

CASES THAT TEST YOUR SKILLS

Mr. F's uncontrollable urge to ingest poisons has caused neurotoxic depression and other symptoms. A death wish or impulse control disorder? You decide.

A suicidal injection obsession

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HISTORY TIRED OF LIVING

Mr. F, age 43, presents to the emergency room with complications of type 2 diabetes mellitus: blurry vision, increased urination, fatigue, and polydipsia. Blood glucose is 676 mg/dL.

The patient flees during treatment—possibly to attempt suicide—but returns 36 hours later, noticeably disoriented. He is readmitted to the ER, where he tells staff he is considering suicide and plans to self-inject a lethal substance. The ER staff refers him to the psychiatry service.

Mr. F also complains of shortness of breath after minimal exertion, aching joints throughout his body, and intense pain in his right great toe. He has been sleeping 12 to 20 hours daily, yet has trouble sleeping at night. He persistently feels fatigued, hopeless, and helpless. He says his suicidal urges have become more intense over 2 months, but he fears he will lose his computer repair job if he is admitted. He also shows difficulties with short-term memory. We admit him for observation.

Mental status examination suggests that Mr. F is generally withdrawn. Eye contact is poor and he is quiet and evasive, possibly signaling paranoia. He spends most of his stay watching television. His thought process is linear, and he thinks constantly of suicide. During the Mini-Mental State Examination, he gives the incorrect date and county. He misses two other items on recall but gets them correct with prompts.

A mild intention tremor distorts his handwriting. He has trouble keeping his balance during the Romberg test, and his gait is mildly ataxic. Ophthalmology consult suggests that diabetic retinopathy and optic disc cupping secondary to glaucoma may be blurring his vision.

Mr. F is taking no medications but had previously used insulin twice a day, and his outpatient doctor insists he should go back on insulin. He smokes 1 pack of cigarettes per day, drinks alcohol moderately (one to two drinks/day), and does not abuse illicit drugs.

continued

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Mr. F's presenting symptoms suggest:

- depression
- a psychotic disorder
- another medical condition



The authors' observations

Mr. F's depressed mood, hopelessness, concentration problems, psychomotor retardation, and suicidal thoughts suggest major depressive disorder. Depression or a delirium secondary to diabetes may account for his referential ideas.

FURTHER HISTORY ONE SHOT AT SATISFACTION

Over the following week, Mr. F becomes more talkative as the psychiatry staff develops a therapeutic rapport. He tells his treatment team that he feels urges to self-inject liquids he finds in his hospital room, such as shower gel and beverages.

Mr. F tells us that approximately 2 years ago, he tried to kill himself by swallowing boric acid. After 6 weeks in intensive care, the poison's physical effects resolved and he no longer appeared suicidal. The staff at that time prepared to discharge Mr. F when, while left alone in his room, he dislodged a wall-mounted sphygmomanometer, disassembled it, and broke open the mercury tube. He then injected about 3 mL of mercury into his intravenous port and swallowed another 3 mL.

A nurse who checked on Mr. F minutes after the

incident did not notice the sphygmomanometer was missing. He showed the broken device to the nurse, saying, "Look what I did." When the nurse asked why, he responded, "I was just sitting here alone and saw the thing on the wall. I thought to myself, I can do this."

The hospital viewed the episode as another suicide attempt. Staff immediately began chelation therapy with dimercaprol, 10 mg/kg every 8 hours for 5 days, then 10 mg/kg every 12 hours for 2 weeks. Within 24 hours of ingesting mercury, Mr. F developed shortness of breath, tachycardia (104 BPM), a fever (101.8°F), and had GI complaints. Increased blood urea nitrogen, increased creatinine, and decreased urination suggested declining renal function. He developed a pruritic rash over his back and mild skin loss on his soles.

Mr. F's mercury levels were 20.8 mg/dL (serum) and 216 mg/dL (urine) 36 hours after ingestion, and 24.8 mg/dL (serum) and 397 mg/dL (urine) after chelation. Serum mercury >5 mg/dL is usually symptomatic.

Approximately 72 hours after the incident, most pulmonary, renal, and dermal manifestations of mercury toxicity began to improve. Mr. F was discharged after 21 days. He was diagnosed with major depression and started on sertraline, 150 mg/d.

'The best feeling.' Two years later, Mr. F tells us he has attempted suicide at least six times. Diffuse metallic foreign bodies throughout his lung vasculature and a 9.6 mg/dL serum mercury reading confirm he has injected mercury. His painful toe is x-rayed to check for mercury deposits, but he ultimately is diagnosed with gout.

During our evaluation, Mr. F admits that "the calmest, best feeling I have ever had" was while injecting mercury, yet he fears the incident has caused permanent physical and mental damage. He describes his desire to self-inject liquids as "impulses" triggered by twice-daily subcutaneous insulin use. For this reason, he has stopped taking insulin against his doctor's advice.

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How would you have handled this case?

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to input your answers and compare them
with those of other readers

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Mr. F's actions suggest:

- obsessive, self-destructive behavior
- a substance use disorder
- borderline personality disorder



The authors' observations

Mr. F's mental status changes and serum mercury suggest mercury poisoning. He shows numerous heavy-metal poisoning symptoms (*Box 1*) as well as erethism, a malaise that can result from heavy-metal exposure.²

The patient insists that insulin shots bring on self-injection urges, but his impulsive and repetitive suicidal behavior, dysphoria, and transient paranoia suggest borderline personality disorder. His impulses may reflect a subtle, long-term personality change caused by mercury's neurotoxic effects.¹ Or they could be akin to cutting behaviors shown by some patients with personality disorders, particularly borderline personality disorder.

We ruled out substance abuse disorder, as Mr. F's mercury ingestion was not premeditated, he has no history of illicit drug use, and intravenous elemental mercury is not psychoactive.

An ever-present threat. Mercury exists in many organic, inorganic, and elemental forms—all toxic.

Elemental mercury found in thermometers, lamps, and dental amalgams slowly ionizes in the blood stream before crossing the blood-brain barrier. Mercury and carbon form toxic "organic" compounds, including methylmercury (found in the environment), phenylmercury (used in some commercial products), and dimethylmercury (found in solid waste sites).

Because mercury's half-life is 60 days, it dissipates slowly, can accumulate with chronic exposure, and stays in the blood stream long after high-dose exposure.³

Box 1

Neurocognitive symptoms that may suggest mercury poisoning

- Emotional lability
- Excessive shyness
- Headaches
- Hearing loss
- Insomnia
- Irritability
- Lack of ambition
- Lack of sexual desire
- Loss of confidence
- Memory loss
- Nervousness
- Neuromuscular changes (including weakness, muscle atrophy, muscle twitching)
- Performance deficits in cognitive function tests
- Polyneuropathy
- Tremor of hands
- Visual field defects

Source: Reference 1

Serum mercury >5 mg/dL can cause subtle, enduring neurotoxic effects, including tremor, dizziness, shortness of breath, blurry vision, decreased visual fields, depression, memory loss, and irritability.³ Serum mercury rarely exceeds 1.5 mg/dL without direct exposure.

Irritability, depressive symptoms, and renal manifestations emerge when urine mercury reaches 200 to 1,000 mg/dL. Renal, respiratory, and GI effects are seen at 1,000 to 2,000 mg/dL.

Means of exposure. Vapor inhalation is the most common means of elemental mercury exposure.³ Elemental mercury used in manufacturing vaporizes at room temperature.

Orally ingested elemental mercury is poorly absorbed from the GI tract, mostly passes unabsorbed, and is toxic only at high doses. Injected elemental mercury is poorly absorbed but can cause mechanical and immunologic effects. The psychiatric literature describes some 200 cases of mercury self-injection⁴⁻⁸ but offers little information on cognitive effects or long-term follow-up.

Consider heavy-metal poisoning in the differ-

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Box 2

Mercury: We eat it, breathe it, and work with it

Consuming or using certain products or working in some industries increases mercury exposure risk. Mercury-containing products include:

Over-the-counter herbal remedies imported from China, Hong Kong, Haiti, and Cuba.⁹

Older, larger marine animals, including tuna, shark, or swordfish from mercury-contaminated waters.^{10,11}

Vaccines and medications. Small amounts of thimerosal (ethylmercury sodium salt) were used as a preservative in some vaccines.¹² Some antiseptics, eye drops, eye ointments, nasal sprays, skin-lightening creams, and gamma globulin contain mercury.

Dental amalgams are approximately 50% mercury. Each amalgam releases roughly 10 mg/d of mercury; chewing gum or grinding teeth may increase exposure.¹³ Some suggest removing the fillings, but this can increase mercury exposure if done incorrectly.¹

Household goods, including latex paint made before 1990 and broken thermometers.^{3,14}

Other environmental exposure, such as from burning coal, water treatment facilities, landfills, and mercury-containing fungicides.

Occupations that carry a high risk of mercury exposure include:³

Manufacturing

Batteries, cosmetics, explosives, paint/pigments, fluorescent lamps, ink, mercury vapor lamps, pharmaceuticals, switches, and rectifiers

Skilled trades

Plumbing, chlorine and caustic soda production, electroplating, felt-making, leather tanning, grinding machine operators, paper millers

Medical

Dental and medical laboratory personnel

Service industries

Hazardous-waste site personnel, painters, pesticide/fungicide production/application

Mining/processing

Cinnabar, gold, silver, copper, or zinc; metallurgy

ential diagnosis of patients with depressive symptoms. Ask about risk factors for environmental mercury exposure, including use of folk medicines, some cosmetics, over-the-counter nasal sprays, ophthalmic solutions, skin-lightening creams, daily fish consumption (particularly tuna or swordfish), living in a house painted with latex paint, or continuous exposure at work (*Box 2*).

Also ask if the patient or a household member recently ingested mercury or handled a broken thermometer. Liquid mercury on clothing and in bodily fluids may cause secondary contamination, whereas mercury vapor cannot.

Order serum mercury testing if you suspect chronic exposure. Refer patients with serum mercury ≥ 1.5 mg/dL to their primary care physicians

and to a poison control center for evaluation and possible chelation. Refer patients with acute mercury exposure symptoms to the ER.

How would you treat Mr. F's depression?

- prescribe an antidepressant
- prescribe a psychostimulant to increase his energy
- change his diabetes medications

The authors' observations

Antidepressants generally will not reduce depression, irritability, personality changes, or apathy sec-

ondary to mercury poisoning. We have found that a psychostimulant such as methylphenidate, starting at 10 mg bid and titrating to therapeutic effect, can help treat mercury-related apathy.

We did not give Mr. F a psychostimulant, however, fearing it would worsen his impulsive behavior and disordered sleep. Also, more effectively managing Mr. F's diabetes should improve his depression.

DISCHARGE CHELATION CHALLENGE

Mr. F's suicidal thoughts continued intermittently. Chelation was tried again with succimer, 1,000 mg tid for 5 days and bid for 5 more days, but the agent caused severe nausea without significantly decreasing serum mercury. He declined outpatient chelation.

After 2 weeks, Mr. F denied suicidal thoughts and said he felt physically better. He was discharged on venlafaxine, 300 mg/d, for his depressive symptoms; and metformin, 1,000 mg/d, glipizide, 10 mg bid, and rosiglitazone, 4 mg/d, to control his blood glucose. We arranged for medication management at a community mental health center. Mr. F was also told to visit the hospital's outpatient clinic for endocrine follow-up but has not returned for 18 months.

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Related resources

- ▶ Agency for Toxic Substances and Disease Registry. Information about toxic substances in the environment and diseases they may cause. www.atsdr.cdc.gov.

DRUG BRAND NAMES

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|-------------------------------------|-------------------------|
| Dimercaprol • BAL in Oil | Rosiglitazone • Avandia |
| Glipizide • Glucotrol | Sertraline • Zoloft |
| Metformin • Glucophage | Succimer • Chemet |
| Methylphenidate • Ritalin, Concerta | Venlafaxine • Effexor |

DISCLOSURE

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Irritability, fatigue, and depressive symptoms can suggest mercury or other heavy-metal poisoning. Order a blood test for patients who use mercury-containing products or are exposed at work. Refer patients with serum mercury ≥ 1.5 mg/dL to a primary care physician or poison control center.

BottomLine