HEMATOLOGY[1]

I. INTRODUCTION

Hematologic abnormalities range from those that are asymptomatic, causing no significant impairment, to those that are symptomatic, causing significant impairment. The following hematologic disorders are among the most common and require an evaluation of the candidate's ability to perform the functions of a peace officer.

A. Anemia
   1) Iron-Deficiency Anemia
   2) Thalassemia

B. Bleeding and Clotting Disorders
   1) von Willebrand Disease
   2) Factor V Leiden
   3) Use of anticoagulants

II. IMPLICATIONS FOR JOB PERFORMANCE

Anemia can limit exercise capacity, thereby impacting performance in the following job situations:

- **Running in Pursuit of Suspects**: speed is important in up to 90% of incidents; distances may range up to 500 yards.
- **Pursuit May Be Followed by Physical Altercation**: subduing combative suspects takes an average of three (3) minutes.
- **Moving Incapacitated Persons**: lifting and carrying someone distances of 40+ feet when speed is critical.

These situations require an exercise capacity of up to 12 METS (Adams et al., 2010; Jette, et al.,1990). They may also result in blunt or penetrating trauma which could lead to serious complications for those with a bleeding disorder or who require anticoagulants.

[1]**Authors**: Leslie M. Israel, D.O., M.P.H. (MED-TOX) with assistance from R. Leonard Goldberg, M.D.
Specialist Review Panel: Howard A. Liebman, M.D.; Ilene C. Weitz, M.D.

III. MEDICAL EXAMINATION GUIDELINES AND EVALUATION CRITERIA

The evaluation of candidates for hematologic disorders requires a comprehensive history and physical examination. A candidate with abnormal findings in the history or physical examination requires a review of relevant medical records to determine the severity of the hematologic disorder. Further laboratory or diagnostic testing by the candidate's treating provider may be required to better define the hematologic disorder, treatment plan, preventive measures including physical activity limitations, and risk of incapacitation. Questions regarding a candidate's aerobic fitness should be assessed with an exercise test (see Cardiovascular System).

A number of hematologic disorders may be inherited; however, the Genetic Information Nondiscrimination Act (GINA) of 2008 prohibits not only genetic testing, but also any inquiries regarding family medical history during candidate and employee evaluations.

To be found acceptable, a candidate should meet the following criteria:

1. No history of severe thrombocytopenia (platelet counts < 5000) or major platelet dysfunction disorder that is active. A history of previous thrombocytopenia that is resolved should not put the candidate at risk and therefore should not be a basis for disqualification. Thrombocytopenia that is transient is not a contraindication.

2. Platelets of <5000 presents a severe risk of bleeding complications. Platelet counts of <30000 also place the officer at an increased risk for bleeding if injured.

3. Demonstrated history of successful participation in contact sports without recurrent bleeding complications.

4. Medical record documentation that the candidate possesses adequate knowledge of his/her disease and has acted responsibly to obtain therapy in a timely manner.

5. Absence of permanent joint damage that would interfere with the safe performance of duties (see Musculoskeletal System).

6. Absence of advanced infectious disease (i.e., hepatitis B/C, and HIV) which would impact the performance of duties (see Infectious Diseases).

7. Written acknowledgment from the candidate that he/she is aware of the following facts and associated personal risks:

    - The mortality from intracranial hemorrhage (ICH) is 20-50%; those who survive often have permanent neurological impairment.

    - Peace officer job demands create an imminent and substantial risk of head trauma.

- To reduce the risk of ICH, it is imperative that the officer obtain factor replacement or undergo a medical evaluation as soon as possible following any trauma to the head or face.

- Early therapy of head trauma must not be delayed, regardless of the lack of symptoms, fears of developing serum inhibitors to replacement factors, or cost considerations.

- While effective, early therapy will not eliminate the risk of death from minor head trauma for those with severe factor deficiencies, or who have serum inhibitors to replacement factors.

IV. COMMON CLINICAL SYNDROMES

A. ANEMIA

Anemia is a reduction in one or more of the major red blood cell measurements obtained as part of the complete blood count (CBC). Common types of anemia in candidates include the following:

1) Iron-Deficiency Anemia (IDA)

IDA is a microcytic anemia and is one of the most prevalent micronutrient deficiencies, with an estimated occurrence rate in 10-20% of both male and female athletes (Ahmadi et al., 2010). Marathon running can contribute to iron loss through hematuria, subclinical gastrointestinal bleeding, sweating, decreased absorption, and mechanical trauma to the foot (Eichner, 1986; Newhouse & Clement, 1988). Relatively severe IDA (hemoglobin <10 gm%) will impair athletic performance (Newhouse & Clement, 1988; Celsing et al., 1986).

Given the potential for IDA to impact performance, the review of medical documentation must demonstrate a history of successful dietary iron supplementation to normalize hemoglobin levels and/or the candidate should perform exercise testing (see Cardiovascular System).

2) Thalassemia

Thalassemia is a microcytic anemia caused by a genetic disorder characterized by absent or diminished synthesis of either the alpha or beta chains in the hemoglobin molecule. The prevalence of heterozygotic Thalassemia "minor" is reported to be common in African, Mediterranean, and Oriental populations. Clinically, there is usually mild microcytic anemia with hematocrits greater than 32%; these individuals usually have normal cardiovascular capacity.

Homozygous thalassemia ("intermedia" and "major") is a very grave condition resulting in premature death, poor growth, absent secondary sexual

characteristics, and multiple endocrine deficiencies. It is extremely unlikely that individuals with this condition would be present in the candidate pool.

B. BLEEDING and CLOTTING DISORDERS

Bleeding and clotting disorders are identified through a comprehensive history and clinical examination that reveals abnormal bleeding, bruising or clotting (thrombosis). The diagnosis and severity of the condition, as well as physical activity limitations, must be confirmed by medical records. If medical records are not available or do not provide the needed information, evaluation by the candidate's treating provider or further evaluation by the candidate's hematology specialist is necessary.

Intracranial hemorrhage (ICH) from minor head trauma poses the greatest risk of harm to the individual. In untreated individuals with hemophilia, this occurs following ~10% of head injuries (unselected for severity), and has a mortality rate of 20-50%. However, ICH can be prevented if clotting factors are administered within six hours of the head trauma, performed either in the ER or by self-administered infusions (Andes et al., 1984).

Complications from acute bleeding in someone with a mild bleeding disorder is unlikely to cause incapacitation or impact performance within the 5-15 minute time span. Furthermore, prophylactic pharmaceutical measures may be available to prevent critical bleeds or thrombotic incidents.

A bleeding diathesis secondary to clotting disorders, or the use of anticoagulants (warfarin), increases the risk of serious injury resulting from physical trauma. Bleeding into joints, the retroperitoneal area, and intracranial bleeding are of particular concern.

1) Von Willebrand Disease

Von Willibrand disease (VWD) is the most common bleeding disorder in humans (Kumar & Carcao, 2013). The risk of bleeding in those with VWD depends upon the level of functional Von Willibrand factor and on many other factors that are poorly understood (NHLBI, 2007). The most important tool in evaluating this condition is a positive response to a history of bleeding. If there is a positive history of bleeding, the candidate should be questioned further. Table V-1 provides supplemental questions regarding history of bleeding. Further evaluation by the candidate's personal physician and a review of the candidate's medical records may be indicated. Treatment of VWD in the United States varies widely and is often based on local experience and physician preference (NHLBI, 2007).

Table V-1: Supplemental Questions for Screening Candidates for a Bleeding Disorder

1. *Have you ever had prolonged bleeding from trivial wounds lasting more than 15 minutes or recurring spontaneously during the 7 days after the wound?*
2. *Have you ever had heavy, prolonged, or recurrent bleeding after surgical procedures, such as a tonsillectomy?*
3. *Have you ever had bruising with minimal or no apparent trauma, especially if you could feel a lump under the bruise?*
4. *Have you ever had a spontaneous nosebleed that required more than 10 minutes to stop or needed medical attention?*
5. *Have you ever had heavy, prolonged, or recurrent bleeding after dental extractions that required medical attention?*
6. *Have you ever had blood in your stool, unexplained by a specific anatomic lesion (such as an ulcer in the stomach, or a polyp in the colon, that required medical attention?*
7. *Have you ever had anemia requiring treatment or received blood transfusion?*
8. *For women: Have you ever had heavy menses, characterized by the presence of clots greater than an inch in diameter and/or the need to change a pad or tampon more than hourly, or resulting in anemia or low iron level?*

Modified from NHLBI 2007

2) Factor V Leiden

Factor V Leiden is the most common cause of venous thromboembolism, accounting for 40–50% of cases (Bauer et al., 2015). Heterozygotes for the Factor V Leiden mutation undergoing surgery receive prophylactic anticoagulation based on the degree of risk associated with the surgery (Bauer, 2015).

3) Use of anticoagulants

Individuals treated with usual doses of warfarin have a 2-4% risk per year of bleeding episodes requiring transfusion, and a 0.2% risk per year of fatal hemorrhage. Risk factors for bleeding include both individual-related and treatment-related factors. Since 2003, the development of new oral anticoagulants (NOACs) has focused on two types: direct factor Xa inhibitors and direct factor IIa (thrombin) inhibitors. Despite the advantages of NOACs, important considerations, such as monitoring and reversal of anticoagulation, are still unresolved (Hirschl & Kundi, 2014). The new anticoagulants (dagabatran, rivaroxaban, apixaban or endoxaban) may or may not prolong the prothrombin time or partial thromboplastin time; therefore, individuals on full dose remain at risk for bleeding. The risk posed by individuals on prophylactic doses or low-dose aspirin is minimal. A combination of antiplatelet agents, such as aspirin combined with clopedigrel (Plavix), can result in significant bleeding with trauma.

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