JOB PERFORMANCE

Infectious disease is of relevance to patrol officer duties for the following reasons:

- The condition (or treatment thereof) may impair the ability of the officer to perform essential duties such as heavy lifting, subduing combative arrestees, driving, or conducting surveillances.
- Anticipated use of sick leave may be more than can be reasonably accommodated by the hiring agency.
- The condition may threaten the officer's ability to perform essential duties in the immediate future (i.e., 2-3 years).
- The condition may pose a significant risk of contagion to others.

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## II. MEDICAL EXAMINATION AND EVALUATION GUIDELINES

### A. GENERAL SCREENING RECOMMENDATIONS

1) History:

The Medical History Statement includes routine questions regarding a history of abnormal liver tests, hepatitis, and tuberculosis. Asking whether the candidate is HIV+ would not be consistent with the intent of the California Health & Safety Code (s. 199.21f) which prohibits HIV testing to determine suitability for employment. An alternative that is more legally tenable is to limit routine inquires to those manifestations of HIV disease that are relevant to patrol officer duties. These would include severe immunodeficiency (CD4+ lymphocyte count of 500 or less), unexplained diarrhea lasting >1 month, fevers lasting >1 month, night sweats, involuntary weight loss of >10% of baseline, or chronic fatigue. However, the physician should discuss any HIV screening protocols with the hiring agency **before** implementation. The physician should also be aware that there are civil and criminal penalties for disclosing a candidate's HIV status without his/her specific authorization. A generic medical release form is not adequate.

2) Examination:

In addition to the routine physical exam recommended in other sections of this manual, the physician should conduct a thorough exam for lymphadenopathy, and inspect the oral cavity and the skin. A finding of two or more extrainguinal nodes of 1.0 cm or larger would require further evaluation, unless an obvious local infection is present. Findings of thrush or hairy leukoplakia in the mouth would also require further evaluation. Similarly, examination of the skin may reveal a Kaposi's sarcoma or multidermatomal zoster that would suggest HIV infection.

3) Routine Testing:

As discussed elsewhere in this manual, routine lab testing should include liver function tests and a CBC with differential. These tests should include serum protein and gammaglobulin. A baseline Mantoux tuberculin skin test should be obtained if the candidate will spend a considerable amount of time working in jails.

B. EVALUATION OF COMMON CLINICAL SYNDROMES

1) HIV

a. GENERAL CONSIDERATIONS:

While HIV+ candidates should be evaluated by the same guiding principles that are used with other conditions, the physician must keep in mind that there are unique legal restrictions that only apply to this disease (see General Screening Recommendations). Many of the HIV regulations are relatively recent in origin, and have not yet been interpreted by the courts. It is unclear how the courts would apply these regulations if asked to review specific medical details of the patrol officer selection process. Given this uncertainty, it would be prudent for the physician to meet with the appropriate representatives from the hiring agency to discuss HIV policy before evaluating a candidate. The physician should use this opportunity to discuss the following issues:

(1) **Relevance of HIV Infection to the Evaluation of Patrol Officer Candidates**

(2) **Selection of Appropriate Screening Protocols**

(3) **Need for Ongoing Evaluation of HIV+ Candidates After Hire**

The information presented in this section is designed to help the physician present these issues to management. Since it is important for all physicians to have a basic knowledge of HIV disease regardless of their specialty, the following discussion assumes a pre-existing informational base equivalent to that found in a standard textbook of internal medicine.

(1) **Relevance of HIV Infection to the Evaluation of Patrol Officer Candidates**

- Current Inability to Perform Patrol Officer Duties: Impairment due to HIV infection can develop directly as a result of the constitutional and neurological impact of HIV virus, or secondarily from neoplasms, drug side-effects, and opportunistic infections. Symptoms such as chronic fatigue, fevers, diarrhea, hypercatabolic wasting, dementia, and anemia can substantially interfere with the performance of patrol officer duties or require the use of sick leave beyond what can be reasonably accommodated by many agencies. One study found exercise impairment in HIV+ subjects even in the absence of symptoms or opportunistic infections (Johnson, et al., 1990).

- Risk of Significant Harm to the Candidate: Development of active TB following exposure in high risk environments (such as prisons) is a potential concern. Persons with CD4+ counts <500/mm3 are at significantly increased risk of progression to active disease after contracting mycobacterium tuberculosis (Di Perri, et al., 1991). Whereas only 5% of recent seroconverters with normal immunocompetence will develop active disease

within one year after seroconversion, a high percentage of HIV+ persons (30% in one study and 39% in another) developed active TB within months of seroconversion (Daly, et al., 1992; Small, et al., 1991). Moreover, these persons are likely to have a rapid and severe progression of illness (CDC, 1992c). However, seroconversion rates among jailers is unknown. This makes it difficult to assess whether the risk of developing active TB among HIV+ jailers with low CD4+ counts would legally constitute a direct threat. A recent study of inmates in a California state correctional institution found seroconversion rates among inmates to be only 3% per year (CDC, 1992b). One would expect that seroconversion rates among jailers would be even lower.

- Risk of Significant Harm to Others: Blood-borne diseases such as HIV may potentially be transmitted to a suspect during two possible situations: (1) if a suspect bites an officer with sufficient pressure to break the skin, the suspect could have oral mucosal exposure to the officer's blood; or (2) if blood from a lacerated officer came into contact with an open wound on the suspect. The potential risk of infection to a suspect depends on how often these situations occur and the risk of transmission per occurrence.

  How often suspects are exposed to the blood of an officer is unknown. However, a preliminary study of workers' compensation records from the Los Angeles Police Department is useful in providing a maximum estimate of the potential exposure rate. It was found that 1% of field officers annually file a claim after being bitten by a suspect (Goldberg, 1993). Another 5% of field officers annually file claims for lacerations sustained either during a pursuit of a suspect or during an altercation with a suspect. These data would suggest a potential suspect exposure rate of 6% per officer. However, the study does not specify whether bitten officers bled from their bites. Similarly, in cases of officer lacerations, it is not known whether the involved suspect had an open wound or was even contaminated by the officer's blood.

  Although the risk of contracting HIV from mucosal exposure is unknown, it is at least an order of magnitude less than the risk from a needle-stick injury (Beekmann, et al., 1990). The risk from a needle-stick injury has been recently estimated to be about 1/500 (Henderson & Gerberding, 1992), which is the best available approximation for the risk of infection following open wound exposure to infected blood. However, both of these estimates are based on exposures to AIDS patients with circulating viral titers that are orders of magnitude higher than would be expected to occur in an HIV+ person healthy enough to be a patrol officer.

  Considering that exposure situations do not occur commonly, and that the risk of transmission per occurrence is very low, it can be confidently concluded that the annual risk of a suspect becoming infected from an HIV+ officer is very remote (<1/10,000).

The potential for an HIV+ candidate to infect others with TB is of concern in jail environments. As mentioned above, certain HIV+ persons are at greater risk of developing active TB. Mitigation of this risk would require frequent skin testing of these persons.

- Probability That the Candidate Will Become Unable to Regularly Perform Essential Duties in the Immediate Future (2-3 years). Although individuals with HIV infection often remain asymptomatic for years, at least 75% will eventually develop an AIDS-defining condition (Table VII-1 - Category C) and die from the disease (Rutherford, et al., 1990). The most important independent prognostic factors appear to be the presence of an AIDS-defining condition, constitutional symptoms, the use of medications, opportunistic infections, and the CD4+ lymphocyte count. In considering these factors, it is possible to group HIV+ candidates into several prognostic categories:

  - Presence of an AIDS-Defining Condition (Table VII-1 - Category C): Regardless of other risk factors, it is more likely than not that these candidates will not survive for three years (Table VII-2). The length of time that they would be capable of unrestricted field duties would be expected to be considerably less, since death is likely to be preceded by a considerable period of disability.

  - CD4+ Count <200 Without an AIDS-Defining Condition (Table VII-1 - Category A3, B3): This group of candidates is also unlikely to be able to perform patrol officer duties in the immediate future. Eighty percent will develop an AIDS-related opportunistic infection or malignancy within three years (Philips, et al., 1991; Moss, et al., 1988; Lang, et al., 1989). In a recent study, two-year death rates were substantial even if AZT was given -- 17% for asymptomatic patients and 44% for patients with constitutional symptoms, oral hairy leukoplakia, or herpes zoster within the last six months (Neil, et al., 1992). In another 2-3 year follow-up study of patients who had a mean CD4+ count of 350/mm3, 38/43 deaths were preceded by at least one count <200/mm3 (Hamilton, et al., 1992). It is also relevant to note that the Center for Disease Control (CDC) has recently expanded their 1987 AIDS surveillance case definition to include all patients with counts <200/mm3 (CDC, 1992a).

  - CD4+ Count Between 200-499 Without AIDS-Defining Condition: The prognosis in this group of candidates is quite variable depending on the presence of constitutional symptoms, history of minor opportunistic infections (see Table VII-1, Clinical Category B), use of medications, and the level/stability of the CD4+ count. There is an extensive amount of active research on this group of patients, as well as a considerable amount of controversy. For example, in February, 1992, the VA Cooperative study of symptomatic patients found that 42% progressed to AIDS within 2-3 years if their initial CD4+ count was between 200-299

TABLE VII-1
1992 Revised CDC HIV Classification System and Expanded AIDS Surveillance Definition for Adolescents and Adults (Draft)

The revised system emphasizes the importance of CD4 lymphocyte testing in clinical management of HIV-infected persons. The system is based on 3 ranges of CD4 counts and 3 clinical categories giving a matrix of 9 exclusive categories. The system replaces the 1986 classification.

CRITERIA FOR HIV INFECTION: Persons 13 years or older with repeatedly (2 or more) reactive screening tests (ELISA) + specific antibodies identified by a supplemental test, e.g., Western blot ["reactive" pattern (CDC criteria) = + vs any two of p24, gp41, or gp120/160 (*MMWR 40:692, 1991*)]. Other specific methods of diagnosis of HIV-1 include virus isolation, antigen detection, and detection of HIV genetic material by PCR.

| CLASSIFICATION SYSTEM | | | | Clinical Category A | Clinical Category B[2] | Clinical Category C[3] |
|---|---|---|---|---|---|---|
| | Clinical Category* | | | Asymptomatic HIV infection<br>Persistent generalized lymphadenopathy (PGL)[1]<br>Acute (primary) HIV illness | Bacterial endocarditis, meningitis, pneumonia, sepsis<br>Candidiasis, vulvovaginal; persistent > 1 month<br>Candidiasis, oropharyngeal<br>Cervical dysplasia, severe or carcinoma<br>Constitutional sx, e.g., fever (>38.5°) or diarrhea > 1 month<br>Hairy leukoplakia, oral<br>Herpes zoster, ≥ 2 episodes or > 1 dermatome<br>Idiopathic thrombocytopenic purpura<br>Listeriosis<br>M. tuberculosis, pulmonary<br>Nocardiosis<br>Pelvic inflammatory disease<br>Peripheral neuropathy | Candidiasis; esophageal, trachea, bronchi<br>Coccidioidomycosis, extrapulmonary<br>Cryptococcosis, extrapulmonary<br>Cryptosporidiosis, chronic intestinal (> 1 month)<br>CMV retinitis, or other than liver, spleen, nodes<br>HIV encephalopathy<br>Herpes simplex with mucocutaneous ulcer > 1 month, bronchitis, pneumonia<br>Isosporiasis, chronic, > 1 month<br>Kaposi's sarcoma<br>Non-Hodgkin's lymphoma; Burkitt's type; immunoblastic sarcoma; primary CNS lymphoma<br>M. avium or M. kansasil, extrapulmonary<br>M. tuberculosis, extrapulmonary<br>Mycobacterium, other species disseminated or extrapulmonary<br>Pneumocystis carinii pneumonia<br>Progressive multifocal leucoencephalopathy<br>Salmonella bacteremia, recurrent<br>Toxoplasmosis, cerebral<br>Wasting syndrome due to HIV |
| CD4 Cell** Category | A | B | C | | | |
| (1) ≥ 500/mm3 | A1 | B1 | C1 | | | |
| (2) 200-499/mm3 | A2 | B2 | C2 | | | |
| (3) < 200/mm3 | A3 | B3 | C3 | | | |

* See table for clinical definitions. Shaded area indicates expansion of AIDS surveillance definition. Cat C currently "reportable." Cats A3 and B3 will be "reportable" as AIDS cases.

** There is a diurnal variation in CD4 counts averaging 60/mm³ higher in the afternoon in HIV+ individuals and 500/mm³ in HIV- persons. Blood for sequential CD4 counts should be drawn at about the same time of day each time (*J AIDS 3:144, 1990*). The equivalence between CD4 counts and CD4 % of total lymphocytes is: >500 = ≥ 29%, 200-499 = 14-28%, < 200 = 14%.

[1] Nodes in 2 or more extrainguinal sites, at least 1 cm in diameter for ≥ 3 months

[2] The above must be attributed to HIV infection or have a clinical course or management complicated by HIV.

[3] These are the 1987 CDC case definitions (*MMWR 36:15, 1987*)

and treatment was withheld until counts dropped to below 200 (Hamilton, et al., 1992). This was in contrast to symptomatic patients with counts of 300-500 who were treated early with AZT, among whom only 15% progressed to AIDS. However, the authors noted that early treatment with AZT did not improve survival; in addition, the early treatment group had increased rates of drug side-effects -- 20% had anemia, 5% required transfusion, and 40% had nausea and diarrhea. This study has caused many AIDS experts to question the use of AZT in these patients. However, just two months later, in April, 1992, the Multicenter AIDS Cohort study reported improvements in survival with AZT/PCP treatment (Neil, et al., 1992). In this study, 2-year death rates in patients with CD4+ counts between 200-349 varied from 21% in symptomatic, untreated patients to 3.9% in asymptomatic, treated patients.

- CD4+ Count of 500 or More Without AIDS-Defining Condition: The two-three year prognosis for these patients is generally considered to be very good.

TABLE VII-2
Recent Studies of Survival After Diagnosis of AIDS

| Author (year) | Findings |
|---|---|
| Hamilton, et al. (1992) | 76 patients treated with AZT. Median survival time was 18 months. |
| Vella, et al. (1992) | 159 patients treated with AZT. Patients with higher CD4+ counts had a 48% 2-year survival rate compared to 42% for patients with lower counts. |
| Moore, et al. (1991) | 352 patients treated with AZT. Two-year survival was 56% for non-Hispanic whites, 47% for minorities. |

### (2) Selection of Appropriate Screening Protocols

As discussed above, state law specifically prohibits routine HIV-antibody testing, and probably would be interpreted as prohibiting any inquiries about HIV status per se. However, there are alternative ways to identify candidates who may warrant restriction. Unfortunately, some of these alternatives are quite expensive; others may involve historical inquiries of a personal nature which may seem inappropriate to a personnel analyst or to the hiring agency's legal counsel. The evaluating physician is therefore strongly advised to consult with the hiring agency before using any of these protocols. These will be discussed in order of increasing cost and potential for controversy.

a. No protocol: For a starting point in this discussion, it is appropriate to estimate how many candidates with HIV who warrant restriction would be hired inappropriately by an agency if no screening protocol were used. The answer to this question depends upon numerous factors, such as the location of the agency, and the ethnic/gender composition of the candidate pool. A considerable amount of self-selection away from a career in law enforcement would be expected among persons with certain risk factors, such as IV drug abuse. For example, the City of Los Angeles has hired over 2,000 officers between 1988-1992 without the use of an HIV+ screening protocol. As of the end of 1992, there are no known cases among these new recruits of an officer developing a disability or other problems due to AIDS.

b. Using physical exam results and laboratory tests that would be obtained for the evaluation of other conditions: The routine physical examination and lab testing that is recommended for other conditions would be expected to detect a certain percentage of HIV+ candidates of concern. For example, examination of the mouth may reveal hairy leukoplakia or candidiasis. The CBC may show lymphopenia (note: Fournier & Sosenko (1992) found that CD4+ counts are highly correlated with total lymphocyte counts). Persons with findings suggestive of HIV could be referred to their private doctor to establish diagnosis and prognosis. This protocol has the advantage of freeing the hiring agency from any additional costs or legal problems. The primary disadvantage is that the use of very non-specific tests will commonly result in unnecessary delays in the processing of acceptable candidates.

c. Asking directed questions regarding HIV-related conditions that are job-specific in addition to using routine lab and exam results: The use of specific questions regarding HIV-related conditions (see General Screening Recommendations) could provide information in addition to that gleaned from the routine exam. Persons answering affirmatively would be asked to provide a private evaluation as in protocol (b). This protocol has all of the advantages of protocol (b), but is more specific.

d. Performing CD4+ testing on high risk candidates: High risk candidates would be those who have had a transfusion between 1978 and 1985, skin anergy, a history of IV drug abuse, a history of homosexuality or multiple sex partners. Persons identified under protocols (b) and (c) above would also be given CD4+ tests. Persons with low CD4+ counts would then be referred for a private evaluation of diagnosis and prognosis. This protocol has the advantage of being the most sensitive and the most consistent with good medical practice in the private community. However, disadvantages include cost (CD4+ tests cost about $100-$150) and invasiveness of privacy that may be considered inappropriate in the pre-placement examination setting. Furthermore, the legal tenability of conducting surrogate HIV tests such as CD4+ counts is uncertain.

A final concern of this approach involves the CD4+ test itself. In non-infected persons, levels can fluctuate by as much as 35-75%, depending on the time of day (McCarthy & Fetterhoff, 1989). Although diurnal fluctuation is less in HIV+ patients, a group of patients with an average CD4+ count of 333/mm3 was observed to have a mean fluctuation of 44/mm3 (Malone, et al., 1990). Acute illness and inter-laboratory differences may also contribute to fluctuations by as much as 100-200/mm3 (Steinberg & Cunningham-Rundles, 1989). Given these considerations, decisions based on CD4+ counts should rely on averages rather than individual measurements or extreme values.

(3) **Need for Ongoing Evaluation of HIV+ Candidates After Hire**

Periodic re-evaluation of HIV+ candidates after hire can identify those who develop conditions that may have an impact on job performance. As mentioned earlier, most of these individuals will become impaired within 10 years (Rutherford, et al., 1990). Additionally, frequent skin testing to assess TB seroconversion and anergy is very important for persons assigned to jails. Persons who develop anergy cannot be assessed by TB skin testing and should be restricted from jail work. For these reasons, a hiring agency may wish to consider having all HIV+ candidates sign a pre-placement agreement consenting to periodic re-evaluation.

b. RECOMMENDED EVALUATION PROTOCOL:

Screening protocols that involve either questions or tests directed at identifying HIV+ candidates must be discussed with the hiring agency.

If the physician already knows that a candidate is HIV+, efforts should be made to obtain all relevant information regarding how and when the infection was acquired, symptoms, treatment, and complications (note: a history of IV drug use is also relevant to the candidate's background investigation). Knowledge of past CD4+ levels are very helpful. If the candidate has experience with AZT or other drugs, the physician should ask about side-effects. The physician must obtain a signed release that specifically authorizes the review of past records related to the HIV infection. As mentioned above, generic medical release forms are not adequate. A current CD4+ lymphocyte count should be required.

Any restrictions of candidates with HIV infection should be based on one or both of the following:

1. CURRENT INABILITY TO PERFORM PATROL OFFICER DUTIES

This evaluation is based primarily on a history of functional problems, exercise and occupational history, and/or a current exercise test. The candidate should be able to demonstrate an aerobic capacity of at least 42 ml/O2/kg (see Respiratory chapter). Inability to perform could be due to either constitutional symptoms, opportunistic infections, or side-effects of medication. Restrictions should be activity specific.

2. IT IS PROBABLE (I.E., >50%) THAT THE CANDIDATE WILL BECOME UNABLE TO REGULARLY PERFORM ESSENTIAL DUTIES IN THE IMMEDIATE FUTURE (I.E., 2-3 YEARS)

GROUP I: CD4+ COUNT AVERAGING 500 OR MORE

These candidates are likely to be able to perform patrol officer duties for longer than 2-3 years.

GROUP II: CD4+ COUNT AVERAGING 200-500 WITHOUT AIDS-DEFINING CONDITION

These candidates should be evaluated by an infectious disease specialist to determine prognosis based on the most recent developments in the field. However, in general, a poor prognosis would be indicated by a history of clinical category B conditions (see Table VII-1), or a CD4 count which has dropped by 50-100% in the last 12-18 months.

GROUP III: CD4+ COUNT AVERAGING <200, OR AIDS-DEFINING CONDITION

The hiring agency should be advised that it is probable that the candidate will be unable to perform the essential duties of a patrol officer within the next 2-3 years.

2) CHRONIC VIRAL HEPATITIS

a. GENERAL CONSIDERATIONS:

Many aspects of chronic hepatitis that have an impact on the ability to perform essential duties, as well as on evaluation and prognosis, are discussed in the Gastrointestinal chapter. It is assumed that the physician has reviewed that chapter (as well as, if necessary, a standard textbook of internal medicine). This section focuses on whether the potential transmission of the B or C hepatitis virus to a suspect would justify placing restrictions on prospective patrol officers. To make this determination, the physician should consider the annual risk of a suspect becoming infected, whether such an infection would constitute a direct threat, and whether there are methods of reasonable accommodation that could significantly reduce the risk of substantial harm to a suspect.

## 1. ANNUAL RISK OF A SUSPECT BECOMING INFECTED

This risk is determined by the following two factors:

- The probability of a suspect being parenterally exposed to the blood of a given patrol officer per year.

  As discussed earlier (see HIV section), this risk has been estimated to be at the most, 1-6% annually.

- The probability of infection per exposure episode.

  This risk depends on a number of factors, such as the amount of the inoculum, whether the exposure occurs to an open wound or a mucosal membrane, and the infectivity of the patrol officer. When estimating infectivity, consider the following:

  Hepatitis B: In persons who are surface antigen positive (HBsAg+), infectivity varies greatly depending on the titer of the "e" antigen (HBeAg). High titers of this antigen (in the absence of "e" antibodies) indicates active viral replication and a high concentration of viral particles in the serum. The risk of transmission based on needle-stick and perinatal studies after exposure to these high-risk persons appears to be about 80% (Table VII-3). Of course, many persons with chronic hepatitis B do not have high HBeAg titers; others commonly develop anti-e antibodies (Liaw, et al., 1982; Norkrans, et al., 1982) indicating clearance of free viral particles from the serum.

  Hepatitis C: Since HCV assays have only recently been developed, infectivity studies are limited. Kiyosawa, et al. (1991) found seroconversion in only 3.7% of 110 persons who had documented needle-stick exposures to the blood of patients with antibodies to HCV. However, by using more sensitive antibody and RNA tests (which are not yet commercially available), Mitsui, et al. (1992) documented seroconversion in 10% of 68 persons following needlestick accidents.

Multiplying estimates of the annual risk of suspect exposure per officer by those for the risk of infection per exposure yields an estimated annual risk for a suspect becoming infected with either hepatitis B or C per infected officer (Table VII-4 - column 2).

TABLE VII-3
Risk of Hepatitis B Infection After Exposure to HBeAg+/HBeAb- Blood Without Post-Exposure Prophylaxis*

| Author (year) | Findings |
|---|---|
| Alter, et al. (1976) | 78% of 18 developed hepatitis after needle-stick accident |
| Beasley, et al. (1977) | 85% of 20 mothers transmitted hepatitis perinatally to their babies |
| Tada, et al. (1982) | 76% of 21 mothers transmitted hepatitis perinatally to their babies |

*HBeAg measured by immunodiffusion

## 2. RISK OF SUBSTANTIAL HARM

Acutely, most infections result in either asymptomatic or mild self-limiting illness. Substantial harm will be defined as either:

- Acute infection severe enough to require hospitalization; or
- Chronic infection since this entails risk of disability, death, hepatic cancer, or transmission to others.

Hepatitis B: Acutely, severe disease requiring hospitalization occurs in about 5% of all cases (DOL, 1989). An additional 5% of acute cases will result in chronic disease consisting of either an asymptomatic (but infectious) chronic infection, chronic persistent hepatitis, chronic active hepatitis, cirrhosis, or hepatic cancer (Junge & Deinhardt, 1985). This results in a total risk of substantial harm of 10% per infection. [Note: These two groups can be added together since they are mutually exclusive in virtually all cases. It is rare for survivors of severe acute hepatitis to develop chronic infection (Karvountsis, et al., 1974)].

Hepatitis C: Acutely, HCV infection is usually not severe and hospitalization rates are unknown. However, chronic infection develops in at least 50% of those infected (Dienstag, 1983).

In Table VII-4, the annual risk of a suspect contracting hepatitis (column 2) is multiplied by the above probabilities that a given infection will result in substantial harm. The resulting estimates of the annual risk of substantial harm to a suspect range from a maximum of 1/200 per officer who is HBeAg+, to 1/300 per officer who is HCV+ (column 3).

TABLE VII-4
Assessment of the Maximal Annual Risk of Substantial Harm to a Suspect Due to the Employment of an Applicant Who is a Chronic HBV or HCV Carrier

| Sero-status of the patrol officer | Annual risk of a suspect contracting hepatitis | Annual risk of substantial harm to a suspect | Residual annual risk of substantial harm if suspect is treated | | |
|---|---|---|---|---|---|
| | | | HBIG only | HBIG+ vaccine | ISG |
| HBeAg+* | 0.8 - 4.8% | 0.08 - 0.48% | 0.02% - 0.12% | 0.002% - 0.034% | |
| HCV+ | 0.1 - 0.6% | 0.05 - 0.30% | | | <0.05 - 0.30% |

*Risks would be substantially lower if the officer is either HBeAg- or has Anti-HBe.

## 3. REASONABLE ACCOMMODATION

The risk of substantial harm to a suspect can be reduced by having an effective post-exposure program.

The risk of contracting HBV from a high-risk donor (HBeAg+) can be reduced to 24-28% if HBIG is administered within seven days of exposure (Table VII-5). Standard protocols recommend a second dose 4 weeks after the first, but one dose appears to be equally efficacious (at least in the small study by Masuko, et al., 1985). Initiating the HBV vaccine series (10-20 mg of yeast-derived recombinant antigen given I.M. at 0, 1, and 6 months) at the time of the first HBIG dose can further decrease the risk of contracting HBV. This regimen has been shown to have an effectiveness of about 93-96% in perinatal studies of HBeAg+ mothers (Stevens, et al., 1987; Wong, et al., 1984; Beasley, et al., 1983). In the only needle-stick study involving HBeAg+ donors, Mitsui, et al. (1989) observed subsequent infection in only 1 of the 31 patients who were administered HBIG and the vaccine. The one case of hepatitis was in a person who could not tolerate the third dose of the vaccine and who did not develop anti-HBs antibody. Together, these studies suggest that the risk of infection after exposure to HBeAg+ blood can be reduced to 3-7% by using HBIG and vaccine.

Thus, it appears that administration of either HBIG alone or with the vaccine could significantly reduce the risk of substantial harm to an exposed suspect. An HBIG program would reduce a suspect's maximum annual risk of substantial harm to 1/800 per infected officer (Table VII-4, column 4). Administering vaccine with HBIG could further reduce maximal risk to 1/3,000 (Table VII-4, column 5).

TABLE VII-5
Rate of HBV Infection Following HBIG Post-Exposure Prophylaxis*

| DONOR HbeAg+ | Number of Persons Exposed | Number Infected After HBIG (%) |
|---|---|---|
| Grady, et al. (1978) | 131 | 32 (24%) |
| Hoofnagle, et al. (1979) | 74 | 21 (28%) |
| Masuko, et al. (1985) | 37 | 10 (27%) |

*HBIG was given within 7 days and repeated after 4 weeks in all studies except for Masuko, et al. (1985) which did not give a second dose. HBeAg was measured by immunodiffusion in all studies.

After exposure to HCV, immune serum globulin (ISG) can be administered, although the effectiveness of this is unknown. However, any effectiveness would reduce the maximal annual risk of substantial harm to a suspect to less than 1/300 per infected officer.

Establishing a post-exposure program for suspects should not cause undue hardship on a police department. Such programs should have already been established for police officers in order to comply with Cal-OSHA regulations. When body fluids are exchanged between officers and suspects, officers often have their own blood tested for baseline purposes. If HBsAg and HCV tests were included in this baseline, the results could be used to guide the proper prophylactic treatment of the suspect. Thus, post-exposure assessment could simply become another standard protocol in the delivery of care to incarcerated suspects.

In conclusion, it would be difficult to justify restricting the activities of a patrol officer candidate based upon what appears to be a very low risk to others after reasonable accommodation.

b. RECOMMENDED EVALUATION PROTOCOL:

The physician should review the protocol suggested in the Gastrointestinal chapter. If the candidate is found acceptable using that criteria, the risk of substantial harm to others would appear to be too low to warrant restrictions. Ideally, the agency should have protocols for evaluating exposed arrestees that includes routine antigen testing of the "donor" officer. This would obviate the need to disclose the antigen status of a candidate to the agency.

3) TUBERCULOSIS

Candidates with a history of tuberculosis, a positive chest radiograph, or a positive skin test are relatively easy to evaluate.

- History of TB: The primary concern here is whether adequate treatment was given and whether there is any residual lung damage. The latter can be evaluated by spirometry and an exercise test, if necessary. A history of adequate treatment should include either 6 months of a three-drug regimen, or 9 months of a two-drug regimen. Furthermore, there should be documentation of sputum conversion and a stable chest radiograph.

- Positive Chest Radiograph: A radiograph suggestive of active TB would require evaluation by the candidate's private physician. Candidates with active pulmonary TB should be deferred until certified as non-infectious.

- Positive Skin Test: About 4% of US citizens are skin-test positive. Assuming the chest radiograph is negative and there is no history of recent night sweats or weight loss, these candidates are at a very low risk of developing active TB in the near future. However, prophylactic treatment with INH is indicated in many cases. Reference should be made to published guidelines from the California TB Control Program. Use of INH will not interfere with patrol officer duties since the primary side effect is reversible liver inflammation.

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