

## Interpreting Urine Drug Screen Results in the Context of Poppy Seed Use

**To the Editor:** The abuse of home opiate preparations derived from poppy seeds (PSs) is gaining popularity in the United States,<sup>1</sup> and clinicians may increasingly encounter these patients in their practice. At least 5 American men have died after consuming poppy-based tea, most often in the context of urine drug screens (UDSs) positive for other illicit substances.<sup>1</sup> Clinicians may find that their patients using PS tea are also using other opioids, which may present a challenge when interpreting UDSs.

In our practice, we encountered a patient who reported drinking tea prepared from 1 to 2 lb of PSs daily. He described development of opioid withdrawal symptoms of diaphoresis, anxiety, and tremors within 24 hours of abstinence. A UDS by liquid chromatography-mass spectrometry revealed a morphine concentration of 37,600 ng/mL, a codeine

concentration of 2580 ng/mL, and a hydromorphone concentration of 1430 ng/mL (reference cutoff, 100 ng/mL, all 3 tests).

Although PSs are well known to cause UDS results positive for codeine and morphine, the dose of PSs required to produce a positive result can vary.<sup>2</sup> Poppy seeds can produce differing amounts of morphine and codeine depending on the country of origin, lot, and baking technique.<sup>2,3</sup> Commercially available PS preparations contain wide ranges of morphine (0.6-151.6 µg/g). When common PS-containing foods are ingested, morphine can be detected in the urine for up to 48 hours.<sup>3</sup> In one example, subjects were given two 45-g doses of PS with known morphine (15.7 mg) and codeine (3 mg) content.<sup>2</sup> The ranges of urine concentrations of morphine and codeine were 2413 to 7522 ng/mL and 284 to 1540 ng/mL, respectively, well above the common cutoff of 100 ng/mL.<sup>2</sup>

When interpreting UDS results for opioids, the following factors may be considered: in general, PSs,

codeine, morphine, and heroin produce a result positive for morphine (Table).<sup>2-5</sup> Although codeine and morphine produce less than 11% hydrocodone and less than 2.5% hydromorphone, respectively,<sup>4</sup> these 2 metabolites have not been reported in the context of PS use. Drugs such as fentanyl, methadone, hydromorphone, and oxycodone do not produce active metabolites<sup>4</sup> and have not been reported to interfere with UDSs for PS. Testing for thebaine, a natural by-product of PS, has been proposed because it is generally not found in the context of codeine, morphine, or heroin use.<sup>3,5</sup> Thebaine testing, however, has not been widely implemented because of its short half-life. Likewise, 6-acetylmorphine has been used as a means of differentiating heroin from PS use, but it is also limited by its short plasma half-life of 10 to 40 minutes.<sup>2,5</sup> Recently, Chen et al<sup>5</sup> described a new test of a metabolite of "street" heroin (ATM4G), which could further serve to differentiate street heroin from PS use.

Although there is no definitive, reliable test to differentiate PS from

**TABLE. Urine Toxicology Results of Common Opioids and Opiates<sup>a</sup>**

Urine toxicology study target	Substances that produce a positive result									
	Poppy seed	Heroin	Morphine	Codeine	Hydrocodone	Oxycodone	Methadone	Hydromorphone	Oxycodone	Fentanyl
Morphine	+	+	+	+						
Codeine	+	+ <sup>b</sup>		+						
6-Acetylmorphine		+								
Thebaine	+									
Hydrocodone				+ <sup>c</sup>	+					
Oxycodone						+				
Methadone							+			
EDDP							+			
Hydromorphone			+ <sup>c</sup>		+			+		
Oxycodone						+			+	
Fentanyl										+

<sup>a</sup>EDDP = 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine, a methadone metabolite; + = positive result.

<sup>b</sup>Codeine is not found in pharmaceutical-grade heroin preparations.<sup>4</sup>

<sup>c</sup>Codeine produces hydrocodone as a metabolite in <1% of total codeine concentration; morphine produces hydromorphone as a metabolite in ≤2.5% of total morphine concentration.<sup>4</sup>

Data from references 2 through 5.

other opioids, knowledge of expected findings in PS use may aid the clinician in diagnosis. In our case, considering that the urine morphine concentration was 376 times the cutoff value and the hydromorphone concentration was greater than 2.5% that of morphine, the concomitant use of PS with other opioids was the most likely explanation for the abnormal UDS results.

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<http://dx.doi.org/10.1016/j.mayocp.2015.08.011>

## Examining the Burden of Licensure, Certification, and Related Credentialing Costs in Young Physicians

**To the Editor:** The financial burden of the overall licensure and certification process borne by physicians-in-training, and those who have recently completed their training and are beginning to enter clinical practice, has become excessive.<sup>1-4</sup> It is worth reminding ourselves that for most new physicians these costs must be managed while concurrently beginning to repay large education debts and incurring the general expenses of becoming established in early family and professional life.

Based on our review and analysis, total estimated expenses and opportunity costs associated with licensure and certification occurring through completion of the first board recertification cycle for physicians is between \$10,000 and \$20,000, depending on specialty, geographic location, and utilization of preparatory courses and materials. When compared with a sample population of advanced nurse practitioners or physician assistants, the difference is staggering. For the same time period, non-physician-practitioner

organizations charge less than \$3000 for their licensing and certification (see the [Table](#)). Beyond the fiscal strain imposed on physicians by the mandated expenses, there are associated travel expenses and lost work time associated with examinations and recertification. Furthermore, preparatory expenses (eg, attending preparatory courses, purchasing self-help materials, and additional travel expenses), while not mandatory, are a significant expense shouldered by most young physicians, and these have widely variable (but oftentimes immense) associated costs.

As financial pressures continue to mount for practicing physicians, we must recognize that in this era of ever-changing health care reform and downstream changes in physicians' roles and responsibilities, being a physician in the 21st century is arguably more demanding and stressful than at any time in history. It is our firm belief that contemporary accreditation bodies should not unduly add to the stress and financial burdens physicians encounter. Instead, medicine's credentialing and certification monopolies should transparently assess and report the value of ongoing and new programs (eg, maintenance of

**TABLE. Comparison of Physicians and Provider Expenses Associated With Medical Licensing, Board Certifications, Continued Certifications, and Other Expenses<sup>a,b</sup>**

Expense	Internal medicine	Pediatric	Certified registered		
	physician	anesthesiologist	Nurse practitioner	nurse anesthetist	Physician assistant
Medical education training exam(s)	\$3305 <sup>5</sup>	\$3305 <sup>5</sup>	\$200 <sup>6</sup>	\$200 <sup>6</sup>	\$475 <sup>7</sup>
State license <sup>2</sup>	\$1000 <sup>8</sup>	\$1000 <sup>8</sup>	\$200 <sup>9</sup>	\$200 <sup>9</sup>	\$125 <sup>10</sup>
Renewal fees (10-y total, eg, AZ) <sup>2</sup>	\$4000 <sup>8</sup>	\$4000 <sup>8</sup>	\$320 <sup>11</sup>	\$320 <sup>11</sup>	\$1665 <sup>10</sup>
Drug Enforcement Agency license (3-y license) <sup>3</sup>	\$731 <sup>12</sup>	\$731 <sup>12</sup>	\$731 <sup>12</sup>	\$731 <sup>12</sup>	\$0 <sup>12</sup>
Board certification <sup>4</sup>	\$1365 <sup>13</sup>	\$1550 <sup>14</sup>	\$270 <sup>15</sup>	\$725 <sup>16</sup>	\$350 <sup>17</sup>
Oral board examination <sup>18</sup>	\$0	\$2100 <sup>19</sup>	\$0	\$0	\$0
Subspecialty board certification <sup>18</sup>	\$0	\$1600 <sup>20</sup>	\$0	\$0	\$0
Maintenance of certification (per 10 y) <sup>5</sup>	\$1940 <sup>21</sup>	\$2100 <sup>22</sup>	\$200 <sup>23</sup>	\$440 <sup>24</sup>	\$0
Total	\$12,341	\$16,386	\$1921	\$2616	\$2615

<sup>a</sup>Elective preparatory expenses, lost wages, and travel expenses are not included. All examination and licensing costs as of September 13, 2015.

<sup>b</sup>All attempts were made to be accurate and up-to-date with fees and licensure requirements. However, given the complex nature of the different medical professions and the variation in requirements based on practitioner type, society, specialty, and geographic location, our calculations are approximations of the true costs.