

APPENDICES

Reference Tables & Resources

A–H

Chemical Nomenclature

Names, identifiers, and synonyms for methamphetamine and its principal forms.

Field	Value
Common name	Methamphetamine (methylamphetamine)
Systematic name (base)	<i>N</i> -methyl-1-phenylpropan-2-amine; benzeneethanamine, <i>N</i> , α -dimethyl-
Systematic name (d-enantiomer)	(<i>S</i>)- <i>N</i> -methyl-1-phenylpropan-2-amine
Molecular formula	C ₁₀ H ₁₅ N (free base; $\approx$ 149.24 g/mol); C ₁₀ H ₁₆ ClN (hydrochloride; $\approx$ 185.69 g/mol)
CAS Registry No.	537-46-2 (methamphetamine); 51-57-0 (hydrochloride)
Other identifiers	ATC N06BA03; EINECS 200-106-9 (HCl); UNII 997F43Z9CV (HCl); RTECS SH4910000
Chemical synonyms	<i>N</i> -methylamphetamine; desoxyephedrine (desoxyephedrine); methylamphetamine; 1-phenyl-2-methylaminopropane; phenylisopropylmethanamine; <i>N</i> , α -dimethylphenethylamine
Enantiomers	Dextromethamphetamine (d-, (<i>S</i>)-(+)); levomethamphetamine (l-, (<i>R</i>)-(-)); racemate (1:1)
Brand / trade names (hist. & current)	Desoxyn; Methedrine; Pervitin; Philopon (Hiropon); Methampex; Syndrox; Norodin
Common street names	meth, speed, crank, ice, crystal, crystal meth, glass, shards, Tina, shabu, yaba, "P"

Closely related compounds	amphetamine; ephedrine; pseudoephedrine; MDMA
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A machine-readable structure is available as the InChI/InChIKey via chemical databases (e.g., PubChem, NIST WebBook). Note that some registry numbers and identifiers are enantiomer- or salt-specific; the values above reflect the most commonly cited entries.¹

Pharmacology Tables

Consolidated pharmacodynamic and pharmacokinetic reference data (see Part IV for full discussion).

Mechanism of action (pharmacodynamics)

Target	Action
DAT / NET / SERT	Substrate; reverses transport → efflux of dopamine, norepinephrine, serotonin (potency DA ≈ NE > 5-HT)
VMAT2	Disrupts vesicular pH gradient → redistributes stored monoamines to cytoplasm
TAAR1	Agonist; modulates transporter uptake/efflux and trafficking
MAO	Interaction/inhibition → less breakdown of cytoplasmic monoamines

Pharmacokinetic parameters

Parameter	Typical value
Time to peak (oral)	≈2.6–3.6 h
Elimination half-life	≈9–12 h average (range ~5–30 h); route-independent; high interindividual variability
Primary metabolism	Hepatic CYP2D6 (polymorphic); FMO3 and others contribute
Active metabolites	Amphetamine (<i>N</i> -demethylation); 4-hydroxymethamphetamine (aromatic hydroxylation)
Excretion	Renal; strongly urinary-pH dependent; ~30–54% unchanged (oral); renal clearance ≈175 mL/min
Urine detection	≈3–5 days (methamphetamine)

window

Therapeutic dosing and enantiomers

Item	Detail
Desoxyn (ADHD)	Initial ~5 mg once–twice daily; titrate ~5 mg/week to usual 20–25 mg/day (immediate-release 5 mg tablets)
d-meth- amphetamine	Potent central stimulant (the pharmaceutical form)
l-meth- amphetamine	Weak central stimulant; predominantly peripheral (decongestant) activity

Brain Anatomy Relevant to Stimulant Action

The regions and circuits central to methamphetamine's effects (see Part V).

Region	Function	Relevance to methamphetamine
Ventral tegmental area (VTA)	Origin of mesolimbic/mesocortical dopamine neurons	Source of the dopamine surge that drives reinforcement
Nucleus accumbens (ventral striatum)	Reward, motivation, reinforcement	Primary site of the rewarding/reinforcing effect; down-regulates with chronic use
Dorsal striatum (caudate/putamen)	Habit learning, motor control	Habitual/compulsive use; dopamine-transporter loss on imaging
Dorsolateral prefrontal cortex	Executive control, working memory	Impaired top-down control; an rTMS target (Ch 33)
Orbitofrontal cortex	Value, decision-making	Metabolism tracks with reduced D2 availability (Volkow)
Medial prefrontal cortex	Limbic regulation, craving circuitry	Cue-induced craving; an rTMS target
Hippocampus	Learning and memory	Memory impairment; site of neurotoxic injury
Amygdala	Emotional salience, fear/stress	Cue conditioning and stress-related relapse

Two frontal-striatal circuits recur in the addiction literature: a limbic circuit (medial prefrontal cortex–ventral striatum) mediating craving, and an executive-control circuit (dorsolateral prefrontal cortex) mediating regulation. Methamphetamine's neurotoxicity chiefly affects dopaminergic and serotonergic terminals within these systems.

Clinical Assessment Scales

Validated and commonly used instruments for assessing methamphetamine use, withdrawal, craving, and comorbidity.

Instrument	Purpose / notes
Amphetamine Withdrawal Questionnaire (AWQ)	10-item self-report of withdrawal severity, based on DSM-IV criteria
Amphetamine Cessation Symptom Assessment (ACSA)	Validated withdrawal scale with subscales for anxiety/mood, fatigue, and craving (McGregor et al., 2008)
Methamphetamine Withdrawal Assessment (MAWA)	13-item, 0–52 severity scale based on DSM-IV amphetamine withdrawal
Amphetamine/Stimulant Selective Severity Assessment	Adapted from the Cocaine Selective Severity Assessment (CSSA)
DSM-5-TR criteria	Diagnostic criteria for stimulant use disorder and stimulant withdrawal (dysphoric mood + ≥ 2 physiological changes)
Severity of Dependence Scale (SDS)	Brief measure of psychological dependence
Addiction Severity Index (ASI)	Multidimensional assessment across life domains
Craving measures	Visual Analog Scale (VAS); Brief Substance Craving Scale
Comorbidity screens	PHQ-9 (depression); GAD-7 (anxiety); C-SSRS (suicide risk); Pittsburgh Sleep Quality Index (sleep)
Psychosis measures	Brief Psychiatric Rating Scale (BPRS); PANSS; Clinical Global Impression (CGI)

Selection depends on setting and purpose; withdrawal scales are used to track the acute-to-subacute course (Chapter 20), and comorbidity screens are essential given the depression, suicide risk, and psychosis associated with use.²

Toxicology Reference Values

Interpretive reference ranges for methamphetamine — to be read only as guidelines, never as absolute thresholds.

Read these values with caution

No blood concentration is an absolute indicator of therapeutic, toxic, or lethal status. Because of **tolerance**, the ranges overlap substantially — a concentration fatal to one person may be tolerated by another (Chapters 10, 22). Interpretation is further complicated by **postmortem redistribution**, and many deaths in which methamphetamine is present are ultimately cardiovascular. These figures are frames of reference for professional interpretation in context, not diagnostic cut-offs.

Context	Approximate blood concentration
Therapeutic (prescribed) use	≈0.02–0.05 mg/L (20–50 ng/mL)
Non-medical use (range reported)	≈0.01–2.5 mg/L
Associated with significant toxicity risk	>3.0 mg/L (documented; highly tolerance-dependent)
Metabolite	Amphetamine typically present alongside methamphetamine
Postmortem redistribution	Peripheral-blood : antemortem-blood ratio ≈1.5; liver : peripheral ≈5–8

Urine testing cut-offs (U.S. federal / SAMHSA)

Step	Cut-off
Initial (immunoassay) — amphetamines	500 ng/mL

Confirmatory — amphetamine / methamphetamine	250 ng/mL
Methamphetamine positivity rule	Requires amphetamine metabolite ≥ 100 ng/mL; target analyte d-methamphetamine

Detection windows by matrix are tabulated in Chapter 25.³

Harm Reduction Resources

Selected treatment, crisis, and harm-reduction resources. In an immediate emergency, contact local emergency services.

SAMHSA National Helpline (U.S.) — 1-800-662-HELP (4357); TTY 1-800-487-4889. Free, confidential, 24/7/365 treatment referral and information, in English and Spanish. Text a ZIP code to 435748 (HELP4U) to find nearby help.

988 Suicide & Crisis Lifeline (U.S. & Canada) — call or text 988; chat at 988lifeline.org. Free, confidential, 24/7 support for mental-health, substance-use, or suicidal crisis. (In the U.S., Veterans may press 1.)

FindTreatment.gov / FindSupport.gov — official U.S. locators for substance-use and mental-health treatment services.

Never Use Alone (U.S.) — 1-800-484-3731. A confidential overdose-prevention hotline; a volunteer stays on the line and can summon help if a person becomes unresponsive.

Crystal Meth Anonymous (CMA) — crystalmeth.org. A twelve-step mutual-aid fellowship for people recovering from methamphetamine use.

SMART Recovery — smartrecovery.org. A secular, skills-based mutual-aid program (self-management and recovery training).

National Harm Reduction Coalition — harmreduction.org. Resources on harm-reduction services, including syringe access, naloxone, and drug checking.

Resources vary by country; readers outside the United States and Canada should seek local equivalents — national helplines, syringe services programs, drug-checking services, and naloxone distribution. Contact information current as of 2026 and subject to change.⁴

Major Research Studies and Landmark Papers

A selection of the studies that anchor this volume, with a note on the significance of each (full citations appear in the reference lists of the relevant parts).

Nagai (1893) and Ogata (1919). The first synthesis of methamphetamine and its first crystalline (hydrochloride) preparation — the chemical origin of the drug (Part II).

Volkow et al. (2001), *J. Neurosci.* and *Am. J. Psychiatry*. PET studies showing reduced striatal dopamine-transporter and D2-receptor availability in people who use methamphetamine, with partial transporter recovery over protracted abstinence — the foundation of the neurotoxicity-and-recovery picture (Part V).

Felitti, Anda et al. (1998), *Am. J. Prev. Med.* The Adverse Childhood Experiences (ACE) Study, establishing the dose-response link between childhood adversity and later substance use disorder (Part VIII).

Trivedi et al. (2021), *NEJM* (ADAPT-2). The trial demonstrating a modest benefit of extended-release naltrexone plus bupropion — the most significant pharmacotherapy result to date (Parts VIII, XIII).

McGregor et al. (2005, 2008). Characterization of the methamphetamine withdrawal course and validation of the Amphetamine Cessation Symptom Assessment (Part VIII; Appendix D).

Meta-analyses of methamphetamine-associated psychosis. Establishing its prevalence (~36%), its features, and the substantial rate of transition to persistent psychotic disorder (Part IX).

Potvin et al. — cognitive-deficit meta-analysis. Defining the domains of cognitive impairment in methamphetamine use disorder (Part V).

The IDEAL Study (Infant Development, Environment, and Lifestyle). The landmark prospective investigation of prenatal methamphetamine exposure, controlling for confounders (Part VII).

Kelly & Westerhoff; Kennedy-Hendricks et al. Experimental evidence that stigmatizing language shifts clinician judgment, and principles for stigma reduction (Part XI).

rTMS meta-analysis and the STIMULUS trial. The evidence base for repetitive transcranial magnetic stimulation as an emerging treatment (Part XIII).

UNODC *World Drug Report* (annual) and CDC/NCHS mortality data. The authoritative sources for global and U.S. epidemiology and mortality (Parts VII, XIV).

Ethical Guidelines for Researchers and Clinicians

Principles that follow from the evidence assembled in this book, for those who study or care for people affected by methamphetamine.

Use person-first, non-stigmatizing language. Because language measurably affects clinical judgment and care-seeking (Chapter 30), describe people as individuals ("a person who uses methamphetamine"), not by labels, in both speech and documentation.

Provide non-punitive, compassionate, treatment-oriented care. Approaches that engage rather than threaten — especially for pregnant people (Chapter 18) and marginalized populations (Chapter 29) — produce better outcomes and are ethically preferable to punitive ones.

Respect autonomy and informed consent. Support people's capacity to make informed decisions, and honor the harm-reduction principle of meeting people where they are without requiring abstinence as a condition of care (Chapter 17).

Protect vulnerable populations. Exercise special care with pregnant people, minors, and those whose circumstances (homelessness, incarceration, poverty) heighten both risk and the potential for coercion.

Safeguard confidentiality and privacy. Given that information about drug use can trigger criminal-justice involvement and discrimination, protect data rigorously — a concern amplified for surveillance and AI applications (Chapter 34).

Pursue equity and non-discrimination. Recognize that methamphetamine harm falls disproportionately on some communities (Chapter 16), and ensure that interventions — including algorithmic tools — do not deepen those disparities.

Uphold research integrity and intellectual honesty. Maintain ethical oversight and beneficence in research; report findings honestly; and clearly distinguish validated knowledge from investigational or projected claims — the standard this encyclopedia has sought to model throughout.

Match capacity to identification. Do not identify people as at-risk without the means to help them; identification without accessible treatment is, at best, pointless and, at worst, harmful (Chapter 34).

References — Appendices

Sources for the reference data in Appendices A, D, E, and F are listed below; Appendices B, C, G, and H consolidate content and sources from Parts I–XIII. Sources current as of 2026.

1. Chemical identifiers — International Programme on Chemical Safety, *Methamphetamine* (Poisons Information Monograph PIM 334; CAS 537-46-2, hydrochloride 51-57-0, RTECS SH4910000, trade names); NIST Chemistry WebBook (systematic names and synonyms); PubChem/ChemSpider (formula, InChI, EINECS 200-106-9, UNII); European Union Drugs Agency, methamphetamine drug profile (chemical and street names).
2. Clinical assessment scales — McGregor C, Srisurapanont M, Mitchell A, et al. Psychometric evaluation of the Amphetamine Cessation Symptom Assessment. *J Subst Abuse Treat.* 2008;34(4):443–449; Amphetamine Withdrawal Questionnaire and Methamphetamine Withdrawal Assessment (DSM-IV-based); Amphetamine/Stimulant Selective Severity Assessment adapted from the Cocaine Selective Severity Assessment (PMC6438747); DSM-5-TR stimulant use disorder and withdrawal criteria; Turning Point, *Methamphetamine Treatment Guidelines* (2018).
3. Toxicology reference values — Godoy Medical Forensics, "Concentration and Metabolites: Methamphetamine" (prescribed ≈ 0.02 – 0.05 mg/L; toxicity risk > 3.0 mg/L); McIntyre IM, et al. Antemortem and postmortem methamphetamine blood concentrations. *J Anal Toxicol.* 2013;37(6):386–389 (postmortem redistribution); Axis Forensic Toxicology reference-range guidance (overlap of therapeutic/toxic/lethal ranges); SAMHSA Mandatory Guidelines (urine cut-offs; see Chapter 6).
4. Harm-reduction and crisis resources — Substance Abuse and Mental Health Services Administration (SAMHSA): National Helpline 1-800-662-HELP (4357), TTY 1-800-487-4889; 988 Suicide & Crisis Lifeline (call/text 988; 988lifeline.org); FindTreatment.gov and FindSupport.gov (SAMHSA, 2026). Never Use Alone overdose-prevention hotline (1-800-484-3731); Crystal Meth Anonymous (crystalmeth.org); SMART Recovery (smartrecovery.org); National Harm Reduction Coalition (harmreduction.org).

END OF THE ENCYCLOPEDIA

Fourteen parts · forty chapters · eight appendices

A scientific, medical, and harm reduction reference.