enzymatic degradation, minimizes protein binding, and generally decreases uptake by normal tissues.

The product should be diluted 1:1 with 5% dextrose injection prior to administration. Each vial contains the equivalent of 50 mg daunorubicin base at a concentration of 2 mg/mL after preparation; it is recommended to be diluted to 1 mg/mL for administration. The only fluid recommended for preparation is 5% dextrose injection; it must not be mixed with a solution containing sodium chloride or benzyl alcohol or with any other solution. An inline filter should not be used for the intravenous infusion of DaunoXome. The final product appears as a red translucent dispersion of liposomes that does scatter light, but it should not be used if it appears opaque or has precipitate or foreign matter in it. It should be stored in a refrigerator (2°C to 8°C; 36°F to 46°F); do not freeze and protect from light (11).

Stealth Liposomes

Liposome research has resulted in liposomes that avoid detection by the body's immune system, specifically the cells of the RES. These liposomes are known as "stealth liposomes" and are prepared with PEG on the outside of the membrane. The PEG coating, which is inert in the body, allows for longer circulatory life for the drug delivery mechanism. In addition to the PEG coating, most stealth liposomes also have some type of biological species attached as a ligand to the liposome in order to enable binding via a specific expression on the targeted drug delivery site. These targeting ligands could be monoclonal antibodies (making an immunoliposome), vitamins, or specific antigens. Targeted liposomes can target nearly any cell type in the body and deliver drugs that would naturally be systemically delivered. Naturally toxic drugs can be much less toxic if delivered only to diseased tissues. In case of tumor development, certain anticancer drugs like doxorubicin (Doxil) and daunorubicin are provided through liposomes.

Doxorubicin hydrochloride (Doxil) liposome injection consists of the drug encapsulated in stealth liposomes for intravenous administration. Doxorubicin is a cytotoxic anthracycline antibiotic that is isolated from *Streptomyces peucetius* var. *caesius*. The product is available as a sterile translucent red liposomal dispersion containing in each 10-mL single-use glass vial 20 mg doxorubicin HCl at a pH of 6.5. The stealth liposomes consist of 3.19 mg/mL of *N*-(carbonyl-methoxypolyethylene glycol 2000)-1,2-distearoyl-sn-glycero-3-phosphoethanolamine sodium salt, 9.58 mg/mL of fully hydrogenated soy phosphatidylcholine, and 3.19 mg/mL of cholesterol; also, each milliliter contains approximately 2 mg ammonium sulfate along with histidine as a buffer, sucrose for tonicity, and hydrochloric acid and/or sodium hydroxide for adjustment of pH. The doxorubicin is at least 90% encapsulated in the stealth liposomes. These stealth liposomes are protected from detection by the mononuclear phagocyte system by the coating with surface-bound methoxy PEG; this increases blood circulation time. These liposomes have a half-life of approximately 55 hours in humans (12).

PEGYLATED DOSAGE FORMS

Neulasta (pegfilgrastim) is a covalent conjugate of recombinant methionyl human granulocyte colony-stimulating factor (G-CSF) (filgrastim) and monomethoxy-PEG. Filgrastim is a water-soluble 175-amino acid protein obtained from bacterial fermentation of a strain of *Escherichia coli*; it has a molecular weight of approximately 19 kDa. Pegfilgrastim is produced by covalently bonding a 20-kDa PEG molecule to the N-terminal methionyl residue of filgrastim, resulting in an average molecular weight of pegfilgrastim of approximately 39 kDa. Neulasta is available in 0.6-mL prefilled syringes for subcutaneous injection. The syringe contains 6 mg of pegfilgrastim (based on protein weight) in a clear, colorless, sterile, preservative-free solution containing 0.35 mg acetate, 30 mg sorbitol, 0.02 mg polysorbate 20, and 0.02 mg sodium in water for injection; the pH of the injection is 4.0.

Pegasys (peginterferon *alfa*-2a), used in the treatment of hepatitis C virus, is a covalent