



CHAPTER 27

Hypertension

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More than 80 million Americans have hypertension, or approximately one out of three adults.¹ Hypertension is a chronic medical condition that is characterized by persistent increases in systolic or diastolic blood pressure, or both. The term *elevated blood pressure* has replaced the category formerly known as prehypertension and is used to identify patients with blood pressures higher than normal but not yet to the threshold diagnostic for hypertension.² Hypertension is elevated blood pressure nearly always asymptomatic. Target organ damage (e.g., coronary artery disease, chronic kidney disease/failure, ischemic stroke), commonly presenting as a cardiovascular event, is the primary cause of associated morbidity and mortality in patients with hypertension.² Most patients (90–95%) with hypertension have primary (also known as essential) hypertension. The remainder have secondary hypertension, which includes patients with drug-induced causes.

CAUSATIVE AGENTS

Drug-induced hypertension is defined as high blood pressure caused by using (or discontinuing the use of) a chemical substance, drug, or medication.³

Expert reviews of drug-induced hypertension are available, but do not thoroughly evaluate published literature to support the association between a comprehensive list of cited drugs and drug-induced hypertension.^{4,5} Drugs that have been reported to cause hypertension are listed in **Table 27-1**.⁶⁻¹⁰⁸ Drugs on this list are also identified as potential causes of resistant hypertension.¹⁰⁹ There are some limitations to this list. Adverse drug effect reporting often identifies increases in blood pressure, not always drug-induced hypertension per se. Therefore, for many drugs that have been reported to increase blood pressure, the incidence of drug-induced hypertension may be unknown. This list also represents agents that are used primarily for chronic conditions or that are used for a prolonged period of time. These medications may cause hypertension, exacerbate previously well-controlled hypertension, or antagonize the effects of antihypertensive pharmacotherapy.

EPIDEMIOLOGY

Hypertension is one of the most common chronic medical conditions. Despite increased public awareness, the prevalence of hypertension is not

Table 27-1 Agents Implicated in Drug-Induced Hypertension

Drug	Incidence ^a	Level of Evidence ^b
Amphetamines ^{6,7}	NK	A
Antihypertensive agents ^{8-27,c}	NK	B
Bevacizumab ²⁸⁻³²	8–18%	A
Bupropion ³³⁻³⁵	2–6.1%	B
Caffeine ³⁶	NK	B
Celecoxib ³⁷⁻⁴²	2.4–12.5%	A
Cocaine ⁴³	NK	C
Corticosteroids ⁴⁴⁻⁴⁹	NK	A
Cyclosporine ⁵⁰⁻⁵⁶	11.2–50%	A
Darbepoetin- α ⁵⁷	23%	A
Desvenlafaxine ⁵⁸	1.3–2.3%	A
Ephedra alkaloids ⁵⁹⁻⁶¹	NK	B
Ergot alkaloids ⁶²	NK	C
Erythropoetin- α ^{63,64}	24%	A
Estrogen-containing oral contraceptives ⁶⁵⁻⁷¹	5%	A
Ivabradine ⁷²	8.9%	A
Licorice ⁷³⁻⁷⁵	NK	C
Monoamine oxidase inhibitors ^{76,77,d}	NK	C
NSAIDs ⁷⁸⁻⁸³	NK	A
Phenylephrine ^{84,85}	NK	C
Pseudoephedrine ⁸⁶⁻⁹⁰	NK	A
Sibutramine ⁹¹⁻⁹⁶	NK	A
Sorafenib ^{97,98}	17%	A
Sunitinib ⁹⁹⁻¹⁰¹	15–30%	A
Tacrolimus ¹⁰²⁻¹⁰⁴	47–50%	A
Testosterone ^{105,106}	3%	A
Venlafaxine ^{107,108}	3–13%	A

NK = not known, NSAID = nonsteroidal anti-inflammatory drug.

^aBased on reported incidence of hypertension or persistent blood pressure elevation, not just increase in blood pressure, from product information or literature (not placebo-corrected).

^bDefinitions for Levels of Evidence: Level A—evidence from one or more randomized, controlled clinical trials; Level B—evidence from nonrandomized clinical trials, prospective observational studies, cohort studies, retrospective studies, case-control studies, meta-analyses and/or postmarketing surveillance studies; and Level C—evidence from one or more published case reports or case series.

^cWhen therapy is abruptly discontinued.

^dResult of a drug–food interaction with tyramine-containing foods or a drug–drug interaction.

declining. Over 30% of the American population has hypertension.¹¹⁰ With the introduction of the 2017 American College of Cardiology (ACC)/American Heart Association (AHA)/American Academy of Physician Assistants (AAPA)/Association of Black Cardiologists (ABC)/American College of Preventive Medicine (ACPM)/American Geriatrics

Society (AGS)/American Pharmacists Association (APhA)/American Society of Hypertension (ASH)/American Society for Preventive Medicine (ASPM)/National Medical Association (NMA)/Preventive Cardiovascular Nurses Association (PCNA) Guideline for the Prevention, Detection, Evaluation, and Management of High