

PRODUCT SPOTLIGHT



BIG SIX NON-O157 SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI* (STEC) RESEARCH MATERIALS

The recent outbreaks of illness caused by non-O157 STEC in Germany and Japan have heightened awareness of the importance of these *E. coli* strains and increased calls for government-mandated testing of food products for non-O157 STEC, particularly the six serogroups that are of the greatest concern to the Centers for Disease Control (CDC): O26, O45, O103, O111, O121, and O145.

Infections associated with these 6 serogroups of *E. coli* have been traced back to contaminated raw ground beef, lettuce and berries. The CDC has estimated that approximately 113,000 illnesses and 300 hospitalizations are caused by these six serogroups of STEC annually in the United States, including severe complications such as hemolytic uremic syndrome (HUS). The most commonly found serogroups of the six are O26, O103 and O111.

In response to growing concerns over non-O157 STEC, in 2009 the CDC issued a recommendation that stools from all patients with community-acquired diarrhea be cultured and tested with an assay such as a rapid enzyme immunoassays (EIA) or a polymerase chain reaction (PCR) assay that targets Shiga toxin antigens or genetic determinants to allow detection of non-O157 STEC. The CDC also requested that all non-O157 STEC isolates should be sent by public health laboratories to CDC for confirmation and further characterization. The number of non-O157 STEC isolates sent to CDC for serotyping has increased each year.

At the request of ATCC, CDC has deposited a selection of strains from the O103, O111, O121, O26, O45, and O145 serogroups recently received from public health laboratories for accessioning into our collection. A second group of strains lacking almost all STEC virulence genes and representative of five of the six serogroups was also deposited by the CDC for use as experimental controls. These strains below are now available for distribution only to researchers within the United States. Also included below are non-O157 STEC strains from the six serogroups isolated internationally.

The table below lists the results of ATCC quality control testing for most strain's serotype and virulence genes: Shiga toxin genes (*stx1* and *stx2*) and the gene that codes for intimin (*eae*), an adherence protein, in addition to each strain's location of isolation if known. Each strain's website product pages lists any additional information given to us by the depositor of that strain.

Table 1: O26 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2003-3023	BAA-2205™	O26:H11	<i>stx1+/stx2-/eae+</i>	Connecticut
<i>Escherichia coli</i>	2003-3014	BAA-2196™	O26:H11	<i>stx1+/stx2+/eae+</i>	Michigan
<i>Escherichia coli</i>	2001-3234	BAA-2204™	O26:H11	<i>stx1+/stx2-/eae+</i>	Nebraska
<i>Escherichia coli</i>	00-3412	BAA-2181™	O26:H11	<i>stx1+/stx2-/eae+</i>	New Mexico
<i>Escherichia coli</i>	99-3301	BAA-2188™	O26:H11	<i>stx1+/stx2-/eae+</i>	Utah
<i>Escherichia coli</i>	99-3294	BAA-2186™	O26:H11	<i>stx1+/stx2-/eae+</i>	Massachusetts
<i>Escherichia coli</i>	EH1534	BAA-1653™	O26:H11		Belgium
<i>Escherichia coli</i>	CDC	12795™	O26:K60(B6)		

Table 2: O45 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2000-3039	BAA-2193™	O45:H2	<i>stx1+/stx2-/eae+</i>	Maine
<i>Escherichia coli</i>	99-3303	BAA-2189™	O45:H2	<i>stx1+/stx2-/eae+</i>	Virginia
<i>Escherichia coli</i>	99-3291	BAA-2185™	O45:H2	<i>stx1+/stx2-/eae+</i>	Massachusetts
<i>Escherichia coli</i>	99-3075	BAA-2202™	O45:H2	<i>stx1+/stx2-/eae+</i>	California
<i>Escherichia coli</i>	98-3215	BAA-2198™	O45:H2	<i>stx1+/stx2-/eae+</i>	Virginia
<i>Escherichia coli</i>	98-3167	BAA-2191™	O45:H2	<i>stx1+/stx2-/eae+</i>	Georgia

Table 3: O103 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2003-3112	BAA-2210™	O103:H2	<i>stx1+/stx2-/eae+</i>	Wisconsin
<i>Escherichia coli</i>	2001-3304	BAA-2207™	O103:H2	<i>stx1+/stx2-/eae+</i>	Connecticut
<i>Escherichia coli</i>	2006-3008	BAA-2215™	O103:H11	<i>stx1+/stx2-/eae+</i>	Idaho
<i>Escherichia coli</i>	2001-3225	BAA-2200™	O103:H11	<i>stx1+/stx2-/eae+</i>	Texas
<i>Escherichia coli</i>	2005-3546	BAA-2213™	O103:H25	<i>stx1+/stx2-/eae+</i>	Virginia
<i>Escherichia coli</i>	2000-3281	BAA-2199™	O103:H25	<i>stx1+/stx2-/eae+</i>	Ohio
<i>Escherichia coli</i>	NCDC H515b	23982™	O103:K:H8		

Table 4: O111 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2002-3092	BAA-2201™	O111:H8	<i>stx1+/stx2-/eae+</i>	Iowa
<i>Escherichia coli</i>	00-3237	BAA-2180™	O111:H8	<i>stx1+/stx2+/eae+</i>	South Dakota
<i>Escherichia coli</i>	10C-3114	BAA-2217™	O111:H8	<i>stx1+/stx2+/eae+</i>	Missouri
<i>Escherichia coli</i>	CDC 2000-3025	BAA-184™	O111:H8		South Dakota
<i>Escherichia coli</i>	CDC 1999-3302	BAA-180™	O111:H8		Utah
<i>Escherichia coli</i>	CDC 1999-3249	BAA-181™	O111:H8		South Dakota
<i>Escherichia coli</i>	CDC 1997-3215	BAA-179™	O111:H8		Alabama
<i>Escherichia coli</i>	B99BE001161	700840™	O111:H8		Texas
<i>Escherichia coli</i>	CDC 3250-76	29552™	O111a,111b: K58:H21		California
<i>Escherichia coli</i>	Stoke W	33780™	O111:K58(B4):H-		Scotland
<i>Escherichia coli</i>	2001-3357	BAA-2209™	O111:NONMOTILE	<i>stx1+/stx2+/eae+</i>	Ohio
<i>Escherichia coli</i>	2001-3010	BAA-2182™	O111:NONMOTILE	<i>stx1+/stx2-/eae+</i>	Virginia
<i>Escherichia coli</i>	CDC B170	43887™	O111:NONMOTILE	<i>stx1-/stx2-/eae+</i>	

Table 5: O121 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2003-3194	BAA-2184™	O121:H19	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	California
<i>Escherichia coli</i>	2002-3211	BAA-2219™	O121:H19	<i>stx1</i> +/ <i>stx2</i> +/ <i>eae</i> +	Virginia
<i>Escherichia coli</i>	2000-3370	BAA-2203™	O121:H19	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Michigan
<i>Escherichia coli</i>	99-3300	BAA-2187™	O121:H19	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Utah
<i>Escherichia coli</i>	10C-3041	BAA-2220™	O121:H19	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Iowa
<i>Escherichia coli</i>	09C-3857	BAA-2221™	O121:H19	<i>stx1</i> +/ <i>stx2</i> +/ <i>eae</i> +	Nebraska

Table 6: O145 Strains

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2003-3375	BAA-2211™	O145:H25	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Minnesota
<i>Escherichia coli</i>	2006-3013	BAA-2197™	O145:H28	<i>stx1</i> +/ <i>stx2</i> -/ <i>eae</i> +	California
<i>Escherichia coli</i>	TW07865	BAA-2129™	O145:H28		Germany
<i>Escherichia coli</i>	EH1533	BAA-1652™	O145:H48		Belgium
<i>Escherichia coli</i>	2006-3142	BAA-2222™	O145:Nonmotile	<i>stx1</i> +/ <i>stx2</i> -/ <i>eae</i> +	Minnesota
<i>Escherichia coli</i>	2005-3287	BAA-2223™	O145:Nonmotile	<i>stx1</i> +/ <i>stx2</i> +/ <i>eae</i> +	
<i>Escherichia coli</i>	2003-3054	BAA-2208™	O145:Nonmotile	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Wisconsin
<i>Escherichia coli</i>	2002-3034	BAA-2195™	O145:Nonmotile	<i>stx1</i> +/ <i>stx2</i> -/ <i>eae</i> +	Georgia
<i>Escherichia coli</i>	2001-3022	BAA-2194™	O145:Nonmotile	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	Missouri
<i>Escherichia coli</i>	2000-3413	BAA-2206™	O145:Nonmotile	<i>stx1</i> -/ <i>stx2</i> +/ <i>eae</i> +	New Mexico
<i>Escherichia coli</i>	99-3311	BAA-2192™	O145:Nonmotile	<i>stx1</i> +/ <i>stx2</i> +/ <i>eae</i> +	South Dakota
<i>Escherichia coli</i>	TW08087	BAA-2130™	O145:Nonmotile		

Table 7: O Antigen strains lacking STEC virulence genes

Description	Designation	ATCC® No.	Serotype	Presence of Select Virulence Genes	Isolation Location
<i>Escherichia coli</i>	2003-3055	BAA-2212™	O26:H4	<i>stx1</i> -/ <i>stx2</i> -/ <i>eae</i> -	Wisconsin
<i>Escherichia coli</i>	2005-3342	BAA-2214™	O103:NONMOTILE	<i>stx1</i> -/ <i>stx2</i> -/ <i>eae</i> -	Virginia
<i>Escherichia coli</i>	99-3071	BAA-2216™	O145:H34	<i>stx1</i> -/ <i>stx2</i> -/ <i>eae</i> +*	Minnesota
<i>Escherichia coli</i>	2000-3140	BAA-2218™	O45:H31	<i>stx1</i> -/ <i>stx2</i> -/ <i>eae</i> -	Georgia
<i>Escherichia coli</i>	98-3306	BAA-2190™	O121:NONMOTILE	<i>stx1</i> -/ <i>stx2</i> -/ <i>eae</i> -	Republic of South Africa
<i>Escherichia coli</i>	98-3167	BAA-2191™	O45:H2	<i>stx1</i> +/ <i>stx2</i> -/ <i>eae</i> +	Georgia

*Strain is positive for intimin

Please visit our website www.atcc.org for more resources to help you in your microbiology-related research applications.

ATCC STANDARDS RESOURCE

The ATCC Standards Resource is a web-based search tool by which procedural standards and commercial identification systems are cross-referenced with recommended ATCC cultures. Search for:


- Standards from organizations and agencies such as CLSI, ASTM International, USP, USDA, FDA, AOAC, and BSI-Global
- Commercial identification systems from companies including bioMérieux, Biolog, Dade, Behring, DuPont Qualicon and others

ATCC RELATED PRODUCTS


Value-added microbial reagents such as our microbial freeze media and dupplements as well as nucleic acids offer convenience while saving time and money.

- TSB with 10% glycerol (ATCC® [20-2200™](#))
- Genomic DNA and RNA from well-characterized and authenticated microbial strains

 10801 University Boulevard
Manassas, Virginia 20110-2209

 703.365.2700

 703.365.2701

 sales@atcc.org

 www.atcc.org

BS-102021-v02

©2022 American Type Culture Collection. The ATCC trademark and trade name, and any other trademarks listed in this publication are trademarks owned by the American Type Culture Collection unless indicated otherwise.

These products are for laboratory use only. Not for human or diagnostic use. ATCC products may not be resold, modified for resale, used to provide commercial services or to manufacture commercial products without prior ATCC written approval.