

# Index

- 5-fluorouracil, 121  
 5HT. *See* serotonin  
 acrosome, 18  
 acrosome reaction assessment, 55  
 actinomycin-d, 121  
 activins, 81  
 adenomas, pituitary, 155–6  
 adoption, 286–7  
 agglutination, 26, 30–1, 53  
 aging, hypogonadism and, 82–3  
 alcohol consumption, 43  
 alkylating agents, 115, 120, 153. *See also* chemotherapy; *specific drugs*  
   CNS tumor treatment, 123  
 alpha-1 adrenoceptor antagonists, 74  
 alpha-blockers, 75  
 anabolic steroids, 43, 267–8  
 anastrozole, 295  
 androgen binding protein (ABP), 265  
 androgen deficiency, 266. *See also* hypogonadism; testosterone varicocele effects, 65  
 Androgen Deficiency in the Aging Male questionnaire, 87  
 androgen insensitivity, 60  
 androgen therapy, 296–7  
 anejaculation (AE), 73–4. *See also* ejaculatory dysfunction  
   idiopathic, 244  
   neurogenic, 244  
   reproductive outcomes, 317  
 anorgasmia, 244  
 anthracyclines, 121  
 anti-androgens, 84  
 anti-epileptic drugs (AED), 150–1  
 antimetabolites, 121  
 anti-Müllerian hormone (AMH), 331  
 antioxidant supplements, 195–6, 297.  
   *See also* dietary supplements  
 anti-sperm antibodies (ASA), 30–1, 53, 299  
 antral follicle count, 331  
 Arimidex, 269  
 aromatase inhibitors, 295  
 assisted hatching (AH), 336–7  
 assisted reproductive technology (ART), 329. *See also specific techniques*  
   complications, 339–40  
   ectopic pregnancy, 339–40  
   multiple gestations, 339  
   ovarian hyperstimulation syndrome (OHSS), 339  
   perinatal outcomes, 340  
 asthenospermia, 28, 53  
   causes, 53  
   differential diagnosis, 53  
 astrocytomas, 152, 154  
 autoimmune diseases, 42  
 autologous endometrial co-culture (AECC), 337  
 azoospermia, 27, 58  
   chemotherapy effects, 113, 114  
   alkylating agents, 120  
   combination chemotherapy, 115–16  
   sperm retrieval, 316–19  
   classification, 58–9  
   etiogenesis, 27, 58  
   evaluation, 58–61  
   FSH measurement, 59  
   history, 58–9  
   physical examination, 59  
   semen analysis, 59  
 fertility options, 314  
   use of cryopreserved sperm, 314–15  
 non-obstructive, 27, 60–1  
   varicocele and, 307–8  
 obstructive, 27, 47, 59–62  
 radiation therapy effects, 106–7  
   sperm retrieval, 319  
   reproductive outcomes, 317  
   treatment, 61–2  
   clomiphene citrate, 293–4  
 barbiturates, 151  
 benign prostatic hyperplasia (BPH)  
   retrograde ejaculation and, 75  
 bevacizumab, glioma treatment, 154  
 bicalutamide, 84  
 birth defects, 174  
 bladder neck  
   past surgery, 42  
   retrograde ejaculation and, 74–5  
   role in seminal fluid expulsion, 35  
 bladder sperm harvesting, 77, 315–16  
 bleomycin, 115–16, 121  
 blood–testis barrier, 13, 299  
   breaching of, 30  
 body composition, hypogonadism effects on, 86  
 bone mineral density (BMD),  
   hypogonadism effects on, 85–6  
 bone sarcomas, 125  
   Ewing sarcoma, 125  
   osteosarcoma, 125  
 brain tumors, 150–2  
   gliomas, 152–5  
   meningiomas, 155  
   metastatic tumors, 158  
   pituitary tumors, 155–6  
   primary central nervous system lymphoma (PCNSL), 156–7  
   supportive treatment, 150–2  
   anti-epileptic drugs (AED), 150–1  
   corticosteroids, 151–2  
 breast cancer, stimulation protocols, 277  
 bromocriptine, 298  
 bulbourethral glands, 7  
 busulfan, 120

- cabergoline, 298
- cancer. *See also* childhood cancer; female cancers; *specific types of cancer*  
 azoospermia and, 60–1  
 fertility preservation importance, 224–7  
 sexual dysfunction relationships, 98  
 spermatogenesis and, 112–13  
 semen analysis in cancer patients, 31–2  
 varicocele and, 67–8
- cancer therapies, 45. *See also* chemotherapy; radiation therapy; *specific types of cancer*  
 female cancers, 274–5  
 fertility preservation importance, 224–7  
 risks for future progeny, 226  
 sexual dysfunction relationships, 98
- capecitabine, 121
- carbamazepine, 151
- carboplatin, 113, 116, 120
- cardiovascular effects of  
 hypogonadism, 85
- carmustine, 120
- central nervous system tumors,  
 123  
 metastatic tumors, 158
- chemotherapy, 45, 110  
 agents, 115  
 alkylating agents, 120  
 antimetabolites, 121  
 classification, 114  
 cytotoxic antibiotics, 121  
 immunomodulators, 121–2  
 mitotic inhibitors, 121  
 platinum analogs, 120–1  
 topoisomerase inhibitors, 121  
 brain tumors, 152–3  
 temozolomide, 153–4
- CNS tumors, 123  
 primary central nervous system  
 lymphoma (PCNSL), 157  
 DNA damage, 116–17  
 effects on spermatogenesis, 255–6  
 combination chemotherapy,  
 115–16  
 versus radiation therapy, 113  
 fertility preservation, 145  
 fertility re-establishment, 146–7  
 gonadotoxicity and, 136–7  
 childhood cancer treatment, 162,  
 255–6  
 female cancer treatment, 274–5
- Hodgkin's lymphoma, 116, 129–31  
 hypogonadism and, 83–4  
 leukemia, 131  
 mechanisms of action, 113–15  
 neuroblastoma, 123  
 non-Hodgkin's lymphoma, 131  
 sarcomas, 124  
 Ewing sarcoma, 125  
 osteosarcoma, 125  
 sperm quality and use following  
 treatment, 315  
 retrieval in azoospermic patients,  
 316–19  
 testicular cancer, 116, 145  
 Wilms' tumor, 123
- childhood cancer, 161, 255  
 adverse effects of treatment in later  
 life, 161  
 fertility issues, 161  
 fertility potential following  
 treatment, 163–4  
 fertility preservation, 164–8, 256–9  
 embryo cryopreservation, 235–8  
 ethical and legal issues, 168–9,  
 232–5  
 hormonal manipulation, 166–8  
 need to clearly state intentions,  
 238–40  
 options, 257  
 sperm cryopreservation, 164,  
 235–8, 256–7  
 stem cell autotransplantation,  
 257–8  
 stem cell culture, 258–9  
 testicular tissue harvesting, 164–6  
 gonadal toxicity following  
 treatment, 161–3, 256  
 chemotherapy, 162, 255–6  
 effects of disease, 163  
 radiotherapy, 162, 256  
 solid tumors, 122–3  
 bone sarcomas, 125  
 central nervous system tumors,  
 123  
 neuroblastoma, 123  
 soft-tissue sarcomas, 124  
 Wilms' tumor, 123–4
- childhood illnesses and conditions,  
 41–2
- chlamydial infection, 298
- chlorambucil, 120
- chromosome abnormalities, 60  
 radiation therapy effects, 107
- cisplatin, 113, 116, 120  
 dosing, 114  
 gonadotoxicity, 114
- Clomid, 269
- clomiphene citrate, 43, 101,  
 293–4  
 hypogonadism management, 88–9
- clomiphene citrate challenge test  
 (CCCT), 331
- coenzyme Q10, 196, 297
- cognitive appraisals, 190
- cognitive function, testosterone  
 relationships, 86
- cohesion, 15–16
- communication  
 barriers to discussion, 172–4, 225,  
 261, 282–3  
 patient barriers, 173–4  
 counseling for donor insemination,  
 287  
 discussing sensitive topics, 283–4  
 facilitating provider discussion,  
 174–5
- computer-assisted sperm assessment  
 (CASA), 28
- congenital bilateral absence of the vas  
 deferens (CBAVD), 42, 61–2
- consent issues  
 childhood cancer, 168–9, 261  
 terminally ill and recently deceased  
 patients, 322–4
- controlled ovarian stimulation, 276.  
*See also* ovarian stimulation  
 with intrauterine insemination,  
 332
- coping strategies, 188
- corpora cavernosa, 7  
 smooth muscle physiology, 9
- corticosteroids, 121  
 brain tumor treatment, 151–2  
 immunological infertility treatment,  
 299
- countertransference issues, 192
- Cowper's glands, 7
- cryobiology, 214–15
- cryopreservation of embryos. *See*  
 embryo cryopreservation
- cryopreservation of oocytes. *See* oocyte  
 cryopreservation
- cryopreservation of sperm, 141, 172,  
 213, 232, 249, 331–2. *See also*  
 fertility preservation; sperm  
 banking  
 childhood cancer management, 164,  
 256–7  
 cooling rates, 217–18

## Index

- cryopreservation of sperm (*cont.*)  
   cryopreserved sperm use in  
     azoospermic patients, 314–15  
   cryoprotective agents (CPA), 216–17  
   history of, 213–14  
   importance for cancer patients,  
     224–7  
   indications, 221–4  
     cryopreservation prior to cancer  
       treatment, 224  
     homologous and donor  
       insemination, 221–3  
     intra-operative cryopreservation,  
       223  
     post-operative cryopreservation,  
       223  
     premortem and postmortem  
       cryopreservation, 223–4  
     pre-operative cryopreservation,  
       223  
   media, 217  
   protocols, 218–20  
     freeze drying, 220  
     vitrification, 219–20  
   safety issues, 226–7  
   semen extenders, 217  
   semen screening, 220–1  
   sperm collection techniques, 141–2,  
     215–16. *See also* sperm retrieval  
   storage costs, 241  
   testicular cancer patients, 141–2  
   thaw protocol, 218  
   time limits for storage, 241  
   tracking, 221  
   versus embryo cryopreservation,  
     235–8  
  
 cryptorchidism, 41  
 cyclophosphamide, 43, 113, 120  
   dosing, 114  
   gonadotoxicity, 114  
 cyproterone acetate, 84  
 cystic fibrosis (CF), 42, 61–2  
 cytarabine, 157  
 cytotoxic antibiotics, 121  
  
 dacarbazine, 115, 120  
 deceased patients. *See* postmortem  
   sperm retrieval  
 decision making, 190  
   cognitive appraisals, 190  
   emotional responses, 190  
   moral judgments, 190  
 deferential artery, 5  
 depression, testosterone relationships,  
   86  
  
 dexamethasone, 151  
 diabetes mellitus (DM), anejaculation  
   and, 73  
 dietary supplements, 195–6  
   antioxidant supplements, 195–6,  
     297  
   coenzyme Q10, 196, 297  
   folic acid, 196–7  
   L-carnitine, 197  
   omega-3 fatty acids, 197–8  
   selenium, 198–9  
   vitamin C, 199–200  
   vitamin E, 198–9  
 diethylstilbestrol (DES) exposure,  
   43  
   prostate cancer treatment, 84  
 digital rectal examination, 47  
 dihydrotestosterone (DHT), 265  
 disorders of sex development (DSD),  
   60  
 DNA damage  
   chemotherapy effects, 116–17  
   radiation effects, 105, 107  
   sperm DNA integrity tests,  
     55–6  
 donor insemination, 223. *See also*  
   sperm donation  
   donor guidelines, 222  
   donor selection, 287–8  
   history, 284–5  
   recipient counseling, 287  
   research, 286  
 dopamine (DA), ejaculation  
   regulation, 156  
 dorsal nerve of the penis, 9  
 double-stranded breaks (DSBs), 15,  
   16  
 doxorubicin, 115, 121  
 drugs. *See* medications; recreational  
   drug use  
  
 ectopic pregnancy, 339–40  
 ejaculation. *See also* ejaculatory  
   dysfunction  
   anatomy, 71–2  
   brain imaging studies, 156  
   dribbling ejaculation, 37  
   emission, 72  
   expulsion, 72  
   low volume ejaculate, 51–2  
   neurochemical regulation  
     dopaminergic control, 35  
     oxytocinergic control, 80  
     serotonergic control, 35  
   physiology, 72–3, 243  
   spinal organization, 72  
 ejaculatory duct, 6  
 ejaculatory dysfunction, 71, 243–4. *See*  
   also ejaculation  
   anejaculation, 73–4  
     idiopathic, 244  
     neurogenic, 244  
   medical treatment, 75–7, 147  
   assisted ejaculation procedures,  
     76–7, 244–6  
   pharmacotherapy, 75–6  
   premature ejaculation, 95, 243  
   retrograde ejaculation, 75,  
     244  
     bladder sperm harvesting, 77,  
       315–16  
   retroperitoneal lymph node  
     dissection effects, 73, 146,  
     244  
   fertility preservation methods,  
     146  
   sperm retrieval, 315–16  
   testosterone role, 97  
 electroejaculation (EEJ), 142, 215–16,  
   245–6, 316  
   adolescents, 246  
   cost-benefit analysis, 247  
   following retroperitoneal lymph  
     node dissection (RPLND), 247,  
     316  
 embryo cryopreservation, 232  
   ethical and legal issues, 235–8  
   balancing test, 235  
   contemporaneous mutual consent  
     approach, 235–6  
   contractual approach, 235  
   female cancer treatment and,  
     276–7  
 embryo transfer, 338  
 emotional responses, 190  
 endometriosis, 330  
 epididymis, 5–6  
   examination, 46  
   function, 5–6  
   seminal fluid emission, 35, 36  
   sperm maturation, 6, 18  
   sperm storage, 5–6  
   sperm transport, 6, 71–2  
   innervation, 5  
   percutaneous sperm aspiration, 215,  
     250  
   seminal components produced,  
     31  
   surgical sperm retrieval, 250  
   vascular supply, 5

- epididymitis, 298
- epispadias, 45
- erectile dysfunction (ED)  
 epidemiology associated with infertility, 94–5  
 phosphodiesterase (PDE) inhibitor treatment, 80, 98–9, 155
- erection, 9. *See also* erectile dysfunction  
 testosterone role in erectile function, 86–7, 96
- estradiol, sexual dysfunction and, 97
- ethical issues  
 childhood cancer, 168–9, 232–5  
 fundamental right to procreate, 232–4  
 right not to reproduce, 240  
 postmortem sperm retrieval, 324–5
- ethylene glycol (EG), 216
- etoposide, 113, 116, 121
- Evans v. the United Kingdom, 236
- Ewing sarcoma, 125
- examination. *See* physical examination
- exogenous testosterone use. *See* testosterone
- family history, 43
- febrile illnesses, 42
- female cancers, 273–4  
 fertility preservation, 273, 275–9  
 counseling, 274  
 embryo cryopreservation, 276–7  
 fertility-sparing surgery, 275–6  
 gonadal protection using drugs, 278–9  
 in-vitro culture of ovarian follicles, 278  
 oocyte cryopreservation, 277  
 ovarian tissue freezing, 277–8  
 ovarian tissue transplantation, 278  
 shielding, 275  
 stimulation protocols with breast cancer, 277  
 gonadotoxic effects of treatment, 274–5  
 chemotherapy, 274–5  
 radiotherapy, 275
- female infertility, 330–1  
 endometriosis, 330  
 polycystic ovary syndrome (PCOS), 330  
 prognostic factors, 331  
 antral follicle count, 331
- hormonal assays, 331  
 ovarian reserve testing, 331  
 tubal factor infertility, 330  
 unexplained infertility, 331
- Fertile Hope's Centers of Excellence Program, 183–4
- fertility preservation, 178  
 barriers to discussion, 172–4, 259–61, 282–4  
 patient barriers, 173–4  
 time, 283  
 chemotherapy and, 145  
 childhood cancer and, 164–8, 256–9  
 embryo cryopreservation, 235–8  
 ethical and legal issues, 168–9, 232–5  
 need to clearly state intentions, 238–40  
 options, 257  
 sperm cryopreservation, 164, 235–8, 256–7  
 stem cell autotransplantation, 257–8  
 stem cell culture, 258–9  
 testicular tissue harvesting, 164–6
- facilitating provider discussion, 174–5
- female cancers, 273, 275–9  
 counseling, 274  
 embryo cryopreservation, 276–7  
 fertility-sparing surgery, 275–6  
 gonadal protection using drugs, 278–9  
 in-vitro culture of ovarian follicles, 278  
 oocyte cryopreservation, 277  
 ovarian tissue freezing, 277–8  
 ovarian tissue transplantation, 278  
 shielding, 275  
 stimulation protocols with breast cancer, 277
- hormonal suppression, 166–8, 203–4  
 animal studies, 205–6  
 clinical trials, 206–8  
 relationship between animal and human studies, 208–9
- importance for cancer patients, 224–7
- interest in, 172
- oncologist's responsibilities, 231–2  
 patient's options, 231–2
- program development. *See* Fertile Hope's Centers of Excellence Program; Memorial Sloan-Kettering Cancer Center (MSKCC)
- psychological issues, 186–7  
 countertransference issues, 192  
 psychological consultation, 190–1  
 psychosocial assessment, 189  
 radiation therapy and, 145  
 retroperitoneal lymph node dissection and, 146  
 spermatogonial transplantation, 209
- testicular cancer patients, 141–6  
 cryopreserved sperm use, 142  
 following radical orchiectomy, 144–6  
 partial orchiectomy and, 142–3, 251  
 sperm banking prior to treatment, 141–2  
 sperm retrieval at orchiectomy, 143–4
- fertility re-establishment, 146–7
- fertilization, 335
- finasteride, 43
- fine-needle aspiration of the testis, 250
- fish oil consumption, 197–8
- flutamide, 84
- folic acid, 196–7
- follicle-stimulating hormone (FSH), 2, 19, 111  
 as marker of Sertoli cell function, 111–12  
 azoospermia evaluation, 59  
 hypogonadism and, 81–2  
 management, 88  
 infertility treatment, 296  
 measurement, 293  
 oligospermia and, 52–3  
 prognostic value in female infertility, 331  
 regulation, 81  
 spermatogenesis and, 266  
 role as marker after chemotherapy, 116  
 testosterone relationships, 2
- freeze drying, 220
- fundamental right to procreate, 232–4
- gemcitabine, 113, 121
- germ cells, 13–14  
 germ cell transplantation, 165–6, 226  
 in-vitro maturation, 166
- glioblastomas, 150, 152

## Index

- gliomas, 152–5  
 chemotherapy, 152  
 immunotherapy, 154  
 radiation therapy, 152  
   effects on pituitary function, 154–5  
 sildenafil effects on growth, 155  
 temozolomide chemotherapy, 153–4
- glucocorticoids, 151–2
- GnRH. *See* gonadotropin-releasing hormone (GnRH)
- GnRH agonists, 84  
 hormonal manipulation for fertility preservation, 167, 204  
 animal studies, 205–6  
 clinical trials, 206–8  
 female cancers, 278–9  
 relationship between animal and human studies, 208–9
- gonadotropin-releasing hormone (GnRH), 19, 111, 265. *See also* GnRH agonists  
 hypogonadism management, 88, 295  
 regulation, 19  
 secretion, 1–2, 80
- graft versus host disease (GVHD), 134–5
- heart health, 195. *See also* dietary supplements
- hematopoietic stem cell transplantation (HSCT), 133  
 allogeneic, 134  
 autologous, 133  
 fertility and, 135–7  
 graft versus host disease (GVHD), 134–5  
 process of, 133–5  
   conditioning, 134  
   graft, 133–4  
   immunosuppression, 134
- hemizona assay, 55
- history taking. *See* infertility; *specific conditions*
- Hodgkin's lymphoma, 32, 44–5, 129–31  
 chemotherapy effects, 83, 114–16, 129–31  
 spermatogenesis and, 112
- homologous recombination, 15–16
- hormonal therapy, 121–2
- human chorionic gonadotropin (hCG), hypogonadism management, 88, 270, 295–6
- human menopausal gonadotropin (hMG), hypogonadism management, 88, 295–6
- human sperm preservation medium (HSPM), 217
- hydrocele, 46
- hypergonadotropic hypogonadism, 81. *See also* hypogonadism
- hyperprolactinemia, 97  
 cranial radiotherapy effects, 155  
 medical treatment, 297–8
- hypertension, 42
- hyperthyroidism, 97
- hyperviscous semen, 26
- hypogastric nerve, 35
- hypogonadism, 80, 266–7. *See also* androgen deficiency; testosterone  
 body composition changes, 86  
 bone mineral density and, 85–6  
 cardiovascular effects of, 85  
 causes, 81–4  
   aging, 82–3  
   cancer therapies, 83–4  
   cognition and mood relationships, 86  
   diagnosis, 87–8  
   metabolic effects of, 84–5  
   sexual function and, 86–7, 96–7  
   testicular cancer and, 44  
 treatment, 88–9, 269–70, 294  
   clomiphene citrate, 294  
   GnRH, 295  
   hCG and hMG, 295–6  
   varicocele and, 308–9
- hypogonadotropic hypogonadism, 82. *See also* hypogonadism
- hypospadias, 45
- hypothalamic–pituitary–gonadal (HPG) axis, 1, 19, 81, 265  
 hormonal suppression for fertility preservation, 203–4  
 animal studies, 205–6  
 clinical trials, 206–8  
 relationship between animal and human studies, 208–9  
 spermatogenesis regulation, 111
- hypothalamus, 1–2  
 GnRH secretion, 1–2
- hypothyroidism, 98
- hysterosalpingography (HSG), 330
- idiopathic anejaculation, 244
- idiopathic anorgasmia, 244
- ifosfamide, 116, 120
- imipramine, ejaculatory dysfunction treatment, 75–6
- immotile cilia syndrome, 42, 53
- immotile sperm, 28. *See also* asthenospermia
- immunomodulators, 121–2
- immunosuppression, 134, 299
- immunotherapy, gliomas, 154
- in-vitro fertilization (IVF), 329  
 following postmortem sperm retrieval, 324–5  
 legal issues, 325–6  
 logistical issues, 325  
 outcomes, 338–9  
 sperm preparation techniques, 333  
 versus intruterine insemination, 332
- infertility, 39  
 chemotherapy effects, 113, 136–7  
 alkylating agents, 120  
 platinum analogs, 120–1  
 childhood cancer long-term effects, 161  
 combined morbidity with sexual dysfunction, 94  
 associated hormonal disorders, 96–8  
 cancer and cancer therapy effects, 98  
 epidemiology, 94–5  
 pharmacotherapy effects, 98–101  
 psychogenic factors, 95–6  
 evaluation, 292–3  
 goals, 39  
 exogenous testosterone use effects, 267  
 recovery after, 268–9
- female infertility  
 endometriosis, 330  
 etiologies, 330–1  
 polycystic ovary syndrome (PCOS), 330  
 prognostic factors, 331  
 tubal factor infertility, 330  
 unexplained infertility, 331
- hematopoietic stem cell transplantation (HSCT) effects, 135–7
- history, 39–45  
 cancer and cancer therapies, 44–5  
 childhood illnesses and conditions, 41–2

- family history, 43  
 lifestyle and occupational history, 43–4  
 medications, 43  
 past surgical history, 42–3  
 reproductive history, 40–1  
 sexual dysfunction, 41  
 systemic diseases, 42  
 in cancer patients, 31–2  
 medical treatment, 293–8  
 androgens, 296–7  
 antioxidant supplements, 297  
 aromatase inhibitors, 295  
 clomiphene citrate, 293–4  
 GnRH, 295  
 hCG and hMG, 295–6  
 hyperprolactinemia treatment, 297–8  
 immunological infertility, 299  
 infectious and inflammatory infertility, 298–9  
 nutraceuticals, 297  
 recombinant FSH, 296  
 tamoxifen, 294–5  
 psychological reactions to, 284  
 radiation therapy effects, 104–6  
 animal data, 106–7  
 gonadal shielding, 108  
 human data, 107–8  
 secondary infertility, 267  
 sexual desire and satisfaction relationships, 95  
 testicular cancer relationships, 140–1
- inguinal hernia repair, 43
- inhibin, 2, 13, 19  
 as spermatogenesis marker  
 after chemotherapy, 116  
 following childhood cancer, 164  
 spermatogenesis regulation, 2
- interferon alpha, 121
- International Index of Erectile Function, 87
- Internet resources, 181
- intracytoplasmic sperm injection (ICSI), 215, 249  
 azoospermic patients, 314–15  
 oocyte preparation, 336  
 using freeze dried sperm, 220
- intratubular germ cell neoplasia (ITGCN), 142–3
- intrauterine insemination (IUI), 332.  
*See also* donor insemination  
 cost-benefit analysis, 247  
 history of, 284
- sperm preparation techniques, 333  
 using cryopreserved sperm, 223  
 versus in-vitro fertilization, 332
- irinotecan, 121
- Kallmann syndrome, 42, 82
- Kartagener's syndrome, 42, 53
- karyotypic abnormalities, 60
- kinetochores, 17
- Klinefelter syndrome, 60, 82
- Krause–Finger corpuscles, 35
- lamotrigine, 151
- L-carnitine, 197
- legal issues  
 childhood cancer, 168–9, 232–5  
 need to clearly state intentions, 238–40  
 postmortem sperm retrieval, 325–6  
 sperm cryopreservation, 220–1  
 versus embryo cryopreservation, 235–8
- letrozole, 277
- leukemia, 106, 131
- leukocytospermia, 31, 54, 299  
 differential diagnosis, 54  
 treatment, 54
- levetiracetam, 151
- Leydig cells, 2, 12–13  
 radiation damage, 105, 256
- lifestyle factors, 43–4, 195. *See also*  
 dietary supplements
- lomustine, 120
- low volume ejaculate, 51–2
- lubricants, 41
- luteinizing hormone (LH), 2, 19, 111, 265  
 hypogonadism and, 81–2  
 regulation, 81  
 spermatogenesis and, 266  
 testosterone relationships, 2, 19  
 negative feedback, 2
- lymphoma. *See* Hodgkin's lymphoma;  
 non-Hodgkin's lymphoma (NHL);  
 primary central nervous system lymphoma (PCNSL)
- major histocompatibility complex (MHC), 134
- male contraceptive, 270
- male infertility. *See* infertility
- male sexual development, 266
- male sexual dysfunction (MSD). *See*  
 sexual dysfunction
- Massachusetts Male Aging Study (MMAS), 94
- mechlorethamine, 115
- mediastinum, 71
- medications, 43. *See also specific drugs*  
 anejaculation and, 73–4
- meiosis, 15–19
- melphalan, 120
- Memorial Sloan–Kettering Cancer Center (MSKCC), 178–83  
 fertility preservation program  
 development, 179–80  
 assessment, 180  
 clinical expertise, 182  
 clinical research, 183  
 clinician education, 181–2  
 clinician resources, 181  
 evaluation, 183  
 implementation, 182–3  
 patient resources, 180–1
- meningiomas, 155, 156
- mental health professional  
 collaborative role, 191–2
- mercury levels in seafood, 198
- mesterolone, 296
- metastases, central nervous system, 158
- methotrexate, 43, 113, 121, 157
- methylprednisolone, 299
- microsurgical epididymal sperm aspiration (MESA), 215
- micro-testicular sperm extraction (microTESE), 147, 215, 251, 316–19
- midodrine, ejaculatory dysfunction  
 treatment, 76
- mitotic inhibitors, 121
- mitoxantrone, 115, 121
- monoclonal antibodies, 122
- moral judgments, 190
- multiple gestations, 339
- mumps, 41–2
- myotonic dystrophy, 42

## Index

- National Health and Social Life Survey (NHSL), 94
- natural-cycle IVF, 277
- necropermia, 28, 53
- neuroblastoma, 123
- neurogenic anejaculation, 244
- nilutamide, 84
- non-Hodgkin's lymphoma (NHL), 131.  
*See also* primary central nervous system lymphoma (PCNSL)
- non-rhabdomyosarcoma soft tissue sarcomas (NRSTS), 124
- nutraceuticals. *See* dietary supplements
- occupational exposures, 44
- oligodendrogliomas, 152
- oligospermia, 27, 52–3  
 androgen therapy, 268  
 differential diagnosis, 52  
 in cancer patients, 31
- omega-3 fatty acids, 197–8
- oocyte cryopreservation, 277
- oocyte retrieval, 276, 335–6  
 maturity assessment, 335  
 preparation for fertilization, 335–6
- oocytes, chemotherapy effects, 274
- orchectomy  
 partial, 142–3, 251  
 radical, fertility preservation following, 144–6  
 sperm retrieval during, 143–4, 251
- orchitis, 298
- organ donation, 323
- orgasm, 35
- osteosarcoma, 125
- ovarian follicle in-vitro culture, 278
- ovarian hyperstimulation syndrome (OHSS), 334, 339  
 risk minimization, 334–5, 339
- ovarian reserve testing, 331
- ovarian stimulation, 333–4. *See also* controlled ovarian stimulation  
 hyper-responding patient, 334–5  
 long agonist protocols, 333  
 poor responding patient, 335  
 short antagonist protocols, 334
- ovarian tissue freezing, 277–8
- ovarian tissue transplantation, 278
- ovarian transposition, 275
- ovary  
 chemotherapy gonadotoxic effects, 274–5  
 radiotherapy effects, 275
- oxaliplatin, 120
- oxcarbamazepine, 151
- oxytocin (OT), ejaculation regulation, 80
- pampiniform plexus, 3
- paragigantocellular nucleus (nPGi), 36
- paraphimosis, 45
- paraventricular hypothalamic nucleus (PVN), 36
- parenthood, meaning of, 324
- partial orchietomy, 142–3
- partial zona dissection (PZD), 336
- pediatric patients. *See* childhood cancer
- pelvic floor muscles, role in seminal fluid expulsion, 72
- pemetrexed, 121
- penile vibratory stimulation (PVS), 76–7, 142, 244–5
- penis, 7–9  
 erection, 9  
 neuroanatomy, 8–9  
 physical examination, 45–6  
 vascular supply, 7–8
- percutaneous embolization, varicocele, 306
- percutaneous epididymal sperm aspiration (PESA), 215, 250
- Peyronie's disease, 46
- phenytoin, 151
- phosphodiesterase-5 (PDE5) inhibitors, 98–100
- physical examination, 45–7  
 azoospermia, 59  
 digital rectal examination, 47  
 penis, 45–6  
 scrotum, 46–7  
 varicocele, 66
- pituitary gland, 80–1. *See also* hypothalamic–pituitary–gonadal (HPG) axis  
 cranial radiotherapy effects on function, 154–5  
 tumors, 155–6
- platinum analogs, 120–1. *See also specific drugs*  
 CNS tumor treatment, 123
- polycystic ovary syndrome (PCOS), 330
- polyspermia, 27
- postmortem sperm retrieval, 322  
 consent issues, 322–4  
 ethical issues, 324–5  
 legal issues, 325–6  
 logistical issues, 325  
 need for protocols, 326–7
- prednisolone, 115, 299
- prednisone, 115
- pre-implantation genetic diagnosis (PGD), 174, 337
- pre-implantation genetic screening (PGS), 337–8
- premature ejaculation, 243  
 epidemiology associated with infertility, 95
- primary central nervous system lymphoma (PCNSL), 156–7  
 chemotherapy, 157  
 methotrexate, 157  
 procarbazine, 157  
 vincristine, 157
- primary ciliary dyskinesia, 42, 53
- primidone, 151
- procarbazine, 114–15, 120, 157
- procreative right, 232–4
- progenitor spermatogonia, 13–14
- prolactin, 97, 298. *See also* hyperprolactinemia  
 prolactin-secreting adenomas, 156
- prolactinoma, 42, 82
- prostate cancer therapy, 84
- prostate gland, 7  
 examination, 47  
 role in seminal fluid emission, 37  
 seminal components produced, 31
- prostate specific antigen (PSA), 31
- prostatitis, 298–9
- pseudoephedrine, ejaculatory dysfunction treatment, 76
- psychological assessment, 188–9
- psychological consultation, 188–9  
 fertility preservation, 190–1
- psychological issues, 186  
 background, 186–7

- countertransference issues, 192  
 mental health professional  
   collaborative role, 191–2  
 psychosocial and emotional factors,  
 187–8
- psychotropic drugs, anejaculation and,  
 74
- pyospermia, 31, 54
- radiation therapy, 45, 104  
 brain tumors, 152  
 childhood cancer, gonadotoxic  
   effects, 162, 256  
 cranial, effects on pituitary function,  
 154–5  
 female cancers, 275  
 fertility preservation, 145  
 fertility re-establishment, 146–7  
 gliomas, 154–5  
 hypogonadism and, 83–4  
 sperm quality and use following  
   treatment, 315  
   retrieval in azoospermic patients,  
   319  
 spermatogenesis impact, 104–6  
   animal data, 106–7  
   gonadal shielding, 108  
   human data, 107–8  
   versus chemotherapy, 113  
 testicular cancer, 144–5
- rapamycin inhibitors, 122
- reactive oxygen species (ROS)  
 semen, 55  
 varicocele and, 304
- recreational drug use, 43–4
- reproductive history, 40–1
- reproductive specialist identification  
 resources, 181
- retrograde ejaculation, 75, 244  
 bladder sperm harvesting, 77,  
 315–16  
 retrograde semen analysis, 77
- retroperitoneal lymph node dissection  
 (RPLND)  
 ejaculatory dysfunction and, 73, 146,  
 244  
 sperm retrieval, 315–16  
 fertility restoration, 246–7  
   cost-benefit analysis, 247  
   electroejaculation, 247  
   medical management, 246–7  
 following radical orchiectomy,  
 145–6  
 modifications for fertility  
 preservation, 146
- rhabdomyosarcoma (RMS), 124
- rituximab, 157
- sacral parasympathetic nucleus (SPN),  
 35
- salpingitis, 330
- sarcomas  
 bone sarcomas, 125  
   Ewing sarcoma, 125  
   osteosarcoma, 125  
 soft-tissue sarcomas, 124  
 rhabdomyosarcoma (RMS), 124
- scrotum, physical examination, 46–7
- Securin, 16
- seizures  
 anti-epileptic drugs (AED), 150–1  
 with brain tumors, 150
- selective serotonin reuptake inhibitors  
 (SSRIs), 99–101
- selenium, 198–9
- semen. *See also* semen analysis (SA)  
 cancer and cancer therapy impact  
   on, 56  
 collection techniques for sperm  
   banking, 141–2, 215–16  
   ejaculation induction, 246  
 liquefaction, 26  
 pH, 26  
 reactive oxygen species (ROS) levels,  
 55  
 screening, 220–1  
 varicocele effects, 65  
 viscosity, 26  
   hyperviscous semen, 26  
 volume, 25–6  
   low volume ejaculate, 51–2
- semen analysis (SA), 23–5, 32–3. *See  
 also* semen; *specific parameters*  
 abnormal parameters, 51  
 azoospermia, 59  
 biochemical analysis, 31  
 in cancer patients, 31–2  
 macroscopic characteristics, 25–6  
 morphology, 29  
 microscopic characteristics, 26–31  
 anti-sperm antibodies (ASA),  
 30–1  
 computer-assisted sperm  
   assessment (CASA), 28  
 count and concentration, 26–7  
 morphology, 28–9  
 motility, 27–8  
 other cell types, 31  
 viability, 29–30  
 viscosity, 26
- parameters and clinical significance,  
 24  
 predictive parameters, 32  
 reference values, 25  
 retrograde semen analysis, 77  
 sample collection, 25. *See also* sperm  
   retrieval  
 semen heterogeneity, 23–4  
 standard criteria, 23  
 technical considerations, 25  
 varicocele and, 67  
 viability, 30
- semen extenders, 217
- semenogelin, 31
- seminal vesicles, 6–7, 72  
 role in seminal fluid emission, 35  
 seminal components produced, 31
- seminiferous tubules, 3–4, 11, 71
- seminoma, 140. *See also* testicular  
 cancer,  
 radiation therapy, 144
- Separase, 16, 17
- serotonin, ejaculation regulation, 35
- Sertoli cells, 2, 4, 13  
 chemotherapy effects, 115  
 functional impairment, 111–12
- sex-hormone binding globulin  
 (SHBG), 82–3, 266
- sexual dysfunction, 41, 94  
 cancer and cancer therapy effects, 98  
 epidemiology related to infertility,  
 94–5  
 hormonal disorders and, 96–8  
 hypogonadism relationships, 86–7,  
 96–7  
 pharmacotherapy related to  
   infertility, 98–101  
 psychogenic sexual dysfunction and  
   infertility, 95–6
- sickle cell disease (SCD), 42
- sildenafil, 98–9  
 effects on glioma growth, 155
- situational anorgasmia, 244
- smoking, 43
- specialist identification resources,  
 181
- sperm  
 agglutination, 26, 30–1, 53  
 concentration, 26–7  
   fertility relationship, 32  
   nomenclature, 27  
 cryopreservation. *See*  
   cryopreservation of sperm

## Index

- sperm (*cont.*)  
 DNA integrity tests, 55–6  
 epididymal storage, 5–6  
 flagellum, 18–19  
 function tests, 54–5  
 head, 18  
 maturation, 6, 18  
 morphological analysis, 28–9. *See also* teratospermia  
 excess residual cytoplasm, 29  
 fertility relationship, 32  
 head shape defects, 29  
 neck and mid-piece defects, 29  
 tail defects, 29  
 motility, 27–8. *See also*  
 asthenospermia  
 fertility relationship, 32  
 immotile sperm, 28  
 lubricant effects, 41  
 non-progressive motility, 28  
 progressive motility, 28  
 nucleus, 18  
 transport through epididymis, 6  
 viability, 30  
 assessment, 29–30, 55
- sperm banking, 141, 172. *See also*  
 cryopreservation of sperm;  
 fertility preservation  
 barriers to discussion, 172–4,  
 225  
 finding sperm banks, 283  
 importance for cancer patients,  
 224–7  
 sperm collection techniques, 141–2.  
*See also* sperm retrieval  
 testicular cancer patients, 141–2  
 tracking, 221
- sperm chromatin structure assay  
 (SCSA), 55
- sperm count, 26–7. *See also*  
 azoospermia; oligospermia  
 fertility relationship, 32
- sperm donation, 284. *See also* donor  
 insemination  
 cultural differences, 285  
 donor guidelines, 222, 285  
 history of, 284–5  
 payment, 285  
 screening, 285
- sperm penetration assay (SPA), 55
- sperm retrieval. *See also*  
 electroejaculation (EEJ); semen  
 analysis (SA)  
 at orchiectomy, 143–4, 251  
 azoospermic patients  
 following chemotherapy, 316–19  
 following radiotherapy, 319
- bladder sperm harvesting, 77,  
 315–16  
 childhood cancers, 257  
 collection techniques for  
 cryopreservation, 141–2  
 following retroperitoneal or pelvic  
 surgery, 315–16  
 percutaneous testicular and  
 epididymal extraction, 250  
 postmortem retrieval, 322  
 consent issues, 322–4  
 ethical issues, 324–5  
 legal issues, 325–6  
 logistical issues, 325  
 need for protocols, 326–7  
 surgical retrieval of testicular sperm,  
 250–1  
 micro-testicular sperm extraction  
 (microTESE), 147, 251,  
 316–19  
 testicular sperm extraction  
 (TESE), 147  
 surgical retrieval of vasal or  
 epididymal sperm, 250  
 terminally ill patients, 322  
 consent issues, 322–4  
 ethical issues, 324–5  
 testicular cancer patients, 251–3
- sperm wash, 333
- spermatic veins, 64–5
- spermatids, 17–18  
 radiation effects, 105
- spermatocytes, 4, 13
- spermatocytogenesis, 13
- spermatogenesis, 4–5, 13–19, 105,  
 110–12  
 cancer effects, 31–2, 112–13  
 chemotherapy effects, 113, 255–6  
 alkylating agents, 120  
 platinum analogs, 120–1  
 gonadal toxicity model, 203  
 hormonal suppression for fertility  
 preservation, 166–8, 203–4  
 animal studies, 205–6  
 clinical trials, 206–8  
 relationship between animal and  
 human studies, 208–9  
 meiosis, 15–19  
 radiation therapy effects, 104–6, 113  
 animal data, 106–7  
 gonadal shielding, 108  
 human data, 107–8  
 recovery after exogenous  
 testosterone use, 268–9  
 regulation, 19  
 negative feedback, 2  
 requirements for, 266
- spermatogonia, 4, 13, 110–11. *See also*  
 spermatogenesis  
 chemotherapy effects, 113  
 commitment to spermatogenesis,  
 13–14  
 division patterns, 14–15  
 gonadal toxicity model, 203  
 radiation effects, 105  
 animal data, 106–7  
 recovery, 105–6
- spermatogonial stem cells, 14, 105. *See*  
*also* stem cell transplantation  
 stem cell culture, 258–9
- spermatogonial transplantation, 209
- spermatotoxic agents, 43
- spermatozoa, 18. *See also* sperm
- spermiogenesis, 5, 13, 111
- spinal cord injury (SCI)  
 anejaculation and, 73  
 electroejaculation, 247  
 penile vibratory stimulation (PVS),  
 76–7
- spinal cord tumors, 157–8
- stanazolol, 268
- stem cell culture, 258–9
- stem cell transplantation, 131–2. *See*  
*also* hematopoietic stem cell  
 transplantation (HSCT)  
 childhood cancer management,  
 257–8  
 reduced dose intensity (RDI)  
 transplant, 132
- streptozocin, 120
- stress, sexual dysfunction and, 95–6
- subparafascicular thalamus (SPFp),  
 36
- surgical castration, 84
- surgical history, 42–3
- surveillance, following radical  
 orchiectomy, 144
- tamoxifen  
 breast cancer treatment, 277  
 male infertility treatment, 294–5
- taxanes, 121
- temozolomide, 120  
 effects on fertility, 153–4  
 glioma treatment, 152–4
- Ten-step circular process model, 191–2
- teratospermia, 29, 53–4  
 differential diagnosis, 53

- terminally ill patients, 322. *See also*  
 postmortem sperm retrieval  
 consent issues, 322–4  
 ethical issues, 324–5
- TEST yolk buffer (TYB), 217
- testicular artery, 3, 5
- testicular biopsy, 225, 250
- testicular cancer, 44, 104, 140  
 cancer therapy effects, 83  
 chemotherapy, 116, 145  
 radiation therapy, 144–5  
 retroperitoneal lymph node  
 dissection (RPLND), 145–6  
 fertility preservation, 141–6  
 cryopreserved sperm use, 142  
 following radical orchiectomy,  
 144–6  
 partial orchiectomy and, 142–3,  
 251  
 special considerations, 251–3  
 sperm banking prior to treatment,  
 141–2  
 sperm retrieval at orchiectomy,  
 143–4, 251  
 germ cell tumors (GCTs), 140–3  
 infertility relationships, 140–1
- testicular dysgenesis syndrome, 60,  
 104
- testicular failure. *See* hypogonadism
- testicular sperm aspiration (TESA),  
 215
- testicular sperm extraction (TESE),  
 147  
 azoospermia and, 61
- testicular tissue harvesting, 164–6,  
 225–6, 258–9  
 germ cell in-vitro maturation, 166  
 germ cell transplantation, 165–6,  
 226
- testicular torsion, 41
- testicular trauma, 41
- testicular vein, 3
- testis, 2–5  
 blood–testis barrier, 13  
 examination, 46  
 fine-needle aspiration, 250  
 gonadal toxicity model, 203  
 hormonal suppression for fertility  
 preservation, 166–8, 203–4  
 animal studies, 205–6  
 clinical trials, 206–8  
 relationship between animal and  
 human studies, 208–9  
 internal organization, 3–4
- macroscopic anatomy, 11  
 microscopic anatomy, 12–13  
 size, 11  
 spermatogenesis, 4–5  
 surgical sperm retrieval, 250–1  
 varicocele effects, 65  
 vascular supply, 3, 11
- testolactone, 295
- testosterone, 19, 81. *See also* androgen  
 deficiency; hypogonadism  
 aging effects, 82  
 as male contraceptive, 270  
 body composition and, 86  
 cognitive function relationships, 86  
 depression relationships, 86  
 exogenous testosterone use, 265  
 infertility and, 267  
 rebound therapy, 296–7  
 spermatogenesis recovery after,  
 268–9  
 types of supplementation, 268  
 FSH relationships, 2  
 levels, 12, 265  
 diurnal rhythm, 266  
 measurement, 87–8, 293  
 raising endogenous levels, 269–70  
 varicolectomy and, 308–9  
 LH relationships, 2, 19, 81  
 negative feedback, 2  
 male sexual development and, 266  
 oligospermia and, 52–3  
 rebound therapy, 268  
 production, 265  
 secretion, 12  
 sexual function relationships, 86–7,  
 96–7  
 spermatogenesis regulation, 19, 111,  
 266  
 systemic effects, 85  
 varicocele effects, 65
- testosterone replacement therapy, 84,  
 268  
 hypogonadism management, 88, 89  
 infertility and, 101
- thyroid dysfunction, 97–8
- topoisomerase inhibitors, 121
- topotecan, 121
- trabeculae, 7
- transurethral resection of the  
 ejaculatory ducts (TURED), 61
- tricyclic antidepressants, 43
- tubal factor infertility, 330
- tuberculosis, 42
- tunica albuginea, 7
- tyrosine kinase inhibitors, 122
- ultrasonography, varicocele  
 investigation, 66–7
- urethra role in seminal fluid expulsion,  
 35
- urethral manipulation syndrome,  
 46
- urethritis, 298
- uterine irradiation, 275
- vaginal irradiation, 275
- valproic acid, 151
- varicocele, 47, 52, 64, 66, 303–4  
 clinical features, 65  
 considerations with cancer, 67–8  
 diagnosis, 304  
 epidemiology, 303  
 evaluation, 66–7  
 pathophysiology, 64–5, 304  
 treatment, 68, 305–6, 307  
 indications, 67–8, 305  
 percutaneous embolization, 306  
 surgery, 305–6
- varicolectomy, 305–6  
 azoospermia and, 307–8  
 efficacy, 306–7  
 hypogonadism and, 308–9  
 reproductive technology and,  
 309–10
- vas deferens, 6, 72  
 absence of, 46–7  
 examination, 46–7  
 role in seminal fluid emission, 35  
 surgical sperm retrieval, 250
- vasectomy, 43
- vinblastine, 115
- Vinca alkaloids, 121
- vincristine, 115, 157
- vitamin C, 199–200, 297  
 sources, 199
- vitamin E, 198–9, 297
- vitrification  
 oocytes, 277  
 ovarian tissue, 278  
 sperm, 219–20
- Wilms' tumor, 123–4
- Wolffian duct, 7
- Y-chromosome microdeletions, 60
- Young's syndrome, 42
- zona pellucida (ZP), 336