VACCINE: _______ Diphtheria ______________

a. Describe the disease agent, disease transmission (R0 and percent vaccinated required for herd immunity), and disease symptoms.

Disease agent: Bacterium (*Corynebacterium diphtheria*)

R0: 6-7

Percent required for herd immunity: 85%

Transmission: respiratory droplets

Symptoms: fever, chills, fatigue, bluish skin, swelling of lymph nodes, thick gray membrane covering your nasal tissues, tonsils, larynx and/or pharynx, nasal discharge, sore throat, loss of appetite, myocarditis, neuritis, ear infection

b. What type of vaccine exists for this disease? Is it a toxoid, attenuated virus, killed virus, subunit, or another type of vaccine?

Type of vaccine: DTaP, TDaP; toxoid

c. What were some milestones in the development of the vaccine? Who was responsible for each milestone?

5th century – Hippocrates documents diphtheria

1883 – Bacteria identified by E. Klebs and F. Loffler

1888 – Properties of the bacterium are defined by A. Yersin and E. Roux

1890 – S. Kitasato and E. von Behring immunize guinea pigs with heat-treated diphtheria (von Behring would go on to win the first Nobel Prize in medicine in 1901 for his work)

1894 – Early use of antitoxin in the U.S., regulation of vaccine, scaling up vaccine production

1913 – The Schick Test is developed to test if a person developed immunity to diphtheria

1920s – First diphtheria toxoid vaccine was produced (W. Park) and mass immunization beings

1964 – Adjuvant added the DTP vaccine

d. Is the vaccine part of the regular immunization schedule for children or adults, or is it given only in special circumstances? Describe.

Regular; first dose @ 2 mos., five doses total; part of the TDaP vaccine
VACCINE: __________ Measles ______________

a. Describe the disease agent, disease transmission (R0 and percent vaccinated required for herd immunity), and disease symptoms.

Disease agent: virus (*morbillivirus*)

R0: 12-18

Percent required for heard immunity: >90%

Transmission: direct contact and through the air (mucus membranes)

Symptoms: high fever, cough, runny nose, red/watery eyes, small dots on cheeks, rash lasting up to two weeks, diarrhea, ear infection

b. What type of vaccine exists for this disease? Is it a toxoid, attenuated virus, killed virus, subunit, or another type of vaccine?

Type of vaccine: live, attenuated virus

c. What were some milestones in the development of the vaccine? Who was responsible for each milestone?

9th century – first written account

1912 – U.S. declared this to be a nationally notifiable disease

1916 – Measles-specific antibodies identified in blood of people who already had measles

1954 – J. Enders and T. Peebles isolate virus

1958 – First measles vaccine tested (S. Katz and T. Peebles)

1963 – Measles vaccine licensed (J. Enders)

1968 – Weaker measles vaccine developed by M. Hilleman

d. Is the vaccine part of the regular immunization schedule for children or adults, or is it given only in special circumstances? Describe.

Standard; given at 6 months of age; part of the MMR vaccine
a. Describe the disease agent, disease transmission (R0 and percent vaccinated required for herd immunity), and disease symptoms.

**Disease agent:** virus

**R0:** \(6-7\)

Percent required for heard immunity: \(~85\%\) however, high-risk groups and sexual activity may vary this number among populations

**Transmission:** sexual

**Symptoms:** can cause genital warts and cervical, vulva, vagina, penis, anus, throat, or oropharyngeal cancer

b. What type of vaccine exists for this disease? Is it a toxoid, attenuated virus, killed virus, subunit, or another type of vaccine?

**Type of vaccine:** subunit (2 approved: Gardasil and Cervarix)

c. What were some milestones in the development of the vaccine? Who was responsible for each milestone?

1976 – H. Zur Hausen publishes theoretical link between HPV and cervical cancer

1983-4 – H. Zur Hausen identifies HPV16 and HPV18 in cervical cancers

Mid 1980’s – Work was initiated to develop a vaccine (I. Frazer and J. Zhou)

2006 – Gardisil approved

2007 – GlaxoSmithKline released in Australia and approved in the U.S. in 2009

2008 – H. Zur Hausen wins the Nobel Prize in physiology or medicine for HPV work

d. Is the vaccine part of the regular immunization schedule for children or adults, or is it given only in special circumstances? Describe.

It was originally approved for use in girls but now recommended as part of the regular immunization schedule for girls and boys aged 11-12 years. Catch-up vaccination is recommended for males through age 21 and females through age 26.
VACCINE: ____________ Hepatitis B ______________

a. Describe the disease agent, disease transmission (R0 and percent vaccinated required for herd immunity), and disease symptoms.

Disease agent: dsDNA virus

R0: ~1.5-1.7

Percent required for heard immunity: unclear

Transmission: attacks the liver, spread by bodily fluid; 2 forms (acute and chronic)

Symptoms: jaundice, fatigue, nausea, dark urine

b. What type of vaccine exists for this disease? Is it a toxoid, attenuated virus, killed virus, subunit, or another type of vaccine?

Type of vaccine: subunit

c. What were some milestones in the development of the vaccine? Who was responsible for each milestone?

1963 – B. Blumberg discovered “Australia Antigen” in the serum of an aboriginal person

1968 – A. Prince identified this as the virus hepatitis B

Late 1970’s – M. Hilleman purified Hep B from blood and performed first trials in humans

1976 – B. Blumberg wins the Nobel Prize in physiology or medicine for his work on Hep B

1986 – Blood-derived vaccine withdrawn and recombinant protein/subunit vaccine takes over

1981 – Vaccine approved

d. Is the vaccine part of the regular immunization schedule for children or adults, or is it given only in special circumstances? Describe.

Standard; first dose – birth, second dose – 1-2 months, third dose – 6 months
VACCINE: _______ Polio ______________

a. Describe the disease agent, disease transmission (R0 and percent vaccinated required for herd immunity), and disease symptoms.

Disease agent: virus
R0: 5-7

Percent required for heard immunity: 83%

Transmission: fecal-oral

Symptoms: fever, sore throat, myalgia (muscle pain), paralysis in some individuals

b. What type of vaccine exists for this disease? Is it a toxoid, attenuated virus, killed virus, subunit, or another type of vaccine?

Type of vaccine: Inactivated in the U.S.; live, attenuated in developing countries

c. What were some milestones in the development of the vaccine? Who was responsible for each milestone?

1905 – Polio discovered to be contagious (I. Wickman)
1908 – K. Landsteiner and E. Popper identify virus
1910 – S. Flexner investigates polio immunity
1921 – FDR contracts polio
1935 – Two teams prepare early polio vaccine trials (M. Brodie and J. Kolmer)
1936 – P. Olitsky and A. Sabin cultivate poliovirus in human nervous tissue
1950 – H. Koprowski conducts first human trial of attenuated oral poliovirus vaccine in children
1952 – Salk begins first tests on human of killed-virus polio vaccine
1952 – IgG used for polio protection (W. Hammon)
1955 – A successful trial of Salk’s vaccine wins government licencing
1960 – Sabin’s polio vaccine licensed

d. Is the vaccine part of the regular immunization schedule for children or adults, or is it given only in special circumstances? Describe.

Regular; first dose – 2 months, second dose – 4 months, third dose – 6-18 months, 4th dose – 4-6 years