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EDITORIAL

Activated charcoal in poisoning management: What's new in clinical practice?

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Poisoning represents a growing global public health concern, with rising incidence observed across both high- and low-income countries. In the United States, intoxications are the primary cause of injury-related mortality, accounting for 102,001 fatalities in 2021 and exceeding motor vehicle collision deaths yearly since 2013.[1] Activated charcoal (AC) remains the most common form of gastrointestinal (GI) decontamination. However, its use requires critical re-evaluation regarding current indications, optimal timing of administration, and contraindications, particularly as emerging evidence challenges the traditionally accepted 1-hour administration window and as newer extended-release drug formulations continue to alter absorption kinetics.

AC acts by adsorbing a wide range of toxic substances within the GI tract, thereby reducing their systemic absorption and, consequently, the severity and potential toxicity of poisoning. The landmark recommendations on the use of single-dose AC were initially published in 1997 as a Position Statement and subsequently updated in 2005 through a Position Paper.[2,3] Since then, new evidence has emerged from clinical studies, pharmacokinetic investigations, and observations of gastric emptying in overdose patients.

In an effort to update previous guidelines, the Clinical Toxicology Recommendations Collaborative Workgroup was established in 2017 as a joint initiative of the American Academy of Clinical Toxicology (AACT), the European Association of Poison Centres and Clinical Toxicologists (EAPCCT), and the Asia Pacific Association of Medical Toxicology (APAMT). A dedicated Activated Charcoal in Clinical Toxicology Workgroup was established within this endeavor, bringing together multidisciplinary experts and collaborating with additional international scientific societies to conduct a comprehensive review of the published literature and develop updated recommendations regarding the use of AC following oral overdose.[4]

One of the most important changes is the reconsideration of the traditional 1-hour time limit for AC administration. This recommendation is supported by studies conducted in both healthy volunteers and poisoned patients, which have demonstrated a significant reduction in the absorption of certain toxic agents even several hours after ingestion. Different studies have

(AI-assisted figure)

shown that gastric emptying may be substantially delayed in overdose situations, particularly following exposure to drugs such as tricyclic antidepressants, acetaminophen, opioid–acetaminophen combinations, and carbamazepine.

Gastroparesis has also been reported following exposure to antimuscarinic agents and opioids, resulting in a 2.2–3.3 times prolongation of gastric emptying time. Even in cases involving drugs without direct effects on GI motility, ingestion of large tablet burdens may itself contribute to gastric hypomotility and delayed emptying. Endoscopic evaluation of patients following overdose with solid pharmaceutical formulations revealed persistent gastric contents in a substantial proportion of cases: 44% retained tablet, food, or soluble/liquid material at 1–4 hours post-ingestion, and 14% still had toxicant-related gastric contents at 4–12 hours.[5] These findings suggest that clinically significant amounts of an ingested substance may remain in the stomach well beyond the timeframe conventionally accepted for AC administration.

Current recommendations suggest that the indication for AC should not be based solely on time elapsed since ingestion, but should also incorporate the toxicological properties of the agent involved, the pharmaceutical formulation, and an individualized risk assessment. Detailed substance-specific guidance is available in the consensus document developed by the Workgroup.

Another concept introduced by the task force is the option of administering an additional dose of AC to optimize GI decontamination. Recommended amounts remain unchanged: 50 g in adults or 1 g/kg in pediatric patients. A 10:1 ratio of AC to xenobiotic is the commonly recommended dose, based on experimental evidence.[6] A second administration, however, may be considered when there is suspicion or evidence of ongoing GI absorption. No fixed time window is established for this additional dose; its indication should be individualized according to the toxicological properties of the substance and the patient's clinical course. The supplemental administration may consist of either a full or a half dose of AC.

A final aspect addressed by the Workgroup is multiple-dose activated charcoal (MDAC), a therapeutic regimen designed to enhance toxicant elimination by interrupting enterohepatic or enteroenteric recirculation. Strong recommendations supporting its use were issued for poisoning involving dapsone, phenobarbital, theophylline, and aminophylline, whereas only weak recommendations were made for carbamazepine, cardiac glycosides, colchicine, phenytoin, and thallium.

To conclude, it is important to acknowledge the work of the international experts who have driven this update. Periodic critical appraisal of the scientific evidence is essential to improving the quality of toxicological care, challenging established paradigms, and generating new lines of research aimed at optimizing outcomes in poisoned patients. Several areas remain in need of further investigation, particularly in special populations, including patients with morbid obesity, prior bariatric surgery, pregnancy, children, and older adults, in whom available evidence is limited.

Conflicts of interest

The authors declare no conflicts of interest.

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