

# Drug-Induced Seizures in the Elderly

## Causative Agents and Optimal Management

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### Summary

We conducted a review of drugs that were most commonly associated with inducing seizures in the elderly population. The method for determining the risk of these agents includes evaluating the utilisation and the percentage of adverse events in previous studies and case reports. Classes of medications, such as antipsychotics and antidepressants, are extensively reviewed to provide the clinician with treatment options in high risk patients. The risk of seizures secondary to the withdrawal of alcohol (ethanol) and benzodiazepines, and methods employed to

minimise this risk are discussed. In addition, the management of patients with drug-induced seizures is delineated.

Drug-induced seizures are a potentially serious adverse effect. It is important that clinicians are aware of which classes of medications and individual medications are associated with reducing seizure threshold.

## 1. Overview

The seizure threshold of individuals may vary as a function of several factors, among which various medications play a significant role. Clinicians frequently work with patients to raise the seizure threshold to recurrent idiopathic seizures. It is known that in treating these individuals for various other disorders, medications may be used either in dosages or in combinations which may inadvertently lower seizure threshold, thereby increasing the possibility of inducing a seizure. However, there is the possibility of a medication directly precipitating a seizure, as a result of toxicity or an adverse effect.

Seizures are a commonly cited adverse drug reaction. The triggering of seizures is not common, but rather a serious adverse effect that receives a great amount of attention. Seizure-inducing drugs include psychotropic and nonpsychotropic agents; however, seizures may also occur as an indirect effect of antiepileptic drugs, miscellaneous agents and drug-drug interactions.

Psychotropic agents are of particular concern in the elderly population, in whom these drugs are often used to manage behaviour. The most commonly encountered withdrawal syndromes leading to seizures in the elderly involve alcohol (ethanol) and benzodiazepines, as well as barbiturates. The treatment of chemically induced seizures in the elderly includes an accurate and in-depth history, careful diagnosis and appropriate treatment with medication to avoid toxicity or suboptimal treatment. Adverse effects of anticonvulsant therapy in drug-induced seizures may be more problematic in the elderly and require careful attention. The effects of drug-induced seizure activity on driving and cognition in the elderly offer cause for significant concern and suggest the need for evaluation such as with a cognitive screening battery. Compli-

ance issues for the elderly patient with drug-induced seizures include educational issues, communication and rapport building, patient health beliefs and issues surrounding cost.

This report reviews the types of medications that have been implicated in the lowering of seizure thresholds and various treatment modalities, and considerations that have been employed once seizure thresholds have been lowered to the point of inducing unwanted seizures in individuals.

## 2. Maintenance of Anticonvulsant Levels

Exacerbation of seizures secondary to toxic effects of antiepileptic agents may occur because of acute or chronic toxicity, sudden withdrawal or an indirect mechanism, i.e. via inappropriate anti-diuretic hormone secretion and hyponatraemia secondary to carbamazepine.<sup>[1]</sup> The elderly are at a higher risk of confusion and medication misuse, thus increasing the likelihood of seizures. Several drug-drug interactions may decrease the efficacy of antiepileptic agents. For example, interactions with other antiepileptics may decrease efficacy as a result of enzyme inhibition, autoinduction or auto-inhibition. Concomitant administration of theophylline and phenytoin can result in decreased serum concentration of the latter. Drugs that inhibit the hepatic microsomal enzyme system, such as cimetidine, ciprofloxacin, erythromycin and high dose allopurinol, reduce hepatic metabolism and decrease theophylline clearance, leading to increased serum concentration. On the other hand, Dillard and colleagues<sup>[2]</sup> reported a case of ciprofloxacin-induced decrease in serum phenytoin concentration in a 78-year-old man. Serum phenytoin concentrations decreased from 14.7 to 6.3 mg/L after 1 day of therapy with intravenous ciprofloxacin