

Birth Puberty

Spermatogenesis

Fertilization

Implantation

Mouse (days)	E7.5	E12.5	4-6 weeks	35 days			E3.5	E7.5
Human (weeks)	G4 G7	G11 G16	12-14 years	74 days			G1	

Primordial Germ Cell Development

PGC Specification Prospermatogonia

Spermatocytogenesis

Spermatogonia		Spermatocyte		Spermatid		Spermatozoon	Epididymal Maturation
Type A	Type B	Primary	Secondary	Round	Elongated		

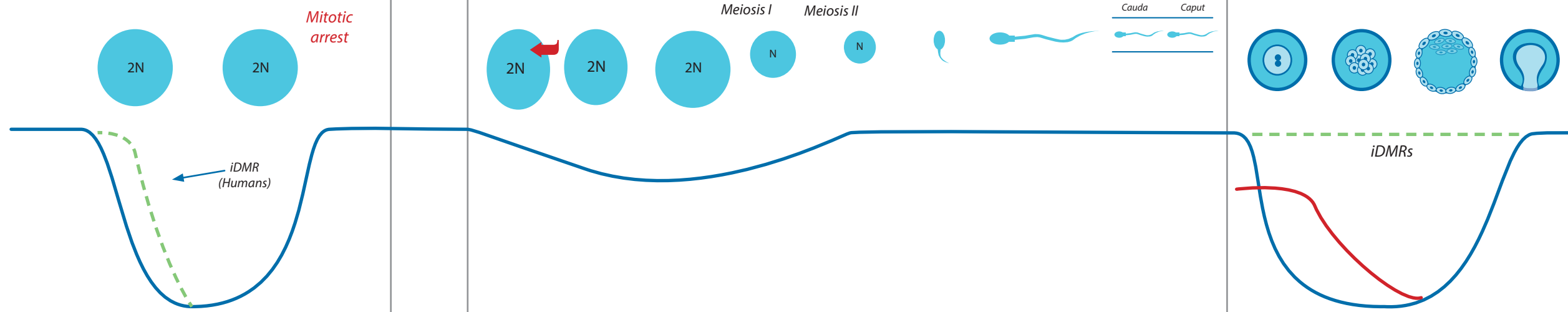
Spermiogenesis

Spermatid		Spermatozoon	Epididymal Maturation
Round	Elongated		

Early Life Development

Fertilized Egg Morula Blastocyst Gastrulation

DNA METHYLATION CONTENT



1. Embryonic And PGC Reprogramming

- Imprinted DMRs and global methylation erasure
- H3 H4 de-acetylation
- H3K4, H3K9, H3K27 methylation
- H2A.Z. replacement
- Establishment of Paternal Specific Imprints?

2. Prepubertal Clonal Expansion

3. Final DNA Methylation Profiles Acquired

BORIS– CTCF Transition

- Passive demethylation
- De novo methylation
- Establishment of Paternal Specific Imprints?

4. Histone Protamine

- Histones H1, H2A, H2B, H3 replaced by sperm variants
- H4K5 and H4K8 tails
- Hyperacetylation of histone tails
- Insertion of transition proteins
- Insertion of protamines (PRM1/PRM2)

5. Epididymal Maturation

- Epididymal-specific exosomes facilitate acquisition of new proteins and RNAs

6. Post-Fertilization

- Protamines replaced with oocyte histones
- Demethylation of inherited parental genomes
- ♂ Active
- ♀ Passive
- Remethylation in epiblast
- Resistant to epigenetic re-programming