Authors	Year	Method	Hypervariable regions	N° of patients	Cohort characteristics	Most represented bacterial taxa	
Hou et al. [3]	2013	Roche 454 GS-FLX (pyrosequencing)	V1-V2	77	Healthy subjects (n= 19) Asthenozoospermia (n= 10) Oligoasthenozoospermia (n= 23) Oligoasthenozoospermia and azoospermia (n= 25)	*PHYLA:* *Firmicutes, Proteobacteira, Actinobacteria, Bacteroidetes* *GENERA:* *Lactobacillus, Corynebacterium, Streptococcus, Staphylococcus, Prevotella, Finegoldia, Anaerococcus, Peptoniphilus, Incertae Sedis XI (family), Veillonella, Pelomonas, Porphyromonas, Acidovorax, Atopobium, Ureaplasma, Bradyrhizobium, Aerococcus, Gemella, Granulicatella, Clostridiales, Cloacibacterium, Ralstonia.*	
Weng et al. [28]	2014	Illumina MiSeq	V4	96	Normal spermatozoa (n= 36)	*GENERA:* *Lactobacillus, Gardnerella, Propionibacterium, Atopobium* *SPECIES:* *Lactobacillus crispatus, Gardnerella vaginalis, Lactobacillus acidophilus, Uncultured gardnerella sp., Atopobium vaginae, Pseudomonas sp. ps10-13*	*GENERA:* *Lactobacillus, Pseudomonas, Prevotella, Gardnerella, Rhodanobacter, Streptococcus, Finegoldia, Haemophilus* *SPECIES:* *Lactobacillus iners, uncultured Prevotella sp., uncultured Gardnerella sp., Lactobacillus sp., uncultured Pseudomonas sp., Prevotella bivia*
					Abnormal sperm: volume (n= 10), concentration (n= 13), motility (n= 12), morphology (n= 44), ASAB (n= 10), leukocytospermia (n= 18)	*GENERA:* *Prevotella, Pseudomonas, Haemophilus, Aggregatibacter,* *Finegoldia, Rhodanobacter, Corynebacterium, Streptococcus, Campylobacter, Peptoniphilus, Brevibacterium, Pasteurella, Sphingobium, Dermococcus, Aggregatibacter, Varibaculum* *SPECIES:* *Prevotella bivia, Haemophilus parainfluenzae, Arthrobacter sp. Zn12, Sphingobium estrogenivorans, Varibaculum cambirense, Prevotella sp. BV3C7, Actinomyces sp., Prophyromonas somerae.*	
Chen et al. [29]	2018	Illumina HiSeq 2000 platform	V4	17	Healthy subjects (n= 5)	*GENERA:* *Alicyclobacillus, Amaricoccus, Anaeromyxobacter, Aquicella, Arsenicicoccus, Azospirillum, Chitinimonas, Chlorobacillus, Coprococcus, Desulfovibrio, Dokdonella, Gallionella, Geobacter, Helicobacter, Idiomarina, Kaistia, Kribbella*	*PHYLA:* *Firmicutes, Proteobacteria, Bacteroidetes, Actinobacteria*

					Obstructive azoospermia (n= 6)	*GENERA:* *Solibacillus, Campylobacter, Campylobacteraceae, Plesiomonas, Alicyclobacillus*	*GENERA:* *Alicyclobacillus, Amaricoccus, Anaeromyxobacter, Aquicella, Arsenicicoccus, Azospirillum, Chitinimonas, Chlorobaculum, Coprococcus, Desulfovibrio, Dokdonella, Gallionella, Geobacter, Helicobacter, Idiomarina, Kaistia, Kribbella*	*GENERA:* *Lactobacillus, Prevotella, Proteus, Pseudomonas, Veillonella, Corynebacterium, Rhodococcus, Staphylococcus, Bacillus*
					Non-obstructive azoospermia (n= 6)	*GENERA:* *Sneathia, Lysobacter sp*		
Monteiro et al. [30]	2018	Ion Torrent (Ion PGM)	V3-V6	118	Healthy subjects (n=29)	*GENERA:* *Enterococcus, Lactobacillus, Staphylococcus, Anaerococcus, Peptoniphilus*	*PHYLA:* *Firmicutes, Proteobacteria, Actinobacteria, Bacteriodetes, OD1* *FAMILIES:* *Caulobacteraceae, Pasteurellaceae, Enterobacteriaceae, Flavobacteriaceae, Actinomycetaceae* *GENERA:* *Enterococcus, Staphylococcus, Anaerococcus, Corynebacterium, Peptoniphilus, Propionibacterium, Aerococcus, Facklamia, Pseudomonas, Klebsiella, Haemophilus, Aggregatibacter*	
					Oligoasthenoteratozoospermia (n= 45)	*GENERA:* *Enterococcus, Pseudomonas, Klebsiella, Aerococcus, Flackamia*		
					Asthenoteratozoospermia (n= 15)	*FAMILIES:* *Gemellaceae* *GENERA:* *Enterococcus, Staphylococcus, Anaerococcus, Pseudomonas, Klebsiella*		
					Semen hyperviscosity (n= 29)	*PHYLA:* *Proteobacteria* *GENERA:* *Pseudomonas, Klebsiella, Enterococcus, Acinetobacter, Neisseria*		
Baud et al. [31]	2019	Illumina MiSeq	V1-V2	94	Normal spermatozoa (n= 24)	*GENERA:* *Staphylococcus, Lactobacillus*	*PHYLA:* *Actinobacteria, Bacteroidetes, Firmicutes, Proteobacteria*	

					Abnormal spermatozoa (n= 68): (count, concentration, progressive motility, total motility, morphology)	*GENERA:* *Prevotella*	*GENERA:* *Corynebacterium, Prevotella, Lactobacillus, Streptococcus, Staphylococcus, Planococcusaceae, Finegoldia, Haemophilus, Burkholderia*	
Yang et al. [32]	2020	Illumina HiSeq 2500 system	V1–V2	159	Healthy controls (n= 58)	*GENERA:* *Pelomonas, Propionibacterium, Bosea, genosp, Bosea, Afipia, Sphingomonas, Vogesella, Brevibacillus, Xylanimicrobium, Flexispira, Pedomicrobium, Phyllobacterium, Aquimonas, Dietzia, Sediminibacterium, Mycobacterium, Eikenella.* *SPECIES:* *Brevibacterium aureum, Propionibacterium acnes, Corynebacterium simulans, Eubacterium dolichum, and Bacillus thermoamylovorans*		
					Oligoasthenospermia (n= 22)	** GENERA:* *Ralstonia, Oscillospira, Parabacteroides, Lachnospira, Phascolarctobacterium, Chryseobacterium, Zoogloea, Ruminococcus, Stenotrophomonas, Actinoplanes, Mycoplana, Delftia, Sneathia, Megasphaera, Atopobium, Faecalibacterium, Bacteroides, Lactobacillus.* **SPECIES:* *Bacteroides uniformis, Stenotrophomonas panacihumi, Bacteroides*	*GENERA* *Lactobacillus, Bacteroides, Delftia, Sneathia, Enhydrobacter, Anaerococcus, Mycoplana, Finegoldia, Stenotrophomonas, Methylobacterium, Coprobacillus, Aerococcus, Atopobium, Chryseobacterium, Kocuria, Megasphaera, Ralstonia, Achromobacter, Erwinia, Ureaplasma, FilifactoR* *SPECIES:*	*PHYLA:* *Proteobacteria, Firmicutes, Actinobacteria, Bacteroidetes, Fusobacteria* *GENERA:* *Lactobacillus, Corynebacterium, Acinetobacter, Prevotella, Enterococcus, Veillonella, Streptococcus, Porphyromonas, Sneathia, Pelomonas*

						plebeius, Prevotella copri, and Faecalibacterium prausnitzii	*Prevotella copri, Saccharopolyspora hirsuta, Kocuria palustris, Prevotella nigrescens, Porphyromonas endodontalis, Lactobacillus coleohominis, Bacteroides barnesiae, Lactobacillus iners*	
					Asthenospermia (n= 58)	**GENERA: Sneathia, Ralstonia, Ureaplasma, Bacteroides, Chryseobacterium, Aerococcus, Enhydrobacter, Methylobacterium, Anaerococcus, Stenotrophomonas, Mycoplana, Delftia, Finegoldia, Corynebacterium, Lactobacillus (at the genus level),* **SPECIES Saccharopolyspora hirsute, Acinetobacter lwoffii, Lactobacillus iners*		
					Azoospermia (n= 8)	*No significant differences compared to healthy controls*		
					Oligospermia (n= 13)	*No significant differences compared to healthy controls*		
Okwelogu et al. [34]	2021	Illumina NextSeq 500	V4	36	Positive IVF	*SPECIES: Lactobacillus jensenii, Faecalibacterium*		
					Negative IVF	*PHYLA: Proteobacteria* *GENERA Prevotella, Escherichia, Bacteroides,*		

Garcia-Segura et al. [36]	2022	Illumina MiSeq	V1-V9	56	Normozoospermic semen donors (n= 14)	*FAMILIES:* *Propionibacteriaceae* *GENERA:* *Cutibacterium, Rhodopseudomonas, Oligotropha*	*PHYLA:* *Firmicutes, Proteobacteria, Actinobacteria, Bacteroidetes* *GENERA:* *Finegoldia, Peptoniphilus, Anaerococcus, Campylobacter, Streptococcus, Staphylococcus, Moraxella, Prevotella, Ezakiella, Corynebacterium, Lactobacillus*
					Idiopathic normozoospermic infertile patients (n= 42)	*FAMILIES:* *Phylobacteriaceae, Vibrionaceae,*	
Bukharin et al. [33]	2022	Illumina MiSeq	V1-V2, V3-V4	72	Healthy subjects (n= 30)	*GENERA:* *Staphylococcus, Corynebacterium, Enterococcus, Neisseria, Veillonella,*	
					Infertile subjects (n= 42)	*GENERA:* *Staphylococcus, Corynebacterium, Enterococcus, Streptococcus, Escherichia, Actinomyces, Bacillus, Klebsiella, Pseudomonas, Propionibacterium*	
Gachet et al. [7]	2022	Illumina MiSeq	V1-V3	91	Normozoospermic infertile patients (n= 38)	*Mobiluncus, Finegoldia, Cutibacterium, Gordonia*	*GENERA:* *Prevotella, Finegoldia, Pseudomonas, Peptinophilus, Streptococcus , Anaerococcus, Corynebacterium*
					Infertile patients with abnormal spermatozoa parameters (count, motility, morphology) (n=53)	*Haemophilus*	
Cao et al. [39]	2023	Illumina MiSeq	V3-V4	53	Healthy subjects (n= 12)		*PHYLA:* *Firmicutes, Bacteroidetes, Actinobacteriota, unidentified phyla* *GENERA:* *Lactobacillus, Prevotella, Finegoldia, Staphylococcus, Streptococcus, Ureaplasma, other unidentified bacteria*
					Asthenzoospermia (n= 12)	*GENERA:* *Staphylococcus*	
					Oligospermia (n= 6)	*GENERA:* *Bacillus*	
					Severa oligospermia or azoospermia (n= 9)		
					Semen hyperviscosity (n= 14)	*GENERA:* *Staphylococcus*	
Campbell et al. [41]	2023	Illumina MiSeq	V1-V2	33	Healthy subjects (n= 19)	*PHYLA:* *Proteobacteria, Firmicutes* *GENERA:*	*GENERA:* *Enterococcus*

						Ideonella, Raoultella, Sneathia	
					Idiopathic NOA (n= 14)	*GENERA:* *Escherichia/Shigella, Ureaplasma*	
Chen et al. [37]	2023	Illumina NovaSeq 6000	V3-V4	60	Helahty subjects (n= 30)	*GENERA:* *Bifidobacterium, Ruegeria*	*PHYLA:* *Bacteroidota, Firmicutes, Proteobacteria* *GENERA:* *Bacteroides, Prevotella, Muribaculaceae, Lactobacillus, Faecalibacterium, Escherichia-Shigella*
					NOA (n= 30)	*GENERA:* *Bacteroides, Escherichia–Shigella, Ruegeria, Donghicola*	
Fu et al. [38]	2024	Illumina NovaSeq 6000	V3-V4 or V4-V5	28	Healthy subjects	*PHYLA:* *Firmicutes, Bacteroidota, Proteobacteria, Actinobacteriota, Campylobacterota* *GENERA:* *Fenollaria, Campylobacter, Peptoniphilus, Negativicoccus, Prevotella, Porphyromonas, Muribaculaceae, Bacteroides, Mobiluncus, Varibaculum* .	
Osadchyi et al. [47]	2024	Illumina MiSeq	V1-V2	73	Normozoospermic (n= 42)	*Staphylococcus hominis, Pseudomonas putida*	*SPECIES:* *Enterococcus faecalis, Corynebacterium tuberculostearicum, Lactobacillus iners, Staphylococcus epidermidis, Finegoldia magna*
					Abnormal spermatozoa parameters (n= 31)	*Peptoniphilus coxii, Lactobacillus iners, Paraburkholderia phenazinium, Pseudomonas fluorescens, Pseudomonas stutzeri*	
Mowla et al. [40]	2025	MiSeq	V1-V2	223	Healthy controls (n= 63)	*GENERA:* *Streptococcus, Prevotella, Lactobacillus/Gardnerella*	
					Male partners in couples with recurrent pregnancy loss (n= 46)		
					Men with male factor infertility (n= 58)		
					Male partners of couples with unexplained infertility (n= 56).		
Yao et al. [35]	2025	Illumina NextSeq 2000	5R (5 regions: V2, V3, V5, V6, V8)	40	Healthy subjects (n= 14)	*SPECIES:* *Providencia vermicola, Bacillus methylotrophicus, Enterobacter cloacae, Enterobacter asburiae*	*PHYLA:* *Proteobacteria, Firmicutes, Bacteroidetes, Actinobacteria*

					Idiopathic infertility (n= 26)	*SPECIES: Providencia rettgeri, Prevotella bivia, Prevotella timonensis, Streptococcus mitis Providencia alcalifaciens, Acinetobacter schindleri Enterococcus*	

**Taxa significantly more abundant in the analyzed group compared to healthy controls (beta-diversity)*

Supplementary Table 1. Characteristics of studies performed on seminal samples analyzing bacterial microbiota using Next Generation Sequencing (NGS) methods, from 2013 to 2025.