HEALTH PROTECTION AGENCY
CENTRE FOR INFECTIONS
LABORATORY OF ENTERIC PATHOGENS
USER MANUAL
SEPTEMBER 2007
Contains Information on Reference Services for

*Campylobacter* and related genera
*Citrobacter* spp.
*Escherichia coli*
*Helicobacter* spp.
*Salmonella* spp.
*Shigella* spp.
*Vibrio* spp.
*Yersinia* spp.

Authorised By:

[Signature]

Professor EJ Threlfall

Effective Date: 24th August 2007
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Introduction

The Laboratory of Enteric Pathogens (LEP) of the Health Protection Agency (HPA), situated in the Centre for Infections (CfI) Colindale, London is the National Reference Centre for England and Wales for pathogenic enteric bacteria and provides some specialist diagnostic tests and a complete identification and typing service using serotyping, phage typing and a range of biochemical and DNA-based molecular techniques.

LEP receives enteric bacteria, faecal specimens, biopsy material and human sera from HPA laboratories, National Health Service laboratories and other laboratories throughout the UK including commercial laboratories serving medical, veterinary and food and water industry clients. LEP supports the Veterinary Laboratories Agency, the Scottish Salmonella Reference Laboratory, and the Scottish Escherichia coli O157 Reference Laboratory by providing advice and reagents for phage typing and serotyping. Other reference services are also provided for Scotland, Northern Ireland and Eire. LEP receives faecal samples for testing for the presence of Vero cytotoxin-producing E. coli (VTEC) and other pathogenic E. coli on request. In addition foods are tested for VTEC and other pathogenic organisms in collaboration with the HPA Food Safety Microbiology Laboratory (FSML), and the London Food Water and Environmental Laboratory also based at the CfI, Colindale. Following re-organisation in 1998 the LEP and FSML are now constituent laboratories of the Department of Gastrointestinal Infections, which, in collaboration with the Enteric Virus Unit of the Virus Reference Department and the Environmental and Enteric Diseases Department (EEDD) aims to provide a coordinated approach to activities on food poisoning and gastrointestinal infections in England and Wales.

LEP is the International Federation of Enteric Phage Typing Collaborating Centre and as such provides support for national centres throughout the world. LEP is also the co-coordinating laboratory centre for the European Union-funded Enter-Net surveillance project for salmonellas, antimicrobial drug resistance, VTEC and Campylobacter spp..

The Research and Development programme within the Laboratory concentrates on the priority areas laid down by the HPA. Projects are targeted at validating and extending existing typing systems, developing molecular technology for diagnosis and enhanced surveillance, and investigating virulence mechanisms and antimicrobial resistance in enteric pathogens. Most of this programme is funded by external grants.

<table>
<thead>
<tr>
<th>Address</th>
<th>Laboratory of Enteric Pathogens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Centre for Infections</td>
</tr>
<tr>
<td></td>
<td>Health Protection Agency</td>
</tr>
<tr>
<td></td>
<td>61 Colindale Avenue</td>
</tr>
<tr>
<td></td>
<td>London NW9 5EQ</td>
</tr>
<tr>
<td>Telephone</td>
<td>020 8327 6114</td>
</tr>
<tr>
<td>Fax</td>
<td>020 8905 9929</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:john.threlfall@hpa.org.uk">john.threlfall@hpa.org.uk</a></td>
</tr>
</tbody>
</table>

Normal laboratory hours are from 09.00 – 17.30 Monday to Friday.

Please contact the appropriate person for emergency work outside these times.
CPA standard E6. 1e requires laboratories to review referral laboratories in terms of EQA performance and turnaround times. The CPA standards also state that “Referral laboratories should where possible, be accredited by CPA or equivalent accreditation body or meet the requirements of the sender's quality management system”.

For information:

1. Our CPA Accreditation Certificate to the new standards can be found at the following website address: [http://www.hpa.org.uk/cfi/dgi/lep_accreditation.pdf](http://www.hpa.org.uk/cfi/dgi/lep_accreditation.pdf)

2. There are no NEQAS schemes for the specialist assay performed within LEP. We do undertake an extensive IQA programme and, whenever possible, participate in formal and informal international EQAs with similar laboratories overseas. Overall performance is satisfactory. We can provide more specific information on EQA on separate request to the individual Unit Heads.

Professor John Threlfall
Director LEP

June 2007
Reference and diagnostic services available

- Primary isolation of *Helicobacter pylori*
- Isolation of Vero cytotoxin-producing *Escherichia coli* (VTEC) and other enterovirulent *E. coli*.
- Detection of *Helicobacter pylori* antigen from stool samples

**Identification and typing**

- Biochemical identification including biotyping for clinically significant enterobacteria
- Detection and identification of *Helicobacter* spp.
- Identification of *Campylobacter* spp. and related genera
- Serotyping for: *Citrobacter koseri, Escherichia coli, Salmonella* spp., *Shigella* spp., *Vibrio cholerae*, *Yersinia* spp.
  (For presumptive *E. coli* O157, confirmation of the O and H antigens may be performed serologically or by PCR tests for the relevant genes).
- Phage typing for: *E. coli* O157; *Salmonella enterica* serotypes Typhi, Paratyphi A and B, Agona, Enteritidis, Hadar, Paratyphi B var Java, Pullorum, Thompson, Typhimurium, Virchow, and *Shigella sonnei*.
- DNA-based typing for: *Campylobacter* spp., *E. coli, Helicobacter* spp., *Salmonella* spp., *Shigella* spp., *V. cholerae*.
- DNA-based tests (probe and PCR) for confirmation of: VTEC and virulence markers of other enterovirulent *Escherichia coli*
- VT typing: *E. coli* O157 and other VTEC
**Antimicrobial susceptibility testing**

Strains are screened for resistance to a wide range of clinically relevant and epidemiologically important antimicrobial drugs using standardised methods at defined breakpoints. The Minimal Inhibitory Concentration (MIC) for specific antimicrobials is determined for cases where antimicrobial therapy may be critical for patient management. Molecular detection of antibiotic resistance mechanisms of *H. pylori* is available for gastric biopsies which are negative by culture.

**Serodiagnosis**

Serodiagnostic reference service for:

- *Escherichia coli* O157*
- *Salmonella* Typhi
- *Salmonella* Paratyphi A, B and C
- *Yersinia enterocolitica* and *Y. pseudotuberculosis*

* Please note that if a patient has undergone renal dialysis or received a blood transfusion as part of their current therapy, this can adversely affect tests for detecting antibodies to *E. coli* O157. Please provide information on request form if any of these treatments have been performed.

- N.B. We do not provide a serodiagnostic service for *Campylobacter* spp. These samples should be sent to Preston Royal Infirmary. A handling charge for posting such requests will be made in future.

**Charges**

Charges for services are reviewed annually. Any changes will be effective from 1st of April. A list of prices can be supplied by e-mail or facsimile on request.
How to obtain services

What information to send

Use LEP request forms as appropriate:

- **Pink**: Salmonella spp.
- **Green**: Campylobacter spp.
- **Blue**: E. coli, Shigella, Yersinia, Vibrio spp.
- **Yellow**: Serodiagnosis (Yersinia spp., and E. coli O157)
- **Purple**: Helicobacter spp.

Request forms can be downloaded at [http://www.hpa.org.uk/cfi/dgi/downloads.htm](http://www.hpa.org.uk/cfi/dgi/downloads.htm)

Please use the appropriate form as using the wrong form may lead to delays in processing of specimens.

Please complete the correct request form as completely as possible including your address and telephone number (direct line preferably), patient (specimen) details including your reference number, major patient symptoms, your identification of the isolate and what testing you require us to perform. Using the correct form provides the most relevant prompts for information useful to LEP.

**What specimens to send**

- **Culture**: Pure culture (*see comment below) on Dorset’s Egg or Nutrient agar slopes. For *Campylobacter* spp: pure culture on Amies Charcoal swab. For *Helicobacter pylori*: in Dent’s transport medium.
- **Biopsy**: For *Helicobacter pylori*: in Dent’s transport medium or in sterile saline
- **Sera**: Not less than 200 µl
- **Faecal sample**: In standard sealed container ≥ 1 gram

*Submitting a pure culture reduces time required to produce result for test requested and ensures that the result relates to the organism of interest to you. When preparing a sub-culture for submission to LEP it is recommended that this be made from a non-selective medium or that part of the process involves a purity check on this sub-culture.*

Recommendations for selection and transport of isolates of *Campylobacter* spp.

It is advisable to pick campylobacter isolates from a non-selective medium to minimise
overgrowth by contaminants.

If an overnight delay before posting is anticipated then isolate should be stored at 4 °C. until put into post. It is not advisable to post samples on a Friday as these will remain at ambient temperature over the weekend.

**Recommendations for transport of isolates and clinical specimens for Helicobacter testing**

**H. pylori cultures**

Growth should be harvested from a plate of culture that is preferably 48-72 h old. Successful recovery of *H. pylori* will decrease as age of the culture increases.

A heavy bacterial suspension (visibly cloudy) should be prepared in Dent's transport medium (provided on request by DSIU).

If Dent’s medium is not available then any rich broth (eg. Brain Heart Infusion or Mueller Hinton broth) or charcoal transport swabs can be used.

Isolates should be transported as soon as possible after harvesting into transport medium.

**Gastric biopsies**

Biopsies for culture of *H. pylori* should be sent without delay, preferably within 24h.

Ideally biopsies should be sent in Dent’s transport medium (provided on request by DSIU) to prevent overgrowth of contaminating bacteria. Alternatively biopsies can be sent in sterile physiological saline - prompt transport is even more critical if saline is used.

If a biopsy is not being posted / couriered on day of receipt in your laboratory then please store at 4 °C. until the biopsy is put into post. It is not advisable to post samples on a Friday as these will remain at ambient temperature over the weekend.

If delays of >96h are anticipated (or if biopsies are culture-negative in the sender laboratory), these samples may only be suitable for detection and antibiotic susceptibility testing by PCR. Such biopsies should be frozen (-20°C) and transported at low temperature (e.g. in an insulated box with an ice pack). This packaging will be returned if a pre-paid returns label is provided.
Suitability of stool samples for testing for *Helicobacter pylori*

Patients **MUST NOT have taken any antibiotics or proton pump inhibitors** for a minimum of **2 weeks** prior to specimen collection for testing.

Stools should be collected in a sterile pot that does not contain any preservatives etc.

Stool sample should be at least about the same size as a cherry, less may be insufficient for testing.

**Liquid stools cannot be tested** (stated by the manufacturer).

Stool samples should be tested within 3 days of collection (unless frozen) and so should be sent without delay.

Where a short delay (< 2 days) is unavoidable, stools should be stored at 2 – 8 °C.

Where a longer delay (>2 days) is anticipated, stools should be frozen (-20 °C) and transported at low temperature (e.g. in an insulated box with an ice pack). This packaging will be returned if a pre paid returns label is provided.

**All samples must be packaged in accordance with current UK or international transport regulations.** (see page 17 for further information)

**Special instructions**

The clinical and epidemiological data, including the patient’s address and recent travel history, requested on the LEP form, should be regarded as essential parts of the report request.

**Requests for work on presumptive isolates that fall into ACDP Category 3 must be clearly marked to show the findings of the sending laboratory.**

All *Salmonella* spp. from humans in England and Wales and referred to LEP for identification / typing will be electronically reported to EEDD from the LEP database. Reports to EEDD for which no isolate is referred to LEP should also be made to LEP using the pink form and the form marked “culture not enclosed”. Electronic file transfer via COSURV may be used where available. Other file transfer systems may be used only if prior agreement has been reached with LEP.

**Antibiogram**

With the exception of *Helicobacter pylori*, details of antibiogram are not released unless specifically requested. If such information is required please telephone and ask for the appropriate LEP extension.

A charge may be made for investigations involving determination of MIC.
DNA-based typing

A range of DNA-based typing and fingerprinting techniques are in use, some of which are organism-specific. Methods include: plasmid typing; pulsed-field gel electrophoresis (PFGE); VT gene subtyping; PCR; PCR-Restriction Fragment Length Polymorphism typing (PCR-RFLP); DNA sequence typing.

Requests for DNA typing should be made through the Laboratory Director or by arrangement with appropriate LEP staff. A charge is generally made for such services unless required for epidemiological purposes in relation to isolates from HPA and NHS laboratories (see above).

Emergency situations

For specimens requiring urgent attention please telephone the appropriate key contact. If out of normal working hours, telephone the Cfl, at 020 8200 4400 to provide details.
### Level of service

#### 1 Average turnaround times

<table>
<thead>
<tr>
<th>Organism/Type</th>
<th>Turnaround times</th>
<th>Optimum day for receipt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter spp.: identification and typing</td>
<td>12 days</td>
<td>Thursday</td>
</tr>
<tr>
<td><em>Citrobacter koseri, Escherichia coli, Shigella</em> spp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Vibrio cholerae, Yersinia</em> spp.: identification</td>
<td>34 days</td>
<td>any</td>
</tr>
<tr>
<td><em>Helicobacter pylori</em>: identification and antimicrobial susceptibility testing</td>
<td>20 days</td>
<td>any</td>
</tr>
<tr>
<td><em>Salmonella</em> spp.: identification</td>
<td>38 days</td>
<td>any</td>
</tr>
<tr>
<td>: phage typing</td>
<td>34 days&lt;sup&gt;b&lt;/sup&gt;</td>
<td>any</td>
</tr>
<tr>
<td><em>Shigella sonnei</em> phage typing</td>
<td>29 days&lt;sup&gt;b&lt;/sup&gt;</td>
<td>any</td>
</tr>
</tbody>
</table>

| Serodiagnosis                                                                |                  |                         |
| - *E. coli* O157                                                             | 3 days           | Any                     |
| - *Yersinia* spp.                                                            | 12 days          | Any                     |
| - *S. Typhi*, *S. Paratyphi A, B and C*                                      | 10 days          | Any                     |

| Faeces                                                                      |                  |                         |
| - Detection of VTEC                                                         | 5 days           | Any                     |
| - Other enterovirulent *E. coli*                                            | By arrangement   |                         |
| - Detection of *Helicobacter pylori* antigen                                 | 14 days          | Any                     |

| Biopsy                                                                      |                  |                         |
| Isolation / Detection of *Helicobacter pylori* and antimicrobial susceptibility testing | 22 days          | Any                     |

<sup>a</sup> Turnaround times are based on averages of monthly figures for processing 75% of specimens received expressed as calendar days.

<sup>b</sup> For phage typing urgent requests will be processed within 10 working days.

#### 2 Exceptions

With the exception of faecal specimens, the above times for culture tests are based on the receipt of pure cultures. Cultures which require purification may increase turnaround time significantly. In addition, salmonellas belonging to serogroups other than subgroup I require additional biochemical tests, which can significantly increase the turnaround time. DNA-based typing can take longer than stated because of the necessity of running relevant control strains in parallel.
3. Sample Retention Times

Salmonella spp.

Cultures for identification are kept for a minimum of 3 months after reporting.

Cultures for phage typing are kept for approximately 6 weeks because of space constraints. However, as part of testing regimen, a duplicate slope is prepared which is kept for a minimum of 2 years.

Other organisms

Escherichia coli, Shigella spp. Vibrio spp. Yersinia spp and Citrobacter koserii are kept for a minimum of one year.

Helicobacter pylori cultures are only viable for one week even when a very heavy inoculum is added therefore referred cultures are only retained for one week.

Campylobacter spp cultures are kept for a minimum of 3 months.

Faeces

Helicobacter samples are stored at -20 °C and tested in batches every two weeks. However, due to the deterioration of the antigen after the sample has been thawed and tested, there is no valid reason for retaining the sample beyond testing. Stool samples are therefore discarded after testing.

Samples for isolation of Vero cytotoxin-producing Escherichia coli (VTEC) and other enterovirulent E. coli are kept for two months.

Serum samples for Yersinia spp. E. coli O157 or Salmonella Typhi and Paratyphi antibodies are kept for a minimum of 1 year.

Gastric biopsies

Biopsies are cultured and frozen on day of arrival. If the culture is negative after 10 days then the biopsy would undergo DNA extraction for a PCR assay. If the culture is positive then the biopsy will still be kept for extraction for internal quality assurance purposes. Biopsies per se are not kept but a subset of DNA extracts will be retained for the development / validation of future assays.
3. **Key staff / Advice**

Key staff are listed on page 19. These are the contacts for any further advice / interpretation of reports.

Requests for further work on a specimen will be considered in the time scale detailed in the departments specimen retention policy. If request agreed to this will be carried out at the convenience of the department.

As there are no medically qualified staff in the LEP, clinical expertise is available from a panel of medical contacts from within CfI, other parts of the HPA and experts in particular disciplines from other centres in the UK.

4. **Follow up**

If you are unable to make the appropriate contact please leave a message with the Office Manager (Direct line 020 8327-6114) and every effort will be made to return your call as soon as possible. Alternatively please facsimile or E-mail the member of staff with direct responsibility for your specific enquiry.

5. **If there is a problem**

What to do: Minor telephone/facsimile/E-mail
Major write/facsimile/E-mail

Who to contact: Minor Unit Head/Responsible person
Major Director

6. **Complaints**

If there is a complaint, please telephone, write, facsimile or E-mail the key member of staff who will initiate our Laboratory Complaints procedure.

*All complaints will be fully investigated and replies will be sent.*
HELP US TO HELP YOU

The Centre for Infections routinely receives several hundred parcels containing pathological specimens every day.

To ensure that specimens are processed as rapidly as possible, please ensure that the name "Laboratory of Enteric Pathogens" is clearly identified on the address label. If in doubt, please use the telephone contacts directory listed at the end of this booklet to check on the appropriate identification.

Full details of the sample or specimen will ensure that all appropriate tests and interpretations are provided.

If a specimen or sample result is required urgently, prior telephone contact with the receiving unit or laboratory will ensure priority.

To ensure that specimens or samples are not subjected to needless transport delays, please always follow the current transport regulations (see page 18 for link).

Samples may also be submitted through the Hays DX System. The address of the Laboratory of Enteric Pathogens is:

HPA Colindale, (LEP)
DX 6530008
Colindale NW

The time taken to perform identification, detection and typing tests is dependent on the receipt of pure cultures. Cultures that require purification may increase turnaround time significantly.
The recommendations of the Caldicott Report (1997) have been adopted by the Health Protection Agency as by the National Health Service as a whole. These recommendations relate to the security of patient identifying data (PID) and the uses to which they are put. The Centre for Infections (Cfl) observes Caldicott guidance in handling PID and has appointed its own Caldicott Guardian. He advises the Director, Cfl, on confidentiality issues and is responsible for monitoring the physical security of PID in all parts of Cfl. This also applies to the transfer of results of investigations to and from Cfl whether by mail services, telephone or fax. The value of ‘safe haven’ arrangements or other means of the sender and receiver of information identifying themselves to each other before data is transferred is emphasised (see attached Cfl Policy on faxing and e-mailing reports containing patients' data).

Cfl is anxious to audit the security of its PID in collaboration with its customers. Customers are invited to review our arrangements in conjunction with individual laboratory directors and/or the Caldicott Guardian. Customers are also asked to draw to the Caldicott Guardian’s attention any instances where PID security has been threatened or has broken down. Uses that PID are put to outside clinical diagnostic services generally allow patient identifiers to have been removed before hand, and when PID is used for research purposes the proposals are considered first by the appropriate Ethics Committee. All enquiries about the security and use of PID should be addressed to the Caldicott Guardian, Dr Barry Evans (020 8327 7459; email barry.evans@hpa.org.uk).
CfI policy on faxing and emailing reports containing patients’ data

The following guidelines are prepared having taken into account the Code of Practice on reporting patients’ results by fax prepared by the DoH and Caldicott recommendations.

It is CfI policy that reports containing patient’s data should not be sent by fax or E-Mail.

E-Mails cannot be relied on to guarantee security of patient’s data because they can be intercepted by a third party on route.

In exceptional circumstances it may be necessary to send a result by fax but not by E-Mail. In this case the following conditions must be adhered to after discussion with the Laboratory. Refer also to the document “CfI recognition of Caldicott recommendations”.

The patient’s name must be conveyed separately using a linking patient identifier.

The report must be sent to a “safe-haven” fax machine. This means that, if the location is in general use, consideration must be given to ensuring that unauthorised personnel are unable to read reports, accidentally or otherwise. Also, the room housing the fax machine must be a secure location which is locked if it is likely to be unattended at the time the fax is sent.

Assurance must be sought from the intended recipient of the faxed report, preferably in writing, that the receiving fax machine is a safe-haven.

Measures must be taken to minimise the risk of mis-dialling, either by double-checking numbers or having frequently used numbers available on the fax machine’s memory dial facility.

Confirmation must always be sought from the intended recipient that the fax is expected and has been received.
TRANSPORT REQUIREMENTS

Any organisation sending out cultures or diagnostic specimens has a legal duty to ensure that such items are sent in a safe manner. Infectious substances which break or leak in transit can result in a major incident, putting those handling them and those in receipt of them at risk of infection. It is therefore vital that the correct transport requirements are followed. Please see Department of Health website for latest changes to transport regulations.


If submitting an isolate suspected to be *Y. pestis* this must be sent as Category A (you should have made arrangements in advance with whichever Category A courier firm you intend to use). You should also inform LEP in advance, using the form at this link.

http://www.hpa.org.uk/cfi/lep/

If submitting an isolate suspected to be a Vero cytotoxin-producing *Escherichia coli* (VTEC) (O157 is the most common serotype) or *Sh. dysenteriae* 1 then this can be sent as Category B but must be sent by a courier who will accept such material and NOT by Royal Mail Group plc. You should also notify LEP using the form at the above link.

Please note this form deliberately does not have a space for patients name to avoid potential for Caldicott breeches caused by misdialling FAX number, however please provide this information on request form which will accompany the sample.

Do not mix Category A and Category B organisms in the same packaging.

Do NOT mix Hazard Group 2 and Hazard Group 3 specimens in the same Category B package.

Place request form(s) in cardboard outer and NOT in the bio-bottle with the samples.

Please avoid use of selotape for sealing specimen containers and cardboardouters of packages.

• If dry ice is used it must be placed around the secondary packaging. Use interior supports to secure secondary packaging after dry ice has dissipated. If ice is used, waterproof outer packaging must be used. If dry ice is used, the outer packaging must allow escape of CO₂. *An explosion may occur if dry ice is placed in the secondary packaging.*
# LIST OF KEY CONTACTS

To contact one of the persons listed, dial 020 8327- and the required extension number.

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Ext</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>Prof EJ Threlfall</td>
<td>6117</td>
<td><a href="mailto:john.threlfall@hpa.org.uk">john.threlfall@hpa.org.uk</a></td>
</tr>
<tr>
<td>PA to Director/Office Manager</td>
<td>Ms BR Purohit</td>
<td>6114</td>
<td><a href="mailto:bharati.purohit@hpa.org.uk">bharati.purohit@hpa.org.uk</a></td>
</tr>
<tr>
<td>Laboratory Manager</td>
<td>Mr S Reith</td>
<td>6110</td>
<td><a href="mailto:stewart.reith@hpa.org.uk">stewart.reith@hpa.org.uk</a></td>
</tr>
<tr>
<td>Compliance Manager</td>
<td>Mr S Reith</td>
<td>6110</td>
<td><a href="mailto:stewart.reith@hpa.org.uk">stewart.reith@hpa.org.uk</a></td>
</tr>
<tr>
<td>Quality Assurance Manager</td>
<td>Mr J Skinner</td>
<td>6158</td>
<td><a href="mailto:jeremy.skinner@hpa.org.uk">jeremy.skinner@hpa.org.uk</a></td>
</tr>
<tr>
<td>Information Manager</td>
<td>Mr O Schmid</td>
<td>6144</td>
<td><a href="mailto:olliver.schmid@hpa.org.uk">olliver.schmid@hpa.org.uk</a></td>
</tr>
</tbody>
</table>

## Detection, Identification, Serotyping and Phage typing

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Name</th>
<th>Ext</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter spp.</td>
<td>Dr RJ Owen</td>
<td>6740</td>
<td><a href="mailto:robert.owen@hpa.org.uk">robert.owen@hpa.org.uk</a></td>
</tr>
<tr>
<td>Helicobacter spp.</td>
<td>Dr RJ Owen</td>
<td>6740</td>
<td><a href="mailto:robert.owen@hpa.org.uk">robert.owen@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>Escherichia</em> including <em>E. coli</em> O157</td>
<td>Mr T Cheasty</td>
<td>6173</td>
<td><a href="mailto:tom.cheasty@hpa.org.uk">tom.cheasty@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>Shigella</em> spp., <em>Yersinia</em> spp., <em>Vibrio</em> spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Salmonella</em> spp.</td>
<td>Mrs E de Pinna</td>
<td>6136</td>
<td><a href="mailto:elizabeth.depinna@hpa.org.uk">elizabeth.depinna@hpa.org.uk</a></td>
</tr>
<tr>
<td>DNA-based tests for VTEC and other enterovirulent <em>E. coli</em></td>
<td>Dr GA Smith</td>
<td>6146</td>
<td><a href="mailto:geraldine.smith@hpa.org.uk">geraldine.smith@hpa.org.uk</a></td>
</tr>
</tbody>
</table>

## Serodiagnosis

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Name</th>
<th>Ext</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Yersinia</em> spp.</td>
<td>Mr T Cheasty</td>
<td>6173</td>
<td><a href="mailto:tom.cheasty@hpa.org.uk">tom.cheasty@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>E. coli</em> O157</td>
<td>Dr H Chart</td>
<td>6101</td>
<td><a href="mailto:henrik.chart@hpa.org.uk">henrik.chart@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>Salmonella</em> Typhi S. Paratyphi A, B and C</td>
<td>Dr H Chart</td>
<td>6101</td>
<td><a href="mailto:henrik.chart@hpa.org.uk">henrik.chart@hpa.org.uk</a></td>
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## Antimicrobial Resistance

<table>
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<tr>
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<th>Name</th>
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</thead>
<tbody>
<tr>
<td>Campylobacter spp.</td>
<td>Dr RJ Owen</td>
<td>6740</td>
<td><a href="mailto:robert.owen@hpa.org.uk">robert.owen@hpa.org.uk</a></td>
</tr>
<tr>
<td>Helicobacter spp.</td>
<td>Dr RJ Owen</td>
<td>6740</td>
<td><a href="mailto:robert.owen@hpa.org.uk">robert.owen@hpa.org.uk</a></td>
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<tr>
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<td>Mr T Cheasty</td>
<td>6173</td>
<td><a href="mailto:tom.cheasty@hpa.org.uk">tom.cheasty@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>Salmonella</em> spp. and other <em>Enterobacteriaceae</em></td>
<td>Prof EJ Threlfall</td>
<td>6117</td>
<td><a href="mailto:john.threlfall@hpa.org.uk">john.threlfall@hpa.org.uk</a></td>
</tr>
<tr>
<td><em>Vibrio</em></td>
<td>Prof EJ Threlfall</td>
<td>6117</td>
<td><a href="mailto:john.threlfall@hpa.org.uk">john.threlfall@hpa.org.uk</a></td>
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## Molecular Typing

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<td><a href="mailto:john.threlfall@hpa.org.uk">john.threlfall@hpa.org.uk</a></td>
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<tr>
<td>VTEC /<em>E. coli</em></td>
<td>Dr GA Smith</td>
<td>6146</td>
<td><a href="mailto:geraldine.smith@hpa.org.uk">geraldine.smith@hpa.org.uk</a></td>
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