

echocardiogram is abnormal, further imaging is warranted. Magnetic resonance imaging allows visualization of areas of sarcoid involvement.<sup>2</sup> Neurological involvement is also of concern to the flight surgeon. Manifestations of CNS involvement include hypothalamic hypopituitarism, central diabetes insipidus, hydrocephalus, lymphocytic meningitis, cranial nerve palsies, and seizures. CT and magnetic resonance imaging can aid in the diagnosis if neurological symptoms are present.

According to Air Force standards, sarcoidosis is disqualifying for all flying classes. For air traffic controllers, ground-based controllers, and space and missile operations duty personnel, sarcoidosis is disqualifying if progressive, with severe or multiple organ involvement not responsive to therapy. A history of cardiac or CNS involvement is not waivable. No aviator should fly while undergoing systemic steroid treatment due to the unpredictability of side effects, especially involving the CNS. Air Force pilots may be considered for aeromedical waiver if asymptomatic, stable, and without functional impairment, and it has been at least 6 mo since any systemic steroid treatment. An aeromedical waiver requires a thorough history, including occupational and environmental exposures, symptoms, activity level, and medications, along with a complete physical exam with emphasis on pulmonary, cardiac, neurologic, ocular, hepatic, and dermatologic systems. Testing should include CXR, biopsy results, spirometry, tuberculosis skin test, ECG, and 24-h Holter monitor. Laboratory evaluation includes complete blood count, calcium, liver function tests, creatinine, blood urea nitrogen, urinalysis, and 24-h urine calcium.<sup>10</sup> Navy aviators with sarcoidosis are disqualified for flying duties until they are asymptomatic without medications at least 2 yr.<sup>7</sup> Army aviators diagnosed with sarcoidosis are also disqualified. However, a waiver may be granted if in remission for at least 1 yr with a normal systemic work-up.<sup>9</sup> Therefore, once the aviator of any military service branch has stabilized, it is possible to obtain a waiver to permit flying duties. According to the Federal Aviation Administration, a special issuance is required if symptoms are present. The focus will be the involved organ system(s) with stable pulmonary function tests. CNS or cardiac sarcoidosis, even with pacemaker placement, is unlikely to be waived.<sup>5</sup> There have been no published aircraft fatalities attributed to sarcoidosis.<sup>1,11</sup>

Our patient with early stage pulmonary sarcoidosis was treated with inhaled corticosteroids with resolution of his cough and shortness of breath. His work-up was otherwise normal and he received an aeromedical waiver to continue flying duties.

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This article was prepared by Niraj Govil, M.D., M.P.H., M.S.

It's a busy Monday morning with patients. You have an inordinate amount of return to flying status patients as well as flying physical health assessments to perform. Suddenly, the phone rings on your direct line. It's the operations group commander; he is very concerned about one of his pilots.

This is one of the more stellar pilots in the squadron. He is a 35-yr-old male instructor pilot with over 1800 total military flying hours. To add to his flying responsibilities, he has many other stressors, including taking extra classes to complete his master's degree before meeting the lieutenant colonel board, having a 12-mo-old son, and suffering from a loss of sleep due to helping his wife with the kids and housework.

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Approximately 1 wk prior to the day of his presentation, he began consuming large quantities of caffeine to stay awake and finish all his tasks (1600 mg of caffeine daily). He was noted to be irritable by his wife. Furthermore, he and his wife began arguing about benign issues, with the arguments lasting longer than usual. He failed a student pilot because of a near miss with another aircraft 2 d prior to presentation. The following day, he neglected to update a slide on a mission brief. That night, he did not sleep at all as he worried about that slide and how his commander would discipline him over it. He began to think his squadron commander planted the student he failed as a test. The irrational thoughts escalated.

On his way to work, he thought he saw “people leaving his neighborhood to live in an adjacent area because there was a conspiracy planned by the Wing to isolate him and his family.” Upon arriving at work, he noted that his squadron commander was dressed in blues and he became even more paranoid. He accused his commander of starting a legal investigation against him and believed that he was going to be indicted. He kept asking for legal counsel. At this point, the flight surgeon and the director of operations were immediately notified.

The instructor pilot was evaluated at the flight medicine clinic and diagnosed with sleep deprivation. He was told to go home and get some sleep. He did not do this. He got on his bike and rode downtown because he apparently wanted to be arrested by civilian police due to his thoughts that the military was out to get him. His wife called the flight surgeon's office and he was followed off base. This incident led to an admission to a local psychiatric hospital.

### 1. What percentage of U.S. Air Force flyers who were hospitalized for psychiatric disorders are returned to flight status?

- A. 65%.
- B. 50%.
- C. 25%.
- D. 10%.

#### ANSWER/DISCUSSION

**1. A.** Many people, including flyers, believe that a psychiatric disorder will end their career. This incident with this patient was disturbing to everyone involved. The operations group commander, the squadron commander, the flight surgeons involved, and the patient and his family must have been gravely concerned about the impact of this event on the pilot's career.

Psychotic disorders themselves are defined by the presence of delusions, hallucinations, or bizarre behavior. The most serious psychotic disorders often begin early in life with nonspecific symptoms.<sup>1</sup> They have been found to have a lifetime prevalence in the general population that exceeds 3%.<sup>4</sup> Patients may create a false interpretation of the world around them that would make no sense to an outside observer. Specific characteristics of psychotic disorders include delusions (a false belief about a very real situation), hallucinations (false perceptions involving one or more of the five senses), illusions (real sensory stimuli that are misinterpreted), depersonalization (losing perception of one's own individual reality), loose

associations (ideas that are poorly connected and devoid of any logic), or even disorganized and bizarre behavior (incoherent speech or immobility).

Psychosis and psychotic disorders are disqualifying conditions for flying under the Army, Navy, Air Force, and Federal Aviation Administration regulations. There are occasions where a previously mentally healthy aviator goes through a brief, intensely stressful period that results in a brief reactive psychosis that eventually clears. Waivers to allow return to flying status may be granted when the duration is brief and the cause is firmly identified as one that will either never recur or can be avoided.

Although this instructor pilot was admitted to the hospital, he received only Ambien (zolpidem) for sleep. His symptoms resolved with no further recurrence. While he was an inpatient, a computed tomography of the head, a magnetic resonance imaging of the brain, laboratory studies, and a urine drug screen were done and found to be negative or within normal limits. Medical history revealed that he had no ongoing or significant previous medical illnesses. He had been deployed approximately six times with no significant issues or incidents and took no current medications except for a multivitamin. His family history was negative for any significant medical issues. One of his younger brothers committed suicide and that brother's twin had significant depression and alcohol abuse. The instructor pilot's physical examination was normal.

Obviously, your next move would be to medically suspend this pilot from any current flying duties. While you are pleased the hospital found no medical illness or intoxication as the cause for his symptoms, for aeromedical purposes, you still need to know what caused his psychosis to understand his vulnerability and risk for recurrence.

### 2. What is NOT one of the three main cause classifications of psychosis?

- A. Psychosis caused by a mood disorder.
- B. Psychosis caused by general medical conditions.
- C. Psychosis caused by the social environment.
- D. Psychosis caused by substances (such as drugs or alcohol).

#### ANSWER/DISCUSSION

**2. C.** Certain psychological and physical conditions have been known to cause psychotic symptoms in patients, while primary psychotic disorders, such as schizophrenia, are defined by persistent psychosis. In bipolar disorder, a patient's moods can swing wildly from one extreme to another, from euphoria to severe depression, leading to hallucinations and bizarre behavior in either phase. Severe depression, including postnatal depression in some women, can also trigger psychotic symptoms. Severe psychological stress, such as death of a loved one, or physical stress, such as sleep deprivation, can also trigger psychotic episodes. The particular underlying psychological cause can actually influence the type of psychotic episode a patient can experience.<sup>2</sup> This can be seen in patients with bipolar disorder, who are more likely to have delusions of grandeur, while a depressed or schizophrenic patient may be more likely to have paranoid delusions.

General medical conditions can present with psychotic symptoms. This is why it is critical to look for an organic medical cause when a

patient presents with such an episode. Brain tumors frequently cause psychotic symptoms (the reason for magnetic resonance imaging and computed tomography). Infections, including human immunodeficiency virus/acquired immunodeficiency syndrome, malaria, syphilis, and Lyme disease, may all be accompanied by psychotic symptoms and may cause persistent psychosis. Other conditions seen more commonly in the elderly include Alzheimer's and Parkinson's diseases. Autoimmune conditions such as lupus must be considered. Also, hypoglycemia, especially in extreme cases, can cause psychosis.

Substances are an important cause of psychotic presentations. Psychotic symptoms can be part of the intoxication or be a time-limited or permanent aftereffect of drug use. One of the most basic tests to perform on a patient who presents with an acute episode is a toxicology screen. Also, a psychotic episode can be triggered if a drug or alcohol is suddenly stopped after prolonged and excessive usage. The most common substances that are implicated in withdrawal psychosis include alcohol, cocaine, amphetamine, cannabis (marijuana), lysergic acid diethylamide, and ketamine.

Another substance that can be legally obtained and commonly used is caffeine. One cup of coffee contains approximately 200 mg of caffeine (this patient was consuming the equivalent of eight cups of coffee). High doses have been known to induce psychotic and manic symptoms, typically when combined with sleep deprivation or high physical/psychological stressors.

There are genetic associations implicated in psychotic disorders (50% concordance rate in monozygotic twins), and some genetic diseases (Huntington's disease) can cause psychosis, but there is not a separate classification of psychotic disorders with genetic causes. This particular patient did have mental health issues in his family, but nothing that would place him at risk for a psychotic event.

This patient was sent for an extensive psychological/psychiatric evaluation by the Aeromedical Consult Service almost 17 mo after his psychiatric admission to a civilian hospital. During that visit, a full history and physical examination were completed. The psychiatrist evaluated him across 8 h of interviews. The member had been symptom free since release from the hospital and, during the evaluation, there was no evidence of any type of paranoid ideation, delusions, or thought disorder. He did note that there were stressors present at the time of the psychological decompensation, but they were not severe. These stressors included a rushed attempt to finish a master's degree before the promotion board, three young children at home (9 yr, 3 yr, and 12 mo), and some conflict with his wife over childcare and other household responsibilities.

His presentation did not appear to be an effect of the near miss in the aircraft. His motivation to fly was strong, early, and sustained. The psychiatrist noted that the pilot had a previous history of recovering his F-15 from an engine failure and landing safely. He had some anxiety about the incident, but was able to return to flying the next week. The original aircraft incident was less stressful.

The psychiatrist concluded that there was no evidence the patient suffered from bipolar disorder, psychotic depression, drug intoxication, infectious disease, or a delusional disorder. His impression and recommendations from that first evaluation were that the patient suffered a brief psychotic disorder, cause unknown, and it was now in remission. The psychiatrist was unable to provide expert delineation of the risk of recurrence. As noted, there were stressors present prior to

the episode of the paranoid delusions, but those stressors were NOT considered to be severe. Therefore, there was a potential risk of recurrence and this was beyond aeromedically acceptable limits. Although the pilot had made a full recovery, the mental health experts could not say for sure that a similar event could not repeat itself. They made the recommendation at that point NOT to provide a waiver, but to reevaluate this patient in 15 mo. Furthermore, he was assigned to follow up with a psychologist for ongoing therapy sessions.

### 3. How is psychosis treated?

- A. Medication.
- B. Counseling and psychotherapy.
- C. Educating the patient and the family.
- D. All the above.

### ANSWER/DISCUSSION

**3. D.** The use of medications is the primary mode of treatment for most psychotic episodes. The drugs used are classified as antipsychotic medications. They are specifically used to reduce the psychotic symptoms. However, all have significant side effects, such as dyskinesia, sedation, weight gain, and lethargy. Many of these side effects can be so severe and debilitating that they can greatly reduce compliance. For aviators, they are not compatible with any flying duties. Fortunately, medications are not always required.<sup>3</sup> For presentations due to environmental factors such as sleep deprivation, hyperthermia, exogenous substance, or medical conditions, simply removing the inciting agent or correcting the underlying condition may be all that is necessary.

Mental health professionals are also using medication-free therapies to treat psychosis, such as supportive psychotherapy, cognitive-behavioral therapy, and family therapy. Especially in cases of a brief reactive psychosis, psychotherapy may help the patient cope with the stresses that may have triggered that episode. Cognitive-behavioral therapy can help patients recognize how their thought patterns can influence their behavior. It is often used with other treatments to help develop strategies to deal with problematic symptoms such as hallucinations and delusions. Family therapy, as the name suggests, helps provide support for the family unit as well as the patient.

Lastly, educating the patient, as well as the family, provides information about the risk of relapse and the guidelines for recognizing and seeking treatment when symptoms develop. The most important area to focus on is stress management so that the original stressors, which may have triggered a brief psychotic episode, are alleviated.

Fifteen months later, the instructor pilot was reevaluated at the U.S. Air Force Aeromedical Consultation Service. A psychiatrist spent approximately 7 h reviewing old records and conducting direct patient interviews. After evaluation of the patient's history of the last 2 yr, the psychiatrist noted that the patient's disorder did have a plausible identifiable causal mechanism. The combination of chronic sleep deprivation and large amounts of caffeine was implicated. The medical literature contains case reports of the two in combination resulting in reactions similar to the patient's.<sup>3</sup> Proposed mechanisms include a synergistic effect on the dopamine neurotransmitter system. Caffeine/sleep-induced psychotic episodes can be brief, resolving after sleep

with the patient recalling the events. The caffeine/sleep deprivation course was similar for this patient.

The revealed history showed that the patient was now making a point to schedule more time for sleep and family. He had also reduced his caffeine intake significantly. He continued to finish his master's degree and had recently been promoted to Lieutenant Colonel. He continued in psychotherapy, attending 20 sessions in the last 2 yr. Most importantly, he continued to excel at his job and experienced no recurrence of any symptoms.

Because this patient had an episode that was reasonably ascribed to a known mechanism of interaction between sleep deprivation and caffeine for a prolonged length of time, and because the patient was able to avoid the stressors over the past year with no further relapse, a waiver was recommended to the waiver authority. The patient had demonstrated insight and perseverance for 2 yr in implementing changes that resulted in much better mental health. It was recommended he continue local mental health follow-up and return to the Aeromedical Consultation Service in 1 yr for review.

#### 4. What is the outcome of psychosis?

- A. These patients never recover.
- B. Prognosis varies for different types of psychosis.
- C. Prognosis is unknown.
- D. None of the above.

#### ANSWER/DISCUSSION

**4. B.** The prognosis does vary with the type of psychosis. There are several recovery process factors that interact and include the treatment environment as well as the medication and psychological therapies. The family and social environment also affect the prognosis.

This particular patient was diagnosed with a brief reactive psychosis (psychotic symptoms lasting less than 30 d). These patients usually respond to treatment within a week, and the disorder is associated with

an excellent outcome when the cause is known.<sup>2</sup> Those where a cause is not found, however, have a 30% recurrence rate. Chronic or recurrent psychosis has a much worse functional prognosis and patients are at increased risk for suicide compared to the general population.

During his third visit the following year, the patient had demonstrated excellent psychological stability over the course of the last 3 yr. He had greatly improved his coping skills and he was better able to balance the demands of work and family. Both his interview and objective psychological testing found him to be free of symptoms and emotionally well adjusted. His final diagnosis was brief psychotic disorder, resolved. It was recommended that his waiver be continued and he was asked to follow up for reevaluation in 3 yr.

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