Table 1. Examples of different cytotoxic agents

Group	Agent	Mode of Action	Degree of Gonadotoxicity
Alkylating agents		Addition of alkyl groups to DNA, altering DNA structure and function	
	Chlorambucil		Prolonged azoospermia
	Cyclophosphamide		
	Procarbazine		
	Melphalan		
	Carmustine		Azoospermia in adulthood after treatment before puberty
	Lomustine		
	Busulfan		Azoospermia likely, but always given with other highly sterilizing agents
	Ifosfamide		
Platinum analogs		Formation of DNA adducts, DNA interstrand cross-links	
	Cisplatin		Prolonged azoospermia
	Carboplatin		Prolonged azoospermia not often observed at indicated doses
Antibiotics	Actinomycin-D	Binding to DNA inhibiting RNA synthesis	Azoospermia likely, but always given with other highly sterilizing agents
	Doxorubicin	Triggering of topoisomerase II-dependent DNA	Can be additive to above agents in causing prolonged azoospermia, but causes only temporary reductions in sperm count when used solo
	Bleomycin	Single- and double-strand breaks in DNA	Only temporary reductions in sperm count at doses used in conventional regimens, but additive effects are possible
Antimetabolites	Fluorouracil	Pyrimidine analog	Only temporary reductions in Sperm count at doses used in conventional regimens, but additive effects are possible
	6-Mecaptopurine	Purine analog	Only temporary reductions in sperm count at doses used in conventional regimens, but additive effects are possible
	Thioguanine	Purine analog	Only temporary reductions in sperm count at doses used in conventional regimens, but additive effects are possible
	Methotrexate	Antifolate	Only temporary reductions in sperm count at doses used in conventional regimens, but additive effects are possible
Plant derivatives	Vincristine Vinblastine	Inhibition of formation of microtubules	Can be additive to above agents in causing prolonged azoospermia, but causes only temporary reductions in sperm count when used solo
	Etoposide	Inhibition of topoisomerase II activity	Only temporary reductions in sperm count at doses used in conventional regimens, but additive effects possible
Miscellaneous	Prednisone	Inhibition of RNA synthesis	Unlikely to affect spermatogenesis
	Interferon	Stimulation of macrophages and natural killer cells	No effects on spermatogenesis

Data from Giwercman et al and Lee et al.[29,31]