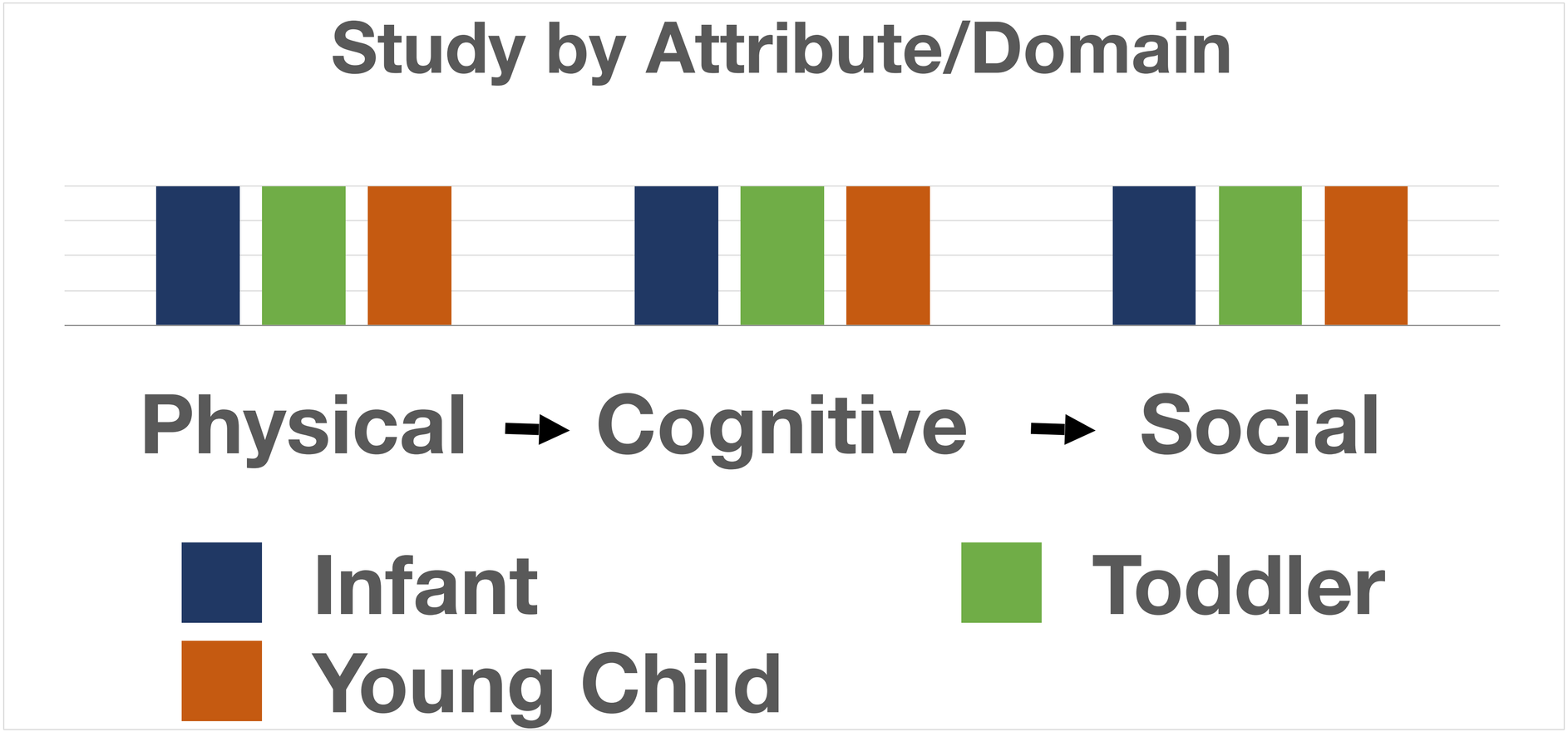
3. Biological Development Throughout the Lifespan

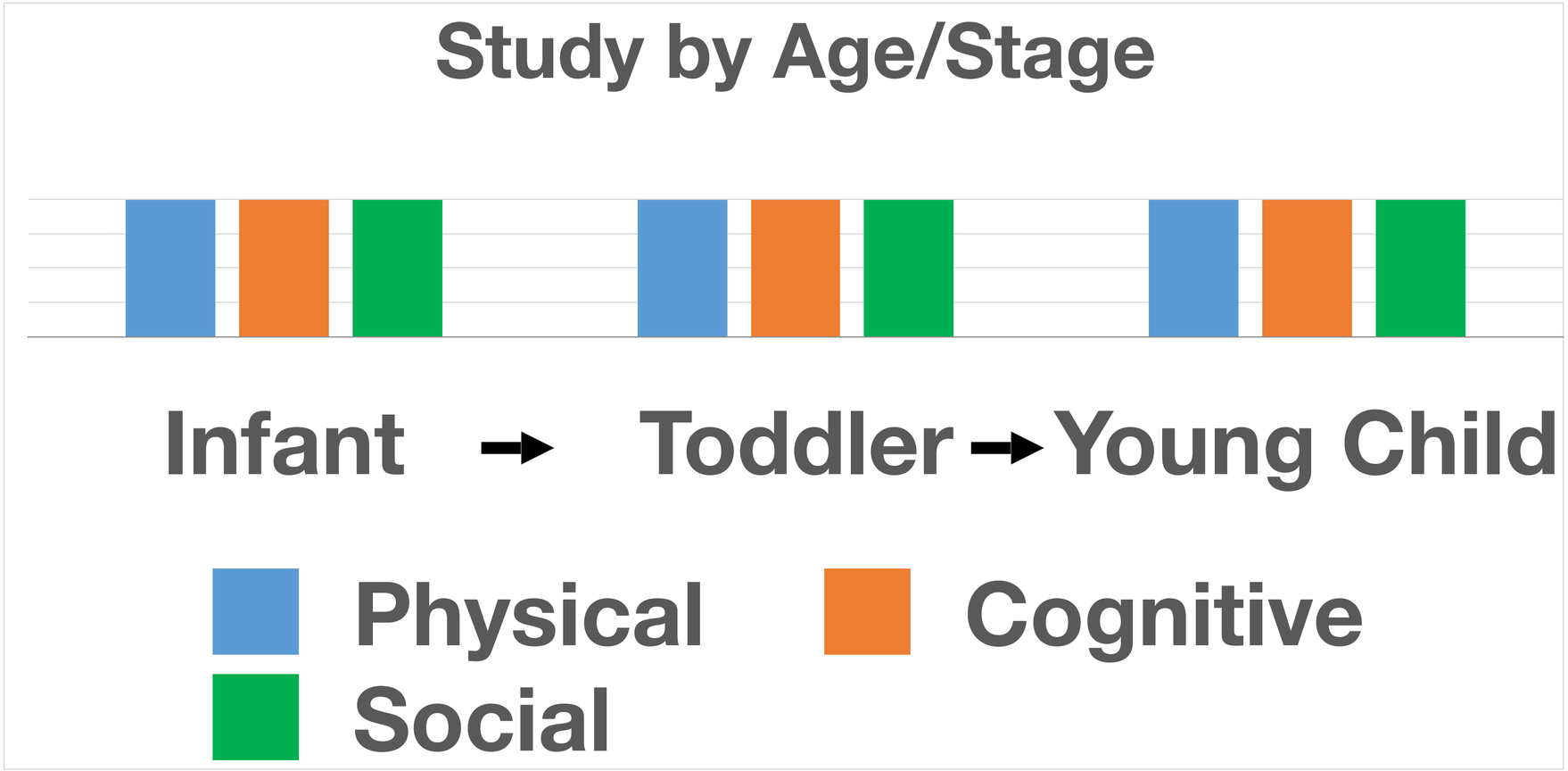
Two Ways to Study Human Development

#1



Two Ways to Study Human Development

#2



3.1 Heredity, Genetics, and Genetic Testing

3.2 Genetic Disorders

3.3 Development of the Brain and Nervous System

3.4 Hormonal Influences

3.5 Prenatal Influences

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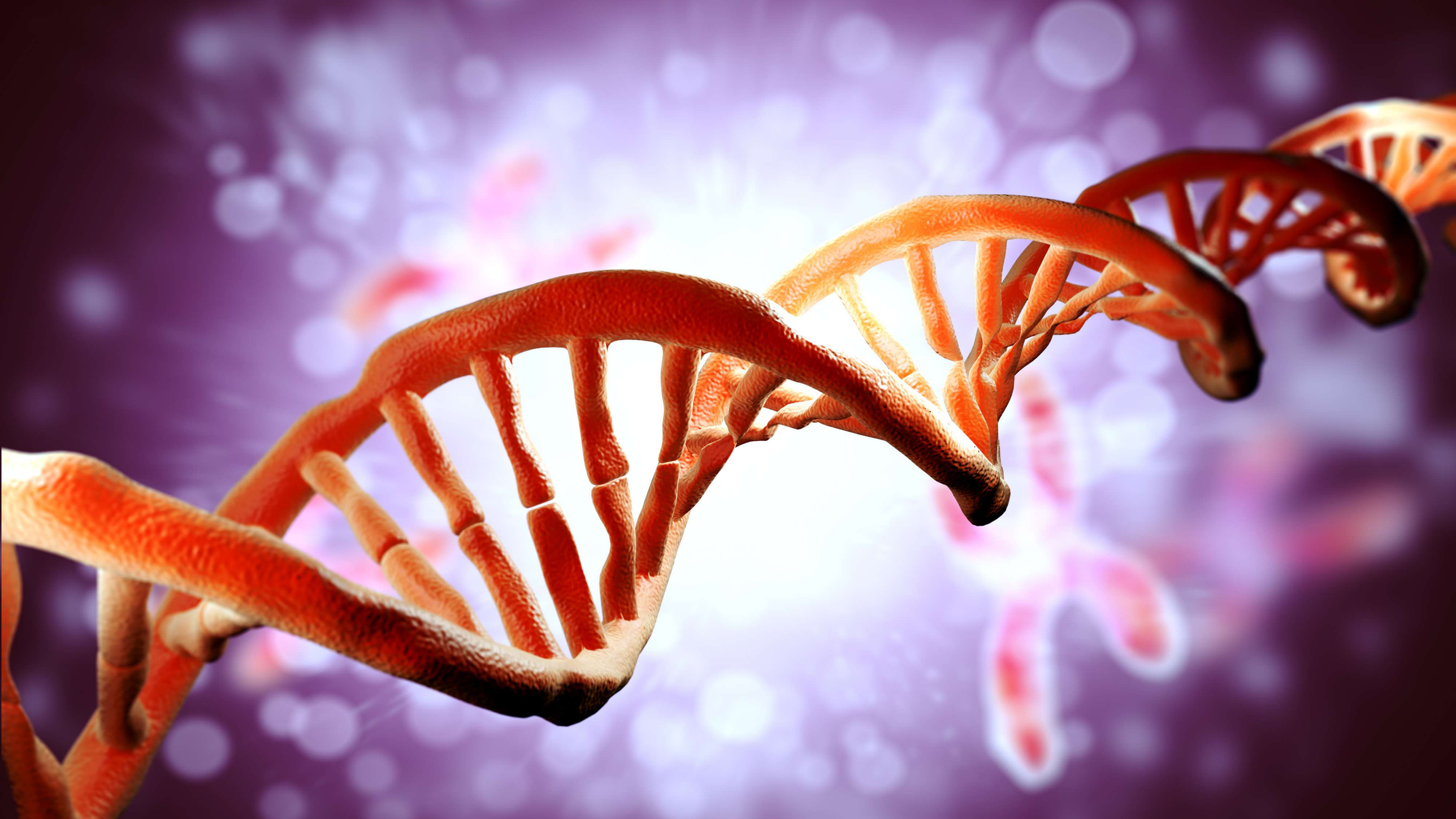
3.10 Motor Development

3.11 Physical Growth, Maturation, and Aging

3.12 Sexual Maturation

3.1 Heredity, Genetics, and Genetic Testing



Inherited traits

- Genetic code on chromosome pairs
- Egg/sperm have half chromosomes to match

Inherited traits

- Sex-determining chromosome pair:
  - XX = female
  - XY = male
  - Sperm determines sex

Chromosomes and traits

- X chromosome has female traits
- Y has male traits
- On other chromosome pairs, traits determined by dominant gene

Chromosomes and traits

- Traits to be analyzed
  - Allosomal = on sex chromosome
  - Autosomal = on all other chromosomes
  - Example: red/green color-blindness is autosomal (not sex-linked)

Genetic testing

- Amniocentesis to find genetic anomalies on chromosomes
- During weeks 14-16 of pregnancy
- Amniotic fluid drawn to analyze genetic codes on chromosomes

Amniocentesis results

- Test can determine range of genetic flaws and known abnormalities
  - Down syndrome
  - Blood type mismatch
  - Neural tube defects, e.g. spina bifida

3.2 Genetic Disorders

Genetic abnormalities

- From genes on sex chromosome or from autosomes
- From mutations in DNA

Genetic abnormalities

- Examples:
  - Down syndrome
  - Hemophilia
  - Muscular dystrophy
  - Culture-specific diseases

3.3 Development of the Brain and Nervous System

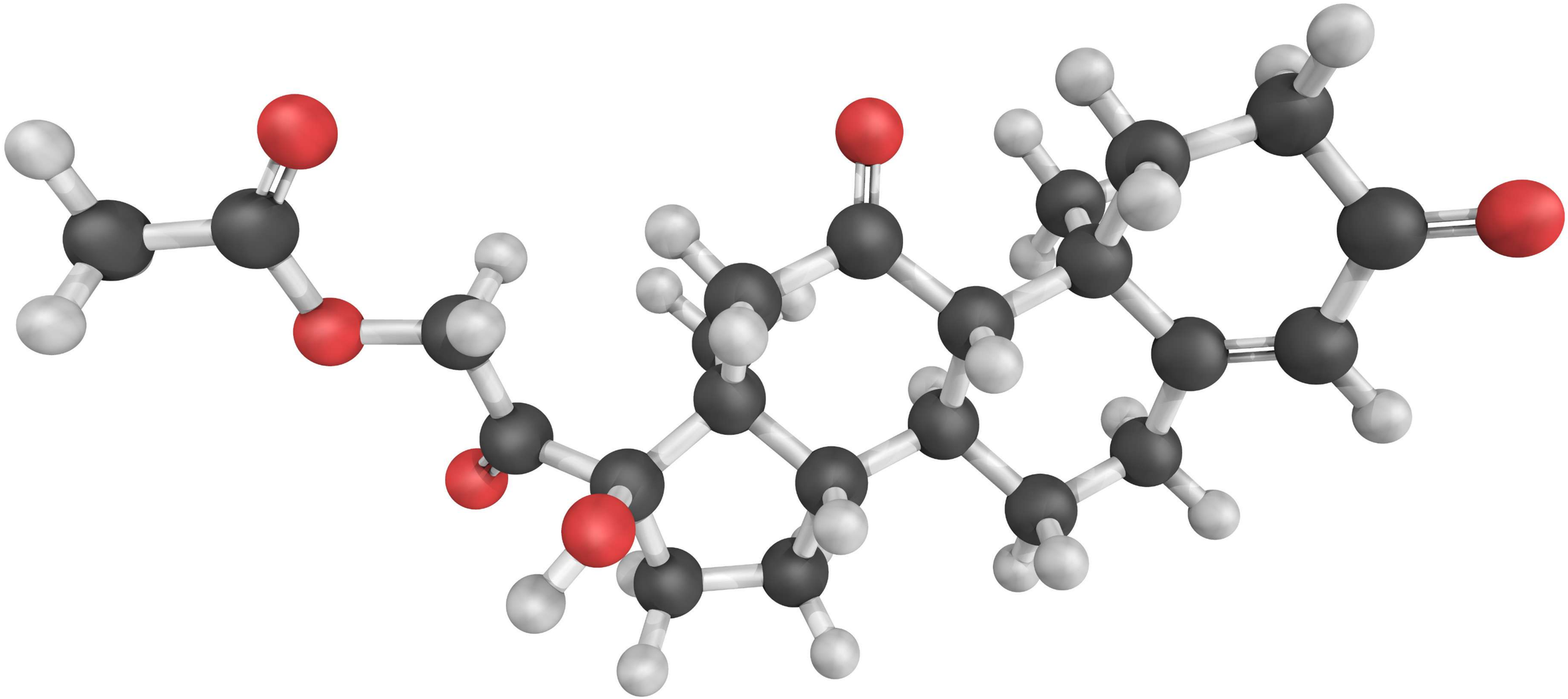
Prenatal stages

- Zygote: single cell
- Blastocyst: cell cluster
- Embryo: Differentiated endoderm, mesoderm, ectoderm (weeks 3-12)

Prenatal stages

- Spinal cord and brain emerge weeks 4-5
- Neurons migrate to specific brain areas

3.4 Hormonal Influences



Hormones in pregnancy

- Hormones: chemicals from glands that trigger body reactions
- Preparation of womb
- Sex determination
- Preparation of mother’s milk

3.5 Prenatal Influences

Prenatal influences

- Environmental: air, water, soil
- Ingested/injected: food, drugs
- Mother’s health: wellness, disease
- Emotional/attitudinal: factors that cause +/- hormone release

3.6 Teratogens

Teratogens: negative influences

- Environmental toxins e.g. pollutants in air, water
- Consumed substances e.g. alcohol, nicotine
- Diseases e.g. rubella, HIV
- Embryonic stage most vulnerable → women may not know of pregnancy

Teratogen effects

- Death, malformation, growth retardation, or functional defect
- Effects influenced by
  - Timing of exposure
  - Amount of exposure
  - Genetics (from twin studies)
  - Males more susceptible

3.7 Influences of Drugs

Pregnancy and drugs

- Prescribed: may give more benefit than risk
- Alcohol → fetal alcohol syndrome (spectrum)
- Nicotine → low birth weight, preterm delivery, sudden infant death

Pregnancy and drugs

- Recreational drugs
  - Cocaine → low birth weight, stillbirth, spontaneous abortion
  - Marijuana (heavy use) → brain damage
  - Heroin → addiction passed to child

3.8 Nutritional Influences

Pregnancy nutrition

- Extra nutrients for mother's tissue and to avoid low birth weight
- Nutrients to be monitored or supplemented
  - Folic acid, iodine for neural support
  - Vitamin D for bones
  - Iron for blood

3.9 Perinatal Influences

Perinatal factors

- From 6th month through 1st week after birth
- Birthing options and risks
  - Home with midwife
  - Birthing center
  - Hospital
- Postpartum depression
  - Sadness, fatigue, worry about caring/harming

3.10 Motor Development

Motor development

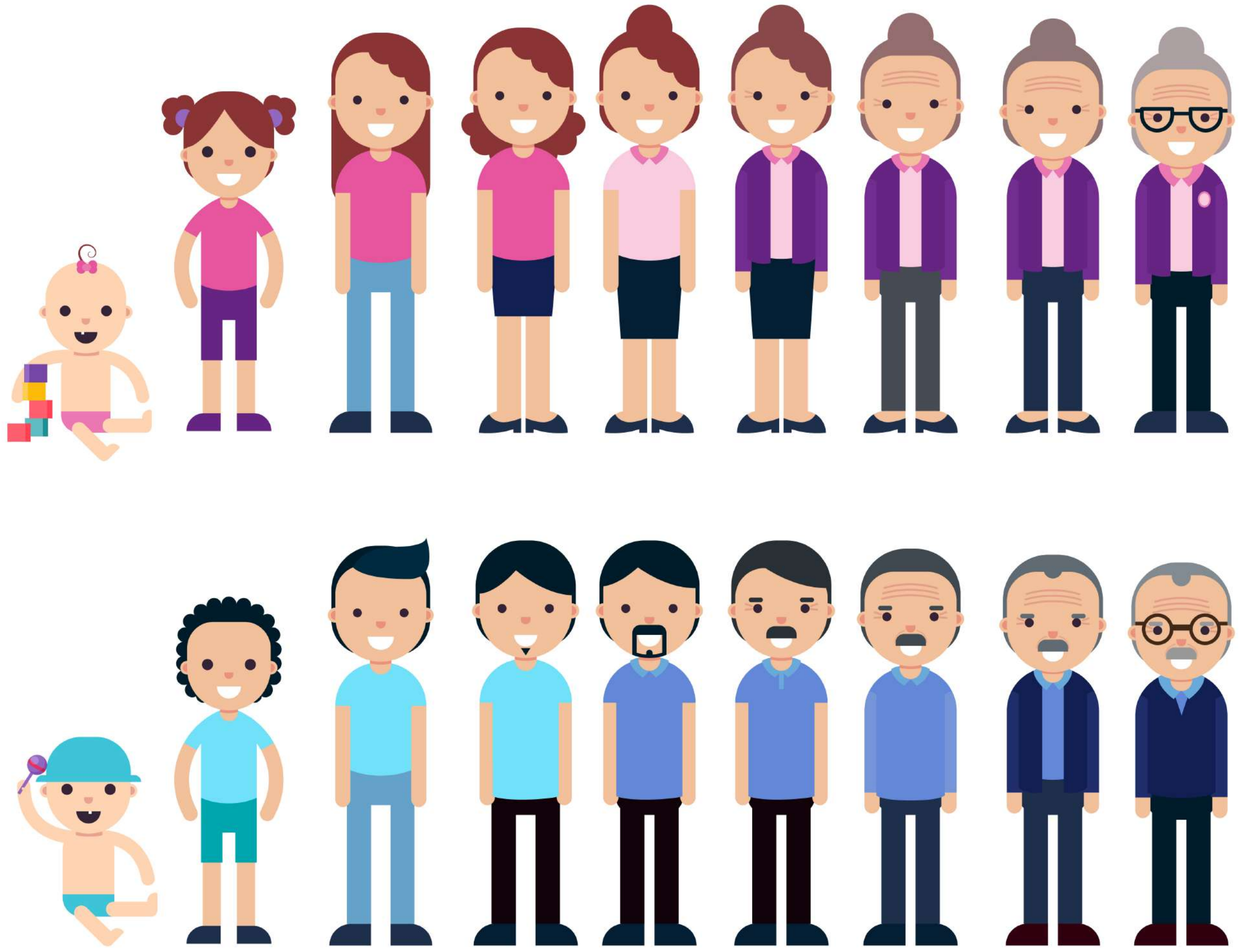
Newborn reflexes (not intentional)

- Moro (startle)
- Walking
- Rooting (turn to stroke)
- Palmar (grasp)
- Plantar (flex down)
- Babinski (flex up)

Voluntary movement

- **Proximodistal development = gross and close (leg/arm) before fine and far (toes/fingers)**
- **Scooting, standing, crawling, hand/mouth manipulating**
- **Walk & first words around age 1**

3.11 Physical Growth, Maturation, and Aging



First 2 years

- Rapid growth and weight gain
- If not, even with good nutrition → failure to thrive
- Change body proportion
- Body “catches up” with head size

Childhood

- Early childhood
  - Control of large motor
  - Start controlling small motor
- Middle childhood
  - Gain muscle strength
  - Large/small motor mastery

Adolescence and Young Adulthood

- Gain to full height
- Muscle maturity → peak
- Sexual maturity → peak

Middle Adulthood

- Weight gain
- Joint deterioration
- Presbyopia (lens hardening → near-sighted)

Middle Adulthood

- Hearing loss
- Sexual changes
  - Menopause in women
  - Andropause in men

Late Adulthood

- Primary aging
  - Continued from middle adulthood
  - Graying/thinning hair
  - Thinning of skin
  - Loss of height
  - Muscle loss

Late Adulthood

- Secondary aging from disease
  - Arthritis
  - Diabetes
  - Hypertension
  - Heart disease

3.12 Sexual Maturation

Primary sex features

- Females enter puberty 2 years earlier than males
- Menarche earlier from higher nutrients/fats
- Females: estrogen and progesterone → develop ovaries, uterus, vagina
- Males: testosterone → enlarged penis/testicles

Secondary sex features

- Females: breasts, hips
- Males: Adam’s apple, voice change, facial hair
- Both: pubic/underarm hair, change sweat glands