

# CIFOR OUE Agent List

Agent Name	Median Incubation Period (Range) <sup>1</sup>	Primary Signs and Symptoms	Primary Specimen(s)	KEI <sup>§</sup> -Special group(s)	KEI-Geographic Considerations	KEI-Notable Exposures
<b>BACTERIAL</b>						
<i>Arcobacter butzleri</i>	32 hrs (6-83 hrs) <sup>2</sup>	D (persistent and watery), abdominal cramps, N, V	Stool in Cary-Blair, raw stool			
<i>Bacillus anthracis</i>	Usually ≤1 week (Up to 60 days)	Severe abdominal pain, N, V, fever, D (may be bloody), ascites, sepsis, meningitis	Blood, stool in Cary-Blair, raw stool		Recent travel to endemic areas, tropical or sub-temperate regions	Undercooked meat or hides of herbivores
<i>Bacillus cereus</i> , diarrheal toxin	10-16 hours (6-24 hours)	Abdominal cramps, D (watery), N	Stool in Cary-Blair, raw stool			Time and/or temperature-abused foods
<i>Bacillus cereus</i> , pre-formed toxin	30 min- 6 hours	Sudden onset of severe N, V, D	Stool in Cary Blair			Time and/or temperature-abused foods
<i>Brucella</i> spp.	3-4 weeks (1 week to several months)	Flu-like symptoms including fever, chills, sweating, HA, joint pain, weakness; may cause recurrent fevers and chronic joint pain/fatigue; <i>may cause diarrhea and bloody stools in acute phase</i>	Blood, serum	Animal handlers, especially farm workers and veterinarians		Ingestion of raw milk and dairy products
<i>Campylobacter</i> spp.	2-5 days (1-10 days)	D (may be bloody), abdominal cramps, Fever, possible N & V, Guillain-Barre Syndrome <sup>3</sup>	Stool in Cary Blair, raw stool			Undercooked or raw meat or poultry; raw milk/ milk-products
<i>Clostridium botulinum</i> , foodborne <sup>£</sup>	12-72 hours (6 hours- 10 days)	V, D, blurred vision, diplopia, dysphagia, "bilateral" descending muscle weakness, cranial nerve palsies (e.g. blurred vision, diplopia, dysphagia)	Raw stool, vomitus or serum (specimens collected prior to anti-toxin administration)			Improperly processed and canned foods in airtight containers/packaging

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<i>Clostridium botulinum</i> , infantile <sup>f</sup>	3- 30 days	Lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag reflex and sucking reflex	Raw stool, serum	Infants		Honey; home canned vegetables, fruits; corn syrup
<i>Clostridium perfringens</i>	8-16 hours (6-24 hours)	D (watery), abdominal cramps, N; fever is rare	Stool in Cary-Blair, raw stool			Time and / or temperature abused foods
<i>Cronobacter sakazakii</i>	Less than 28 days	Bacteremia, meningitis, necrotizing enterocolitis	Blood, stool in Cary-Blair, raw stool	Premature infants		Infant formula
<i>Coxiella burnetii</i> (Acute Q fever)	2-3 weeks (3-39 days)	Fever, HA, fatigue, malaise, cough, anorexia, N, V, D, abdominal pain, pneumonia	Blood with EDTA/serum, tissue	Pregnant women, immunosuppressed, and patients with a pre-existing heart valve defects		Consumption of raw cow or goat milk; contact with cows or goats
Enterohemorrhagic <i>E. coli</i> (EHEC) (including Shiga-toxin producing <i>E. coli</i> (STEC) and Verotoxin producing <i>E. coli</i> (VTEC))	3-4 days (1-10 days)	D (often bloody), abdominal cramps, V, hemolytic-uremic syndrome (HUS)	Stool in Cary-Blair, raw stool	Young children		Consumption of raw milk; contact with cattle/ruminants; undercooked ground beef; leafy greens
Enterotoxigenic <i>E. coli</i> (ETEC)	24-72 hours (10 hours- 6 days)	D (profuse watery), abdominal cramps, V	Stool in Cary-Blair, raw stool		Foreign travel especially to developing countries	Contaminated water and food sources
Enteroinvasive <i>E. coli</i> (EIEC)	As short as 10-18 hrs	D (watery), fever, abdominal cramps, dysentery (in rare cases)- scant stools w/ evidence of blood, mucous or leukocytes in stool	Stool in Cary-Blair, raw stool		Foreign travel especially to developing countries	
Enteropathogenic <i>E. coli</i> (EPEC)	As short as 9-12 hrs	D (watery with mucous), fever, V	Stool in Cary-Blair, raw stool	Children < 2 years of age		
Enteraggregative <i>E. coli</i> (EAEC)	Estimated at 20-48 hrs	Chronic or acute D (watery), V	Stool in Cary-Blair, raw stool			
Diffuse-Adherence <i>E. coli</i> (DAEC)		D	Stool in Cary-Blair, raw stool	Young children		

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<i>Leptospira interrogans</i>	5-14 days (2-30 days)	<b>Anicteric disease</b> (no liver involvement)- Abrupt onset of fever, HA, abdominal pain, N, V, severe myalgia, malaise, <b>conjunctival petechiae and/or hemorrhage</b> <b>Icteric disease</b> (liver involvement)- Jaundice, upper right quadrant pain, N, V, decreased urine output, edema, hemorrhage, vascular collapse, severe altered mental status (AMS)	Blood, CSF, Urine	Farmers, veterinarians, slaughterhouse and sewer workers		Water activities (swimming, kayaking)
<i>Listeria monocytogenes</i>	1 day- 3 weeks (3-70 days)	<b>Invasive disease</b> - Severe HA, N, V, stiff neck, confusion, and other neurological symptoms consistent with meningitis, sepsis, bacteremia, premature birth or stillbirth <b>Gastrointestinal disease</b> - Fever, D, myalgia	Blood, CSF, Stool in Cary-Blair	Pregnant women <sup>c</sup> , immunosuppressed <sup>*,</sup> elderly <sup>*</sup>		Raw milk/dairy; soft cheeses; deli or RTE meats, raw produce
<i>Mycobacterium bovis</i>	Undetermined	<b>Gastrointestinal disease</b> - Abdominal pain, D <b>Lung disease</b> - Fever, weight loss, night sweats, cough	Stool in Cary-Blair, sputum	Foreign born, immigrants, immunocompromised, dairy workers		Raw milk/milk products; contact with cattle, bison, elk and deer
<i>Salmonella spp.</i> (non-typhi)	12-36 hours (6- 72 hours)	D (can be bloody) fever, abdominal pain, N, V	Stool in Cary-Blair, raw stool			
<i>Salmonella Typhi</i> / Paratyphi	<b>Typhi</b> - 7-14 days (3-60+ days) <b>Paratyphi</b> - 1-10 days	Fever, HA, malaise, chills, myalgia, weight loss, constipation or D, bacteremia, rash, cough	Stool in Cary-Blair, raw stool		Recent travel to endemic areas; Africa, Southeast Asia	Contaminated water and food sources
<i>Shigella spp.</i>	24-72 hours (1-7 days)	D (stools can have blood and mucus), abdominal cramps, fever, V, tenesmus	Stool in Cary-Blair, raw stool	Young children		Usually person to person, water or raw milk

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<i>Staphylococcus aureus</i> (preformed toxin)	1-6 hrs (30 minutes- 8hrs)	Severe N, V, abdominal cramps, prostration, D, drop in blood pressure	Stool in Cary-Blair, raw stool			Foods handled with bare hands especially those without further cooking or inadequate heating/ refrigeration, time and / or temperature abused foods
<i>Streptococcus</i> , Group A	1-5 days	Sore throat (pharyngitis, tonsillitis), fever, malaise, rash, cellulitis	Throat swab			Milk/ raw milk, eggs, raw produce
<i>Vibrio parahaemolyticus</i>	12-24 hours (2-96 hours)	D (watery), N, V, abdominal cramps, HA, fever, chills; Wound infections are possible	Stool in Cary-Blair, blood, wound culture	Immunocompromised, pre-existing liver conditions	Coastal, brackish waters, estuaries	Raw or undercooked seafood (oysters, clams, squid, mackerel, tuna, sardines, crab, shrimp)
<i>Vibrio vulnificus</i>	24-72 hours (1-7 days)	V, D, abdominal pain, wound infections, bacteremia, shock	Stool in Cary-Blair, blood, wound culture	Immuocompromised, pre-existing liver conditions	Coastal, brackish waters, estuaries	Raw or under-cooked seafood (oysters, clams, squid, mackerel, tuna, sardines, crab, shrimp), contaminated water, open wounds.
<i>Vibrio cholerae</i> , toxigenic	24-72 hours (few hours to 5 days)	D (profuse watery), abdominal cramps, N, V, dehydration, shock	Stool in Cary-Blair, rectal swab	Immunocompromised, esp. pre-existing liver conditions	Coastal, brackish waters, estuaries esp. Pacific Northwest	Seafood, raw or under-cooked oysters, contaminated water Recent travel to endemic areas
<i>Yersinia enterocolitica</i>	3- 7 days (1-14 days)	Fever, abdominal pain, D, V	Stool in Cary-Blair, raw stool; blood	Children and elderly more susceptible		Undercooked pork products, raw milk
<i>Yersinia pseudotuberculosis</i>	3- 7 days (1-14 days)	Fever, abdominal pain, D, V, (can have scarlatiniform rash)	Stool in Cary-Blair, raw stool; blood	Males		
<b>FUNGAL</b>						
<i>Cryptococcus</i>	2 to 14 months ( <i>C. gattii</i> )	D, abdominal cramps	CSF, serum	Immunocompromised	Pacific Northwest, Australia, Africa	Inhalation

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<b>PARASITIC</b>						
<i>Angiostrongylus cantonensis</i> or <i>A. costaricensis</i>	1-3 weeks (1 day- 6 weeks-cantonensis); weeks- 1 year (costaricensis)	Severe HA, N, V, stiff neck, and other neurological symptoms consistent with meningitis ( <i>A. canontensis</i> ); Abdominal pain, fever, N, V ( <i>A. costaricensis</i> )	CSF, blood, serum		Texas, Pacific Basin, SE Asia ( <i>A. cantonensis</i> ); Latin America, Caribbean ( <i>A. costaricensis</i> )	Raw/undercooked snails, slugs; chopped vegetables contaminated with infected snails or slugs
<i>Cryptosporidium</i>	7 days (1-14 days)	D (severe watery; may be recurrent), abdominal cramps, N, fever	Stool (2-3 samples collected over several days)			Recreational water, drinking water, unpasteurized milk, contact with cattle, children in daycare settings (fecal-oral transmission)
<i>Cyclospora cayetanensis</i>	7 days (1-14 days)	D (watery), weight loss, anorexia, abdominal cramps, N, V and fatigue; fever rare	Stool, intestinal fluid, tissue biopsy		More common in tropical and subtropical countries, but occurs in other areas due to contaminated imported produce	Fresh fruit and vegetables (e.g. berries, basil, snow peas, lettuce), contaminated water
<i>Entamoeba histolytica</i>	1-4 weeks (from a few days to several months or years)	Fever, chills, lower abdominal pain, D, bloody D (amoebic dysentery), liver (or other organ) abscess	Stool (2-3 samples over several days), blood if disseminated	Invasive amoebiasis more common in young adults, liver abscess more common in males, dysentery rare before age 5	Tropical countries with poor sanitation (South and Central America, Africa, and Asia)	Human reservoir, fecally contaminated food or water; person-to-person less common
<i>Giardia lamblia</i>	1-3 weeks (3 days- 3 weeks)	D, abdominal cramps, greasy stools, gas	Stool (2-3 samples collected over several days)			Drinking water, recreational water, children in daycare settings (fecal-oral transmission); occasional food contamination

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<i>Toxoplasma gondii</i>	7 days (4-23 days)	Cervical lymphadenopathy, flu-like illness; if immunocompromised, central nervous system (CNS) disease, myocarditis, or pneumonitis can occur	Serum			Raw beef
<i>Trichinella spiralis</i>	GI symptoms- 1-2 days; 5 days- 8 weeks for other symptoms	Muscle soreness accompanied by fever and edema of eyelids are characteristic; eosinophilia, N, V, chills, D, abdominal cramps, fatigue and weakness possible	Serum; biopsy of tissue			Consumption of raw or undercooked meat (particularly bear, pork, wild feline, fox, dog, wolf, moose, horse, seal or walrus)
<b>VIRAL</b>						
Adenovirus	1-10 days	D (prolonged), N, V, HA, fever, malaise, abdominal pain; Types 40 and 41 can cause GI outbreaks	Stool in Cary-Blair, raw stool, serum, naso-pharyngeal swab,	Children		
Astrovirus	1-4 days	D (watery), N, V, fever, malaise, abdominal pain, HA, anorexia	Stool in Cary-Blair, raw stool, serum	Children and immunocompromised		Child care facilities, long-term care facilities
Hepatitis A	28 days (15-50 days)	Jaundice, dark urine, fatigue, anorexia, N, D, fever, HA, abdominal pain, weight loss	Stool in Cary-Blair, raw stool, Serum	Men who have sex with men, injection drug users, international adoptees	Foreign travel	Water contaminated with infectious human waste; raw, under-cooked mollusks harvested from contaminated waters
Hepatitis E	26-42 days (15- 64 days)	Jaundice, dark urine, D, fever, abdominal pain, arthralgia, rash, hepatomegaly, altered consciousness	Stool in Cary-Blair, raw stool, Serum		Foreign travel, especially Asia, Middle East, Africa and Central America; exposure to pigs	Contaminated drinking water; oysters, mussels and other shellfish; pork, pig liver; and raw/rare deer and boar
Norovirus	12-48 hours (10- 50 hours)	N, V, D, abdominal cramps, fever (low grade), HA, myalgia, malaise	Stool in Cary-Blair, raw stool	Institutionalized populations		
Parvovirus (Human Bocavirus, HBoV 2-4)	Unknown- emerging pathogen	D, V, fever, abdominal pain, coryza, cough	Stool in Cary-Blair, raw stool, serum, CSF	Children		

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Rotavirus	1-3 days	D (watery), V, fever (low grade), abdominal pain	Stool in Cary-Blair, raw stool	Children		
Saffold virus (SAFV)	Unknown-emerging pathogen	D, V, respiratory symptoms (children); if invasive, then meningitis, encephalitis, myelitis, myocarditis, enanthema, exanthema, septicemia	Stool in Cary-Blair, raw stool, nasopharyngeal swab, CSF	Children		
Sapovirus	12-48 hours	N, V, D, abdominal pain, fever, HA, myalgia	Stool in Cary-Blair, raw stool	Infants, young children and institutionalized populations (esp. long-term care facilities)		
OTHER						
Brainerd D agent	Unknown	D (Profuse, watery, prolonged 2-36 months)	Stool in Cary-Blair, raw stool			
Toxins						
Azaspiracid Poisoning (AZP)	12-24 hours	N, V, D, abdominal cramps	Shellfish, toxin detection		Europe	Mussels, oysters
Carchatoxin	< 1-6 hours	N, V, D, and paresthesias	Food		Madagascar	Shark, particularly the liver
Ciguatera toxin	GI symptoms- 1-6 hours (few minutes- 48 hours) Neurologic symptoms- few minutes- 48 hours	N, V, D, abdominal cramps, sweating, HA, muscle aches, paresthesia of lips, tongue, face or extremities and temperature sensation reversal (hot/cold sensation flip)	Fish for purification/ extraction and mouse bioassay		Tropical areas	Predatory fish like barracuda, grouper, sea bass, snapper, mullet
Scombroid	Few minutes- 3 hours	Rash, D, flushing, sweating, HA, V, burning/tingling sensation in mouth, swelling in mouth, abdominal pain and metallic taste	Fish, histamine testing			Fish such as tuna and mackerel; (bacterial action in) Swiss cheese

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Tetrodotoxin	< 30 minutes	Paresthesia of lips, tongue, face or extremities often following numbness; floating sensation, V, D, abdominal pain, ascending paralysis, respiratory failure	Puffer fish, toxin testing			Puffer fish consumption
Mushroom toxin (short-acting)	Few minutes- 2 hours	V, D, confusion, vision problems, salivation, diaphoresis, hallucinations	Mushrooms, toxin detection			Mushroom consumption
Mushroom toxin (long-acting)	4-24 hours	D, abdominal cramps, liver and kidney failure	Mushrooms, toxin detection			Mushroom consumption
Shellfish toxin (diarrheic)	30 minutes- 2 hours	N, V, D, abdominal pain, chills, HA, fever	Shellfish, toxin detection			Mussels, oysters, scallops from Gulf of Mexico, FL
Shellfish toxin (neurotoxic)	Few minutes- 3 hours	Tingling and numbness of lips, tongue and throat; muscle aches, dizziness and reversal of hot/cold sensation, D, V	Shellfish, toxin detection			Mussels, oysters, scallops from Gulf of Mexico, FL
Shellfish toxin (amnesic)	< 24 - 48 hours	V, D, abdominal pain and neurologic symptoms of confusion, memory loss, disorientation, seizure or coma	Shellfish, toxin detection			Mussels, oysters, scallops
Shellfish toxin (paralytic poisoning)	30 minutes- 3 hours (15 minutes- 10 hours)	N, V, D, paresthesia of mouth and lips, weakness, dysphasia, dysphoria, respiratory paralysis	Shellfish or water, toxin detection			Scallops, mussels, clams, cockles
<b>Chemicals</b>						
Antimony	<1 hour (5 mins- 8 hours)	V, D, abdominal pain, metallic taste	Food or beverage			Metallic container
Arsenic	Few hours	N, V, D, pins and needles sensation, colic	Urine analysis			
Cadmium	<1 hour (5 mins- 8 hours)	N, V, D, myalgia, increased salivation, abdominal pain; often a metallic taste	Food			Seafood, oysters, clams, lobsters, grains and peanuts



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Chlorinated hydrocarbon insecticides (aldrin, chlordane, DDT, endrin, lindane, toxaphene)	30 minutes- 6 hours	N, V, paresthesia, dizziness, muscular weakness, anorexia, weight loss, confusion	Blood, urine, stools, gastric washings			Storing insecticides in same areas as foods; mistaking pesticides for powdered foods
Copper	<1 hour (5 mins- 8 hours)	N, V (blue or green), D; often a metallic taste	Food or beverage			Metallic containers
Mercury	<1 week	N, V, D, numbness, skin rash, eye irritation, weakness of legs, spastic paralysis, impaired vision, blindness, coma	Blood, hair			Fish; grains treated with mercury containing fungicides
Monosodium glutamate (MSG)	Few minutes to 1 hour	Tingling, flushing, dizziness, HA, N, burning sensation in back of neck, forearms; feeling of tightness in chest	N/A			Foods seasoned with MSG
Nicotinic acid/Niacin	Few minutes to 1 hour	Flushing, sensation of warmth, itching, abdominal pain, puffiness of face and knees	N/A			Meats or other foods with sodium nicotinate as color preservative; high doses of dietary supplements
Nitrite poisoning	1-2 hours	N, V, cyanosis/blue skin, HA, dizziness, weakness, fatigue, loss of consciousness, chocolate-brown colored blood	Blood, food			Cured meats and spinach
Organophosphates or carbamate pesticides (Diazinon, Malathion, Parathion, TEPP; Carbaryl, Sevin®, Lannate®, Aprocarb®)	Few minutes to few hours	N, V, abdominal pain, HA, nervousness, blurred vision, twitching, convulsions	Blood, food			Spraying foods just before harvesting; storing insecticides in same areas as foods; mistaking pesticides for powdered foods
Sodium fluoride	Few minutes to 2 hours	Irritation of skin, eyes, and respiratory tract, salty or soapy taste in mouth, numbness of mouth, V, D, dilated pupils, spasms, pallor, shock, collapse	Vomit, gastric washes and food			Dry goods (powdered milk, flour, baking powder, cake mix), insecticides and rodenticides

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Thallium	Few hours	V, D, hair loss, neurologic manifestations (paresthesia, respiratory depression, bronchospasms, cranial nerve palsies)	Urine, hair			Centers for Disease Control and Prevention. Thallium Poisoning from Eating Contaminated Cake-- Iraq, 2008. MMWR. September 19, 2008 / 57(37);1015-1018.
Tin	Few hours	N, V, D; often a metallic taste	Food			Metallic container
Triorthocresyl phosphate	10 days (5-21 days)	N, V, D, leg pain, ungainly high stepping gait, food and wrist drop	N/A			Using compound to extract foods or as cooking or salad oil
Zinc	Few hours	Stomach cramps, N, V, D, myalgias; often a metallic taste	Blood, stool, saliva, urine and food			Metallic container

Notes:

<sup>1</sup> Unless otherwise noted, the median incubation period and range were obtained from the following three sources: Heymann, D.L. (Ed.)(2008). **Control of Communicable Diseases Manual** (19th ed.). Washington, DC: American Public Health Association; Centers for Disease Control and Prevention (CDC) (March 26, 2014) A-Z Index for Foodborne Illness. Retrieved from <http://www.cdc.gov/foodsafety/diseases/index.html>.

<sup>2</sup> Victoria Lappi, John R. Archer, Elizabeth Cebelinski, Fe Leano, John M. Besser, Rachel F. Klos, Carlota Medus, Kirk E. Smith, Collette Fitzgerald, and Jeffrey P. Davis. Foodborne Pathogens and Disease. March 2013, 10(3): 250-255. doi:10.1089/fpd.2012.1307.

<sup>3</sup> B.R. Jackson, J. Alomia Zegarra, H. Lopez-Gatell, J. Sejvar, F. Arzate, S. Waterman, A. Sanchez Nunez, B. Lopez, J. Weiss, R. Quintero Cruz, D. Y. Lopez Murrieta, R. Luna-Gierke, K. Heiman, A. R. Vieira, C. Fitzgerald, P. Kwan, M. Zarate-Bermudez, D. Talkington, V. R. Hill and B. Mahon (2014). Binational outbreak of Guillain-Barré syndrome associated with Campylobacter jejuni infection, Mexico and USA, 2011. *Epidemiology and Infection*, 142, pp 1089-1099. doi:10.1017/S0950268813001908.

§- Key epidemiological information

£- Clinical consultation and testing recommendations (including lab collection recommendations) can be obtained through consultation with CDC.

€- Pregnant women may be more likely to present with mild, flu-like symptoms.

¥- Elderly or immunocompromised may be more likely to present with sepsis or meningitis.

N- nausea, D- diarrhea, V-vomiting, HA- headache