

## How to Use the Handbook

### ■ What Is the Handbook?

The *Handbook on Injectable Drugs* is a collection of summaries of information from the published literature on the pharmaceuticals of parenteral medications as applied to the clinical setting. The *Handbook* is constructed from information derived from 2830 references with the information presented in the standardized structure described below. The purpose of the *Handbook* is to facilitate the use of this clinical pharmaceuticals research by knowledgeable health care professionals for the benefit of patients. The summary information from published research is supplemented with information from the labeling of each product and from other references.

The information base summarized in the *Handbook on Injectable Drugs* is large and highly complex, requiring thoughtful consideration for proper use. The *Handbook* is not, nor should it be considered, elementary in nature or a primer. A single quick glance in a table is not adequate for proper interpretation of this highly complex information base. Proper interpretation includes the obvious need to consider and evaluate all relevant research information and results. Additionally, information on the formulation components, product attributes (especially pH), and the known stability behaviors of each parenteral drug, as well as the clinical situation of the patient, must be included in a thoughtful, reasoned evaluation of clinical pharmaceuticals questions.

### ■ Who Should Use the Handbook?

The *Handbook on Injectable Drugs* is designed for use as a professional reference and guide to the literature on the clinical pharmaceuticals of parenteral medications. The intended audience consists of knowledgeable health care professionals, particularly pharmacists, well versed in the formulation and clinical use of parenteral medications and who have the highly specialized knowledge base, training, and skills set necessary to interpret and apply the information. Practitioners who are not well versed in the formulation, essential properties, and clinical application of parenteral drugs should seek the assistance of more knowledgeable and experienced health care professionals to ensure patient safety.

Users of the *Handbook* must recognize that no reference work, including this one, can substitute for adequate decision-making by health care professionals. Proper clinical decisions must be made considering all aspects of the patient's condition and needs, with particular attention to the special demands imposed by parenteral medications. The *Handbook* cannot make decisions for its users. However, in knowledgeable hands, it is a valuable tool for the proper use of parenteral medications.

### ■ Organization of the Handbook

The *Handbook on Injectable Drugs* has been organized as a collection of monographs on each of the drugs. The monographs are arranged alphabetically by nonproprietary name. The names of the drugs follow the style of *USAN and the USP Dictionary of Drug Names*. Also included are some of the trade names and manufacturers of the drug products; this listing is not necessarily comprehensive and should not be considered an endorsement of any product or manufacturer.

All of the information included in the *Handbook* is referenced so that those who wish to study the original sources may find them. In addition, the *American Hospital Formulary Service Classification System* numbers have been included to facilitate the location of therapeutic information on the drugs.

The monographs have been divided into the subheadings described below:

**Products**—lists many of the sizes, strengths, volumes, and forms in which the drug is supplied, along with other components of the formulation. Instructions for reconstitution (when applicable) are included in this section.

The products cited do not necessarily constitute a comprehensive list of all available products. Rather, some common representative products are described. Furthermore, dosage forms, sizes, and container configurations of parenteral products may undergo significant changes during the lifespan of this edition of the *Handbook*.

Following the product descriptions, the pH of the drug products, the osmotic value(s) of the drug and/or dilutions (when available), and other product information such as the sodium content and definition of units are presented.

Practitioners have not always recognized the value and importance of incorporating product formulation information into the thought process that leads to their decision on handling drug compatibility and stability questions. However, consideration of the product information and formulation components as well as the properties and attributes of the products, especially pH, is essential to proper interpretation of the information presented in the *Handbook*.

**Administration**—includes route(s) by which the drug can be given, rates of administration (when applicable), and other related administration details.

The administration information is a condensation derived primarily from the product's official labeling and the *American Hospital Formulary Service*. For complete information, including dosage information sufficient for prescribing, the reader should

refer to the official labeling and therapeutically comprehensive references such as the *American Hospital Formulary Service*.

**Stability**—describes the drug's stability and storage requirements. The storage condition terminology of *The United States Pharmacopeia*, 34th ed., is used in the *Handbook on Injectable Drugs*.

*The United States Pharmacopeia* defines controlled room temperature as "A temperature maintained thermostatically that encompasses the usual and customary working environment of 20 ° to 25 °; that results in a mean kinetic temperature calculated to be not more than 25 °; and that allows for excursions between 15 ° and 30 ° that are experienced in pharmacies, hospitals, and warehouses."<sup>1</sup> (All temperatures are Celsius.)

Protection from excessive heat is often required; excessive heat is defined as any temperature above 40 °C. Similarly, protection from freezing may be required for products that are subject to loss of strength or potency, or destructive alteration of their characteristics in addition to the risk of container breakage.<sup>1</sup>

Some products may require storage at a cool temperature, which is defined as any temperature between 8 and 15 °C, or a cold temperature, which is defined as any temperature not exceeding 8 °C. A refrigerator is defined as a cold place in which the temperature is maintained thermostatically between 2 and 8 °C. Freezer storage refers to a place in which the temperature is maintained thermostatically between -25 and -10 °C.<sup>1</sup>

In addition to storage requirements, aspects of drug stability related to pH, freezing, and exposure to light are presented in this section. Also presented is information on repackaging of the drugs or their dilutions in container/closure systems other than the original package (e.g., prefilling into syringes or in ambulatory pumps). Sorption and filtration characteristics of the drugs are provided as well when this information is available. The information is derived principally from the primary published research literature and is supplemented by the product labeling and the *AHFS Drug Information*.

**Compatibility Information**—tabulates the results of published reports from primary research on the compatibility of the subject drug with infusion solutions and the other drugs. The various citations are listed alphabetically by solution or drug name; the information is completely cross-referenced among the monographs.

Four types of tables are utilized to present the available information, depending on the kind of test being reported. The first type is for information on the compatibility of a drug in various infusion solutions and is depicted in Table 1. The second type of table presents information on two or more drugs in intravenous solutions and is shown in Table 2. The third type of table is used for tests of two or more drugs in syringes and is shown in Table 3. The fourth table format is used for reports of simulated or actual injection into Y-sites and manifolds of administration sets and is shown in Table 4.

Many published articles, especially older ones, do not include all of the information necessary to complete the tables. However, the tables have been completed as fully as possible from the original articles.

**Table 1. Solution Compatibility**

Monograph drug name						
Solution	Mfr	Mfr	Conc/L	Remarks	Ref	C/I
(1)	(2)	(3)	(4)	(5)	(6)	(7)

- Solution in which the test was conducted.
- Manufacturer of the solution.
- Manufacturer of the drug about which the monograph is written.
- Concentration of the drug about which the monograph is written.
- Description of the results of the test.
- Reference to the original source of the information.
- Designation of the compatibility (C) or incompatibility (I) of the test result according to conventional guidelines.

**Table 2. Additive Compatibility**

Monograph drug name								
Drug	Mfr	Conc/L	Mfr	Conc/L	Test Soln	Remarks	Refs	C/I
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

- Test drug.
- Manufacturer of the test drug.
- Concentration of the test drug.
- Manufacturer of the drug about which the monograph is written.
- Concentration of the drug about which the monograph is written.
- Infusion solution in which the test was conducted.
- Description of the results of the test.
- Reference to the original source of the information.
- Designation of the compatibility (C) or incompatibility (I) of the test result according to conventional guidelines.

**Table 3. Drugs in Syringe Compatibility**

Monograph drug name							
Drug (in syringe)	Mfr	Amt	Mfr	Amt	Remarks	Ref	C/I
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

- Test drug.
- Manufacturer of the test drug.
- Actual amount of the test drug.
- Manufacturer of the drug about which the monograph is written.
- Actual amount of the drug about which the monograph is written.
- Description of the results of the test.
- Reference to the original source of the information.
- Designation of the compatibility (C) or incompatibility (I) of the test result according to conventional guidelines.

**Table 4. Y-Site Injection Compatibility (1:1 Mixture)**

Monograph drug name							
Drug	Mfr	Conc	Mfr	Conc	Remarks	Ref	C/I
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

- Test drug.
- Manufacturer of the test drug.
- Concentration of the test drug prior to mixing at the Y-site.
- Manufacturer of the drug about which the monograph is written.
- Concentration of the drug about which the monograph is written prior to mixing at the Y-site.
- Description of the results of the test.
- Reference to the original source of the information.
- Designation of the compatibility (C) or incompatibility (I) of the test result according to conventional guidelines.

**Additional Compatibility Information**—provides additional information and discussions of compatibility presented largely in narrative form.

**Other Information**—contains any relevant auxiliary information concerning the drug which does not fall into the previous categories.

■ **The Listing of Concentration**

The concentrations of all admixtures in intravenous solutions in the tables have been indicated in terms of concentration per liter to facilitate comparison of the various studies. In some cases, this may result in amounts of the drug that are greater or lesser than those normally administered (as when the recommended dose is tested in 100 mL of vehicle), but the listings do accurately reflect the actual concentrations tested, expressed in standardized terms.

For studies involving syringes, the amounts actually used are indicated. The volumes are also listed if indicated in the original article.

For studies of actual or simulated Y-site injection of drugs, the concentrations are cited in terms of concentration per milliliter of each drug solution prior to mixing at the Y-site. Most published research reports have presented the drug concentrations in this manner, and the *Handbook* follows this convention. For those few published reports that presented the drug concentrations after mixing at the Y-site, the concentrations have been recalculated to be consistent with the more common presentation style to maintain the consistency of presentation in the *Handbook*. Note that the Y-Site Injection Compatibility table is designed with the assumption of a 1:1 mixture of the subject drug and infusion solution or admixture. For citations reporting other than a 1:1 mixture, the actual amounts tested are specifically noted.

■ **Designating Compatibility or Incompatibility**

Each summary of a published research report appearing in the Compatibility Information tables bears a compatibility indicator (C, I, or ?). A report receives a designation of C when the study results indicate that compatibility of the test samples existed under the test conditions. If the study determined an incompatibility existed under the test conditions, then an I designation is assigned for the *Handbook* entry for that study result. Specific standardized guidelines are used to assign these compatibility designations. The citation is designated as a report of compatibility when results of the original article indicated one or more of the following criteria were met:

- Physical or visual compatibility of the combination was reported (no visible or electronically detected indication of particulate formation, haze, precipitation, color change, or gas evolution).
- Stability of the components for at least 24 hours in an admixture under the specified conditions was reported (decomposition of 10% or less).
- Stability of the components for the entire test period, although in some cases it was less than 24 hours, was reported (time periods less than 24 hours have been noted).

The citation is designated as a report of incompatibility when the results of the original article indicated either or both of the following criteria were met:

- A physical or visual incompatibility was reported (visible or electronically detected particulate formation, haze, precipitation, color change, or gas evolution).
- Greater than 10% decomposition of one or more components in 24 hours or less under the specified conditions was reported (time periods of less than 24 hours have been noted in the table).

Reports of test results that do not clearly fit into the compatibility or incompatibility definitions cannot be designated as either. These are indicated with a question mark.

Although these criteria have become the conventional definitions of compatibility and incompatibility, the reader should recognize that the criteria may need to be tempered with professional judgment. Inflexible adherence to the compatibility designations should be avoided. Instead, they should be used as aids in the exercising of professional judgment.

Therapeutic incompatibilities or other drug interactions are not within the scope of the *Handbook* and have not been included.

■ **Interpreting Compatibility Information in the Handbook**

As mentioned above, the body of information summarized in the *Handbook* is large and complicated. With the possible exception of a report of immediate gross precipitation, it usually takes some degree of thoughtful consideration and judgment to properly evaluate and appropriately act on the research results that are summarized in this book.

Nowhere is the need for judgment more obvious than when apparently contradictory information appears in two or more published reports. The body of literature in drug-drug and drug-vehicle compatibility is replete with apparently contradictory results. Except for study results that have been documented later to be incorrect, the conflicting information has been included in the *Handbook* to provide practitioners with all of the information for their consideration. The conflicting information will be readily apparent to the reader because of the content of the Remarks section as well as the C, I, and ? designations following each citation.

Many or most of the apparently conflicting citations may be the result of differing conditions or materials used in the studies. A variety of factors that can influence the compatibility and stability of drugs must be considered in evaluating such conflicting results, and absolute statements are often difficult or impossible to make. Differences in concentrations, buffering systems, preservatives, vehicles, temperatures, and order of mixing may all play a role. By reviewing a variety of reports, the user of the *Handbook* is better able to exercise professional judgment with regard to compatibility and stability.

The reader must guard against misinterpretation of research results, which may lead to extensions of compatibility and stability that are inappropriate. As an example, a finding of precipitate formation two hours after two drugs are mixed does not imply nor should it be interpreted to mean that the combination is compatible until that time point, when a sudden precipitation occurs. Rather, it should be interpreted to mean that precipitation occurred at some point between mixing and the first observation point at two hours. Such a result would lead to a designation of incompatibility in the *Handbook*.

Precipitation reports can be particularly troublesome for practitioners to deal with because of the variability of the time frames in which they may occur. Apart from combinations that repeatedly result in immediate precipitation, the formation of a precipitate can be unpredictable to some degree. Numerous examples of variable precipitation time frames can be found in the literature, including paclitaxel, etoposide, and sulfamethoxazole-trimethoprim in infusion solutions and calcium and phosphates precipitation in parenteral nutrition mixtures. Differing drug concentrations can also play a role in creating variability in results. A good example of this occurs with co-administered vancomycin hydrochloride and beta-lactam antibiotics. Users of the information in the *Handbook* must always be aware that a marginally incompatible combination might exhibit precipitation earlier or later than that reported in the literature. In many such cases, the precipitation is ultimately going to occur, it is just the timing that is in question. This is of particular importance for precipitate formation because of the potential for serious adverse clinical consequences, including death, which have occurred. Certainly, users of the *Handbook* information should always keep in mind and anticipate the possibility of precipitation and its clinical ramifications. Furthermore, all injections and infusions should be inspected for particulate matter and discoloration. If found, they should be discarded.

In addition, many research reports cite test solutions or concentrations that may not be appropriate for clinical use. An example would be a report of a drug's stability in unsterile water. Although the *Handbook* summary will accurately reflect the test solutions and conditions that existed in a study, it is certainly inappropriate to misinterpret a stability report like this as being an authorization to use the product clinically. In such cases, the researchers may have used the clinically inappropriate diluent to evaluate the drug's stability for extrapolation to a more suitable vehicle that is similar, or they may not have recognized that the diluent is clinically unsuitable. In either event, it is incumbent on the practitioner in the clinical setting to use professional judgment to apply the information in an appropriate manner and recognize what is not acceptable clinically.

Further, it should be noted that many of the citations designated incompatible are not absolute. While a particular admixture may incur more than 10% decomposition

within 24 hours, the combination may be useful for a shorter time period. The concept of “utility time” or the time to 10% decomposition may be useful in these cases. Unfortunately, such information is often not available. Included in the Remarks columns of the tables are the amount of decomposition, the time period involved, and the temperature at which the study was conducted when this information is available.

Users of the *Handbook* information should always keep in mind that the information in the *Handbook* must be used as a tool and a guide to the research that has been conducted and published. It is not a replacement for thoughtfully considered professional judgment. It falls to the practitioner to interpret the information in light of the clinical situation, including the patient's needs and status. What is certain is that relying solely on the *C* or *I* designation without the application of professional judgment is inappropriate.

### ■ Limitations of the Literature

In addition to conflicting information, many of the published articles have provided only partial evaluations, not looking at all aspects of a drug's stability and compatibility. This is not surprising considering the complexity, difficulty, and costs of conducting such research. There are, in fact, some articles that do provide evaluations of both physical stability/compatibility and chemical stability. But others are devoted only to physical issues, while others examine only chemical stability. Although a finding of precipitation, haze, or other physical effect may constitute an incompatibility (unless transient), the lack of such changes does not rule out chemical deterioration. In some cases, drugs initially designated as compatible because of a lack of visual change were later shown to undergo chemical decomposition. Similarly, the determination of chemical stability does not rule out the presence of unacceptable levels of particulates and/or turbidity in the combination. In a classic case, the drugs leucovorin calcium and fluorouracil were determined to be chemically stable for extended periods by stability-indicating HPLC assays in several studies, but years later, repeated episodes of filter clogging led to the discovery of unacceptable quantities of particulates in combinations of these drugs. The reader must always bear in mind these possibilities when only partial information is available.

And, finally, contemporary practitioners have come to expect that the analytical methods used in reports on the chemical stability of drugs will be validated stability-indicating methods. However, many early studies used methods that were not demonstrated to be stability indicating.

### ■ Literature Search for Updating the Handbook

To gather the bulk of the published compatibility and stability information for updating the *Handbook*, a literature search is performed using the *International Pharmaceutical Abstracts* database. By using key terms (e.g., stability), a listing of candidate articles for inclusion in the *Handbook* is generated. From this list, relevant articles are selected. As a supplement to this automated literature searching, a manual search of the references of the articles is also conducted, and any articles not included previously are obtained.

## Abbreviations

AA	Amino acids (percentage specified)
D	Dextrose solution (percentage unspecified)
D5LR	Dextrose 5% in Ringer's injection, lactated
D5R	Dextrose 5% in Ringer's injection
D-S	Dextrose-saline combinations
D2.5½S	Dextrose 2.5% in sodium chloride 0.45%
D2.5S	Dextrose 2.5% in sodium chloride 0.9%
D5¼S	Dextrose 5% in sodium chloride 0.225%
D5½S	Dextrose 5% in sodium chloride 0.45%
D5S	Dextrose 5% in sodium chloride 0.9%
D10S	Dextrose 10% in sodium chloride 0.9%
D5W	Dextrose 5%
D10W	Dextrose 10%
IM	Isolyte M
IP	Isolyte P
LR	Ringer's injection, lactated
NM	Normosol M
NR	Normosol R
NS	Sodium chloride 0.9%
R	Ringer's injections
REF	Refrigeration

RT	Room temperature
S	Saline solution (percentage unspecified)
½S	Sodium chloride 0.45%
SL	Sodium lactate (1/6) M
W	Sterile water for injection

## Manufacturer and Compendium Abbreviations

AB	Abbott
ABX	Abraxis
ACC	American Critical Care
AD	Adria
AGT	Aguetant
AH	Allen & Hanburys
AHP	Ascot Hospital Pharmaceuticals
AKN	Akorn
ALP	Alpharma
ALT	Altana Pharma
ALZ	Alza
AM	ASTA Medica
AMG	Amgen
AMP	Amphastar
AMR	American Regent
AMS	Amerisource
AND	Andromaco
ANT	Antigen
AP	Asta-Pharma
APC	Apothecan
APO	Apotex
APP	American Pharmaceutical Partners
AQ	American Quinine
AR	Armour
ARC	American Red Cross
AS	Arnar-Stone
ASC	Ascot
ASP	Astellas Pharma
AST	Astra
ASZ	AstraZeneca
AT	Alpha Therapeutic
AVE	Aventis
AW	Asta Werke
AY	Ayerst
BA	Baxter
BB	B & B Pharmaceuticals
BAN	Banyu Pharmaceuticals
BAY	Bayer
BC	Bencard
BD	Becton Dickinson
BE	Beecham
BED	Bedford
BEL	R. Bellon
BFM	Bieffe Medital
BI	Boehringer Ingelheim
BIO	Bioniche Pharma

BK	Berk	EA	Eaton
BKN	Baker Norton	EBE	Ebewe
BM	Boehringer Mannheim	ELN	Elan
BMS	Bristol-Myers Squibb	EN	Endo
BN	Breon	ENZ	Enzon
BP	British Pharmacopoeia <sup>a</sup>	ES	Elkins-Sinn
BPC	British Pharmaceutical Codex <sup>a</sup>	ESL	ESI Lederle
BR	Bristol	ESP	ESP Pharma
BRD	Bracco Diagnostics	EST	Esteve
BRN	B. Braun	EV	Evans
BRT	Britianna	EX	Essex
BT	Boots	FA	Farmitalia
BTK	Biotika	FAN	Fandre Laboratories
BV	Ben Venue	FAU	Faulding
BW	Burroughs Wellcome	FC	Frosst & Cie
BX	Berlex	FED	Federa
CA	Calmic	FER	Ferring
CAR	Cardinal Health	FI	Fisons
CE	Carlo Erba	FOR	Forest Laboratories
CEN	Centocor	FP	Faro Pharma
CER	Cerenex	FRE	Fresenius
CET	Cetus	FRK	Fresenius Kabi
CH	Lab. Choay Societe Anonyme	FUJ	Fujisawa
CHI	Chiron	GEI	Geistlich Pharma
CI	Ciba	GEM	Geneva-Marsam
CIS	CIS US	GEN	Genentech
CL	Clintec	GG	Geigy
CN	Connaught	GIL	Gilead
CNF	Centrafarm	GIU	Giulini
CO	Cole	GL	Glaxo
COR	COR Therapeutics	GNS	Gensia-Sicor
CP	Continental Pharma	GO	Goedecke
CPP	CP Pharmaceuticals	GRI	Grifols
CR	Critikon	GRP	Gruppo
CSL	CSL Ltd.	GRU	Grunenthal
CTI	Cell Therapeutics Inc.	GSK	GlaxoSmithKline
CU	Cutter	GVA	Geneva
CUB	Cubist	GW	Glaxo Wellcome
CUP	Cura Pharmaceuticals	HAE	Haemonetics
CUR	Curomed	HC	Hillcross
CY	Cyanamid	HMR	Hoechst Marion Roussel
DAK	Dakota	HO	Hoechst-Roussel
DB	David Bull Laboratories	HOS	Hospira
DCC	Dupont Critical Care	HR	Horner
DI	Dista	HY	Hyland
DIA	Diamant	ICI	ICI Pharmaceuticals
DM	Dome	ICN	ICN Pharmaceuticals
DME	Dupont Merck Pharma	IMM	Immunex
DMX	Dumex	IMS	IMS Ltd.
DRA	Dr. Rentschler Arzneimittel	IN	Intra
DU	DuPont	INT	Intermune
DUR	Dura	IV	Ives
DW	Delta West	IVX	Ivex
		IX	Invenex

JC	Janssen-Cilag	OM	Omega
JJ	Johnson & Johnson	OMJ	OMJ Pharmaceuticals
JN	Janssen	OMN	Ortho-McNeil
JP	Jones Pharma	ON	Orion
KA	Kabi	OR	Organon
KEY	Key Pharmaceuticals	ORC	Orchid
KN	Knoll	ORP	Orphan Medical
KP	Kabi Pharmacia	ORT	Ortho
KV	Kabi-Vitrum	PAD	Paddock
KY	Kyowa	PB	Pohl-Boskamp
LA	Lagap	PD	Parke-Davis
LE	Lederle	PE	Pentagone
LEM	Lemmon	PF	Pfizer
LEO	Leo Laboratories	PFM	Pfrimmer
LI	Lilly	PH	Pharmacia
LME	Laboratoire Meram	PHC	Pharmachemie
LY	Lyphomed	PHS	Pharmascience
LZ	Labaz Laboratories	PHT	Pharma-Tek
MA	Mallinckrodt	PHU	Pharmacia & Upjohn
MAC	Maco Pharma	PHX	Phoenix
MAR	Marsam	PO	Poulenc
MAY	Mayne Pharma	PP	Pharmaceutical Partners
MB	May & Baker	PR	Pasadena Research
MDI	Medimmune	PRF	Pierre Fabre
MDX	Medex	PRK	Parkfields
ME	Merck	PX	Pharmax
MG	McGaw	QLM	Qualimed Labs
MGI	MGI Pharma	QU	Quad
MI	Miles	RB	Robins
MJ	Mead Johnson	RBP	Ribosepharm
MN	McNeil	RC	Roche
MMD	Marion Merrell Dow	RI	Riker
MMT	Meridian Medical Technologies	RKB	Reckitt & Benckhiser
MON	Monarch	RKC	Reckitt & Colman
MRD	Merrill-Dow	ROR	Rorer
MRN	Merrill-National	ROX	Roxane
MSD	Merck Sharp & Dohme	RP	Rhone-Poulenc
MUN	Mundi Pharma	RPR	Rhone-Poulenc Rorer
MY	Maney	RR	Roerig
MYR	Mayrhofer Pharmazeutika	RS	Roussel
NA	National	RU	Rugby
NAB	Nabi	SA	Sankyo
NAP	NAPP Pharmaceuticals	SAA	Sanofi Aventis
NCI	National Cancer Institute	SAG	Sageant
NE	Norwich-Eaton	SAN	Sanofi
NF	National Formulary <sup>a</sup>	SC	Schering
NO	Nordic	SCI	Scios
NOP	Novopharm	SCN	Schein
NOV	Novo Pharm	SCS	SCS Pharmaceuticals
NVA	Novartis	SE	Searle
NVP	Nova Plus	SEQ	Sequus
NYC	Nycomed	SER	Servier
OHM	Ohmeda	SGS	SangStat
		SHI	Shionogi

SIC	Sicor	YAM	Yamanouchi
SIG	Sigma Tau	ZEN	Zeneca
SKB	SmithKline Beecham	ZLB	ZLB Biopharma
SKF	Smith Kline & French	ZNS	Zeneus Pharma
SM	Smith		
SN	Smith + Nephew		
SO	SoloPak		
SQ	Squibb		
SS	Sanofi-Synthelabo		
ST	Sterilab		
STP	Sterop		
STR	Sterling		
STS	Steris		
STU	Stuart		
SV	Savage		
SW	Sanofi Winthrop		
SX	Sabex		
SY	Syntex		
SYN	Synergen		
SYO	Synthelabo		
SZ	Sandoz		
TAK	Takeda		
TAP	TAP Holdings		
TAY	Taylor		
TE	Teva		
TEC	Teclapharm		
TL	Tillotts		
TMC	The Medicines Company		
TO	Torigian		
TR	Travenol		
UCB	UCB		
UP	Upjohn		
USB	US Bioscience		
USP	United States Pharmacopeia <sup>a</sup>		
USV	USV Pharmaceuticals		
UT	United Therapeutics		
VHA	VHA Plus		
VI	Vitarine		
VIC	Vicuron Pharmaceuticals		
VT	Vitrum		
WAS	Wasserman		
WAT	Watson		
WAY	Wyeth-Ayerst		
WB	Winthrop-Breon		
WC	Warner-Chilcott		
WED	Weddel		
WEL	Wellcome		
WI	Winthrop		
WL	Warner Lambert		
WOC	Wockhardt		
WW	Westward		
WY	Wyeth		
XGN	X-Gen		

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<sup>a</sup>While reference to a compendium does not indicate the specific manufacturer of a product, it does help to indicate the formulation that was used in the test.