From Enter-net: International surveillance network for the enteric infections - Salmonella and VTEC O157

VTEC SURVEILLANCE REPORT, JANUARY-DECEMBER 2000

This report details the results of an analysis of the Enter-net VTEC database for the year 2000. Data are collected according to the specification agreed by consensus among the participants in 1997.

There are a total of 2,013 human records in the Enter-net VTEC database for the year 2000; these have been supplied by 13 countries: Most cases were reported by England and Wales (898, 44.6% of the total), followed by Germany (520, 25.8%), Scotland (198, 9.8%), the Czech Republic (70, 3.5%), Denmark (62, 3.1%), Sweden (59, 2.9%), Belgium (47, 2.3%), Ireland (46, 2.3%), the Netherlands (46, 2.3%), Italy (28, 1.4%), Finland (17, 0.8%), Austria (13, 0.6%) and Spain (9, 0.4%).

SEROGROUPS IDENTIFIED

The distribution of serogroups identified differs by country, with some countries only identifying Escherichia coli O157, and others identifying other serogroups as detailed in Table 1. The predominant serogroup is O157, which makes up 1,462 of the cases (72.6%). Other groups with significant numbers are given in Table 2 and Figure 1. The category “other” is made up of 46 different serogroups.

VT TYPES

Data on VT production are available for 1,709 of the records. For E. coli O157 isolates, type 1 was identified in 125 (10.3%) cases, type 2 in 1,087 (89.7%), and types 1 and 2 in 354 (23.7%) cases. In non-O157, type 1 was identified in 337 (67.8%) cases, type 2 in 160 (32.2%), and both types in 82 (16.5%) cases.

Table 1 - Distribution of E. coli O157 and non O157 serogroups identified by country

<table>
<thead>
<tr>
<th>Country</th>
<th>O157</th>
<th>Non-O157</th>
<th>Not stated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>84.6</td>
<td>15.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Czech Rep</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Denmark</td>
<td>30.6</td>
<td>69.4</td>
<td>9.7</td>
</tr>
<tr>
<td>Germany</td>
<td>19.0</td>
<td>81.0</td>
<td>14.3</td>
</tr>
<tr>
<td>Spain</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Ireland</td>
<td>89.1</td>
<td>10.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Scotland</td>
<td>99.5</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Finland</td>
<td>35.3</td>
<td>64.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Italy</td>
<td>17.9</td>
<td>82.1</td>
<td>14.3</td>
</tr>
<tr>
<td>Netherlands</td>
<td>93.5</td>
<td>6.5</td>
<td>0.0</td>
</tr>
<tr>
<td>England &amp; Wales</td>
<td>99.8</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Belgium</td>
<td>57.4</td>
<td>42.6</td>
<td>27.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>72.9</td>
<td>27.1</td>
<td>5.1</td>
</tr>
</tbody>
</table>

ANTIMICROBIAL RESISTANCE TESTING RESULTS

Antimicrobial susceptibility test results were available for 1,475 of the 2,013 cases, all of which were tested against the panel of 11 antimicrobial agents recommended by Enter-net. The frequency and percentage in each category are given in Table 4. Thirty-three records (2.2%) showed resistance to 5 or more antibiotics; 8 were group O26 or O157, 4 were not stated; 2 were O103, O111 or

International VTEC/STEC Club (IVC) is a meeting point to promote communication among the various groups throughout the world that are studying VTEC infection. IVC news collect information on outbreaks, case-clusters, isolation of particularly interesting strains, updates on the trend of O157 isolation, requests for strains, etc. The newsletter is not a scientific journal, and thus contributions will not be kept or delayed if authors plan to publish them elsewhere. They will not undergo a review process but minor editorial changes may be made. IVC has a web site at URL: http://www.iss.it/centri/vtec/vtec.htm

To receive IVC news or submit communications please contact:

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Figure 1 - Frequency of non-O157 serogroups in 2000 (n=551)

Figure 2 - O157 (906) and non-O157 (271) E. coli by clinical manifestation in 2000

Table 2 - Distribution of serogroups

<table>
<thead>
<tr>
<th>Serogroup</th>
<th>no</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>O157</td>
<td>1,462</td>
<td>72.6</td>
</tr>
<tr>
<td>O26</td>
<td>121</td>
<td>6.0</td>
</tr>
<tr>
<td>O103</td>
<td>64</td>
<td>3.2</td>
</tr>
<tr>
<td>O91</td>
<td>39</td>
<td>1.9</td>
</tr>
<tr>
<td>O145</td>
<td>29</td>
<td>1.4</td>
</tr>
<tr>
<td>O111</td>
<td>21</td>
<td>1.0</td>
</tr>
<tr>
<td>O113</td>
<td>18</td>
<td>0.9</td>
</tr>
<tr>
<td>O128</td>
<td>18</td>
<td>0.9</td>
</tr>
<tr>
<td>O8</td>
<td>15</td>
<td>0.8</td>
</tr>
<tr>
<td>O146</td>
<td>14</td>
<td>0.7</td>
</tr>
<tr>
<td>O76</td>
<td>12</td>
<td>0.6</td>
</tr>
<tr>
<td>Others</td>
<td>87</td>
<td>4.3</td>
</tr>
<tr>
<td>Not stated</td>
<td>113</td>
<td>6.5</td>
</tr>
<tr>
<td>Total</td>
<td>2,013</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3 - Distribution of O157 phage type

<table>
<thead>
<tr>
<th>O157 phage type</th>
<th>no</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>21/28</td>
<td>381</td>
<td>26.1</td>
</tr>
<tr>
<td>8</td>
<td>248</td>
<td>16.7</td>
</tr>
<tr>
<td>2</td>
<td>210</td>
<td>14.4</td>
</tr>
<tr>
<td>32</td>
<td>117</td>
<td>8.0</td>
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<td>4</td>
<td>67</td>
<td>4.6</td>
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<tr>
<td>14</td>
<td>58</td>
<td>4.0</td>
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<tr>
<td>21</td>
<td>19</td>
<td>1.3</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
<td>1.2</td>
</tr>
<tr>
<td>34</td>
<td>18</td>
<td>1.2</td>
</tr>
<tr>
<td>Other</td>
<td>78</td>
<td>5.3</td>
</tr>
<tr>
<td>Not stated</td>
<td>248</td>
<td>17.2</td>
</tr>
<tr>
<td>Total</td>
<td>1,462</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4 - Antimicrobial susceptibility of VTEC isolates

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Resistant Freq (%)</th>
<th>Intermediate Freq (%)</th>
<th>Sensitive Freq (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>78 (5.3)</td>
<td>445 (30.2)</td>
<td>952 (64.5)</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>21 (1.4)</td>
<td>20 (0.0)</td>
<td>1,454 (98.6)</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>250 (16.9)</td>
<td>241 (16.3)</td>
<td>1,205 (81.7)</td>
</tr>
<tr>
<td>Sulphonamides</td>
<td>292 (19.8)</td>
<td>280 (19.0)</td>
<td>942 (63.9)</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>212 (14.3)</td>
<td>280 (19.0)</td>
<td>983 (66.7)</td>
</tr>
</tbody>
</table>

Data on the clinical manifestation of the cases at time of testing were available for 1,183 cases. Seven hundred and seventy-five reports had diarrhoea (65.5%), 310 had bloody diarrhoea (26.2%), 60 (5.1%) had Haemolytic Uraemic Syndrome (HUS), and 38 (3.2%) were asymptomatic.

CLINICAL MANIFESTATION

The clinical manifestation does vary significantly between O157 and non-O157 cases. More
expected from *E. coli* infections, with just under half of the cases (871, 44.1%), occurring in the months of July, August and September (Figure 3).

**Age and Sex Distribution**

Data are available for 1,947 of the reports, with the majority (717, 36.8%) being in the age bands of 0-5 years, followed by 695 (36.7%) in the 15-64 years age band. However, the age distribution does vary between O157 and non-O157 cases. There are more cases of O157 than non-O157 in the under 1 year age group (4.9% cf 1.6%) although this is reversed for the 1-5 age band (27.7% cf 47.0%). One other notable difference occurs in the 65 years + age band with 9.8% of all non-O157 cases in this band compared with only 4.2% of O157 cases. There are more females (51.2%) than males (44.2%), this is similar for both O157 and non-O157 cases. Although the difference is most pronounced in the 15-64 years age band (Figures 4 and 5).

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**Ian Fisher. Enter-net Scientific Co-ordinator, on behalf of the Enter-net surveillance network. Enter-net is funded by the European Commission, DG SANCO - contract no SI2.307479 (2000CVG4-037)**

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cases with non-O157 infection had diarrhoea than O157 cases, 77.5% cf 61.8%. Conversely bloody diarrhoea was reported in 30.9% of the O157 cases, and only 10.7% of the non-O157 cases. HUS was reported in 3.6% of O157 cases, but in 10.0% of non-O157 cases (although this may be biased as HUS is often an indicator to look for other VTECs as well), 3.6% of O157 reports were asymptomatic compared with 1.8% of non-O157 reports (Figure 2).

**Seasonality**

Of the 1,974 cases for whom dates were available, the seasonality showed the distribution ex-

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**Figure 3 - *E. coli* cases by months in 2000 (no = 1,974)**

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**Figure 4 - Non-O157 *E. coli* by age and sex in 2000 (no = 528)**

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**Figure 5 - *E. coli* O157 by age and sex - 2000 (no = 1,419)**
From Enter-net

Changing patterns of VTEC infection in Britain and continental Europe

Within the European Union the surveillance of infections carried by Verocytotoxin-producing E. coli (VTEC) has been enhanced by Enter-net.

Enter-net is the surveillance network for VTEC and salmonella infections, funded by the European Commission and the participants include all fifteen European Union members plus Australia, Canada, Japan, Norway, South Africa and Switzerland. The main objectives of Enter-net for VTEC infections are monitoring of trends in the microbiology and epidemiology of VTEC infection and outbreak recognition. Monitoring data are important in the identification of risk factors and an international database has been established. Enter-net functions on a rapid communication network so that information on outbreaks that may be affecting more than one country can be identified and information can be disseminated rapidly. Data from the Enter-net VTEC database are published separately. In this study we have examined changes in patterns of VTEC infection in selected European countries with particular emphasis on strain typing. Data have been provided by England and Wales, Germany, Italy and Scotland.

An inventory of laboratory methods for diagnosis of VTEC infection was conducted by Enter-net. This showed that there is considerable variation in the techniques employed in different countries. In England, Wales and Scotland the vast majority of diagnostic laboratories examined diarrhoeal stool specimens for Non-Sorbitol Fermenting (NSF) E. coli O157 by plating on Sorbitol MacConkey agar containing cefixime and tellurite. This was also performed in some laboratories in Italy. In Germany specimens were screened using an ELISA and PCR for VT genes. In all countries in this study selected stool specimens were examined in reference laboratories. For E. coli O157 immunomagnetic separation was used and for VTEC of all serogroups the methods were the Vero cell assay and ELISA for VT, PCR and DNA hybridisation for VT genes. Typing of VTEC isolates involved the use of different combinations of methods. Isolates were identified biochemically as E. coli and serotyped. The VT gene type and subtype was determined by DNA hybridisation and PCR. VTEC O157 strains were phage typed using the scheme developed in Canada. The presence of virulence genes was detected by PCR and further strain discrimination was performed by pulsed field gel electrophoresis (PFGE).

Between 1995 and 2001 the incidence and rates of VTEC infection varied considerably between countries with Scotland recording the highest rates. For England, Wales and Scotland data for VTEC O157 only were available (Table 1) since laboratory surveillance for non-O157 VTEC was so limited. The rates per 100,000 population in Scotland reached 9.9 and 8.2 in 1996 and 1997 respectively mainly as a result of the very large Central Scotland outbreak. In other years the rates in Scotland were 2 to 3 times higher than those in England and Wales.

Surveillance of Haemolytic Uraemic Syndrome (HUS) provides valuable data and is an indicator of changes in overall VTEC infections. In Britain between 1997 and 2001 the rates per 100,000 population were 0.8 for children < 15 years and 1.5 for those < 5 years. Italian data for 1995 to 2001 showed rates of 0.3 per 100,000 for < 15 years and 0.8 for children under 5 years old.

Data for VTEC infections caused by all serogroups in Italy between 1988 and 2000 have been published recently (3) and updated information for 1995 to 2001 is shown in Figure 1.

Many of these isolates were from HUS cases. The number of non-O157 VTEC has increased as

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>England &amp; Wales</td>
<td>1.6</td>
<td>1.3</td>
<td>2.1</td>
<td>1.7</td>
<td>2.1</td>
<td>1.8</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>792</td>
<td>660</td>
<td>1087</td>
<td>890</td>
<td>1084</td>
<td>896</td>
<td>768</td>
</tr>
<tr>
<td>Scotland</td>
<td>4.8</td>
<td>9.9</td>
<td>8.2</td>
<td>4.2</td>
<td>5.7</td>
<td>4.1</td>
<td>4.6</td>
</tr>
<tr>
<td>Total</td>
<td>247</td>
<td>506</td>
<td>423</td>
<td>217</td>
<td>294</td>
<td>197</td>
<td>236</td>
</tr>
</tbody>
</table>

Figure 1 - Serogroups of VTEC in Italy: 1995-2001
shown by VTEC O26 in 2000. VTEC O111 were detected before 1995 but isolates of that serogroup have been very rare since as shown in Figure 1. Results from Germany from 1999 to 2001 are shown in Figure 2. VTEC O157 was the single most commonly isolated serogroup but accounted only for 16 to 21% of the VTEC isolates between 1999 and 2001. VTEC strains of serogroups O26, O103 and O91 were commonly isolated but in each of the three years over 20% of the VTEC belonged to wide variety of serogroups other than those shown in Figure 2.

The percentages of different phage types (PT) of VTEC O157 from 1995 to 2001 are shown in Figures 3 and 4 for the data in England and Wales and Scotland respectively.

Data on the phage types of VTEC O157 in Germany for 2000 and 2001 are shown in Figure 5. Significant changes in PT distribution were seen and PT21/28 has been predominant in Scotland since 1997 and in England and Wales since 1999 and this rise in PT21/28 has been accompanied by a drop in isolates belonging to PT2. This phage type has never been isolated from humans in Italy. Phage types 4, 8 and 14 were isolated in England and Wales, Germany, Italy and Scotland. In Germany approximately 10% of the VTEC O157 belonged to PT88. These isolates were all Sorbitol fermenters and such isolates did not grow on sorbitol MacConkey containing cefixime and tellurite (4). The Scottish E. coli O157 Reference Laboratory has recently reported the isolation of a sorbitol-fermenting VTEC O157 from a child with HUS (5).

For epidemiological studies further typing is required within O serogroups and also the common phage types of VTEC O157 and in most laboratories this is usually performed by PFGE.

Although the data presented in this study were incomplete some clear conclusions can be drawn.
- Significant differences were observed in the incidence of VTEC infections in the countries included in this study.
In contrast to the British data those from Germany and Italy illustrated the importance of non-O157 serogroups including their contribution as the cause of HUS cases.

Improved laboratory-based surveillance for VTEC of all serogroups is required. Use of similar methods in all EU countries is needed to enable Internet to achieve its objectives as a surveillance network for VTEC.

The use of O serogrouping, phage typing for VTEC O157, VT typing and pulsed field gel electrophoresis has provided valuable data for following changes of VTEC strains.

Surveillance of HUS provides an important indicator of VTEC infection and this needs to be improved on a European basis.

This work was presented as a poster at the International Conference on Emerging Infectious Diseases held in Atlanta, USA March 24–27th 2002.

References


Attaching-effacing Escherichia coli: AEEC Infections

A European Union Research and Technological Development Project

A EU R&D project titled “AEEC infections: pathogenesis, host response and epidemiology of Attaching and Effacing E. coli (AEEC)” (QLK2-2000-00600) started in the year 2000, funded under the EU Quality of Life V framework. The project is coordinated by Eric Oswald from the Institut National de la Recherche Agronomique (INRA) in Toulouse, and includes 12 institutes from 8 countries: France (Eric Oswald, Isabelle Oswald - Institut National de la Recherche Agronomique, Toulouse), United Kingdom (Hywell Ball-The Queen's University of Belfast, Belfast, Gad Frankel-Imperial College of Science, Technology and Medicine, London, Tim Wallis-Institute for Animal Health, Compton, Berkshire), Germany (Lothar Beutin - Robert Koch-Institute, Berlin, Herbert Schmidl-Universitat Dresden, Dresden), Belgium (Jacques Mainil, Veterinary Faculty, University of Liege), Italy (Alfredo Caprioli - Istituto Superiore di Sanita, Rome), Hungary (Bela Nagy - Academy of Science Hungary, Budapest), Israel (Ilan Rosenman - The Hebrew University Faculty of Medicine, Jerusalem), and Canada (John Fairbrother - Universite de Montreal, Saint-Hyacinthe).

The overall scientific objective of the project is to understand the molecular, immunological and epidemiological basis for controlling zoonotic AEEC infections. The expected achievement of this project is to improve current strategies aimed at assessing and preventing the risk associated with AEEC. The combined results will provide a solid scientific (and technological) basis for the design of effective strategies for the control of AEEC infections in both humans and animals. The novel technical and scientific approaches used in the AEEC project to study AEEC pathogenesis will help to determine which virulence factors are essential for the differentiation of full pathogenic AEEC isolates.

Potential applications from the work developed within the project are development of preventive strategies for AEEC infections including vaccines (a live attenuated vaccine and a DNA vaccine) and immunotherapy (with egg yolk antibodies); development of sensitive and specific diagnostic tests for AEEC (an immuno-magnetic separation method for selective enrichment of AEEC and MAb-based ELISA’s).

Project web-site: http://www.inra.fr/aaee/

Eric Oswald (Institut National de la Recherche Agronomique, INRA) e-mail: e.oswald@envt.fr

HR Smith, T Cheasty, GA Willshaw (PHLS Laboratory of Enteric Pathogens, Central Public Health Laboratory, London), A Caprioli, AE Tozzi (Istituto Superiore di Sanita, Rome), E Coia (Scottish E. coli O157 Reference Laboratory, Edinburgh), IST Fisher, SJ O'Brien (PHLS Gastrointestinal Diseases Division, Communicable Diseases Surveillance Centre, London), A Frith, H Tschape (Robert Koch institut, Wernigerode), WJ Reilly (Scottish Centre for Infection and Environmental Health, Glasgow), (on behalf of the Internet participants)
VTEC 2003
5th International Symposium on Shiga Toxin Producing Escherichia coli infections
Edinburgh 8-11 June, 2003
www.vtec2003.com

VTEC 2003 will be a showcase for the latest research on VTEC infections from around the world and will build on the success of the conference held in Bergamo, Italy (1994), Baltimore, USA (1997) and more recently in Kyoto, Japan in 2000. Experts from a variety of disciplines will attend including paediatricians, nephrologists, haematologists, gastroenterologists, microbiologists, internists, veterinarians, food scientists, public health experts, biochemists, immunologists and molecular biologists. We expect around 600 delegates to attend.

CONFERENCE VENUE

The Conference will be held in the Edinburgh International Conference Centre (EICC) located in the heart of the city. The EICC is within easy walking distance of the conference hotels and is fully accessible by those with physical disabilities.

CONFERENCE THEMES

- VTEC in the food chain, veterinary, agriculture
- Epidemiology of VTEC in humans, public health
- Pathogenic mechanisms, virulence factors and animal models, strain diversity
- Pathophysiology, treatment and prevention

CONFERENCE TOPICS AND SUBTOPICS AND PRELIMINARY LIST OF SPEAKERS

Food chain
- Risk assessment
- Animal epidemiology
- Environmental persistence
- Survival in foods
- Intervention strategies
 Speakers: Michael Doyle, Center for Food Safety, University of Georgia, USA; Patricia Desmarchelier, Food Science Australia, Australia; David Gally, Zoonotic and Animal Pathogens Research Laboratories, The University of Edinburgh, UK; Brett Finlay, Biotechnology Laboratory Wesbrook Building, University of British Columbia, Canada; USA; Bernd Zimmerhackl, University of Innsbruck, Austria; Leo Monnens, University of Nijmegen, The Netherlands; Kiyotaka Nishikawa, Research Institute, International Medical Center of Japan, Japan

Epidemiology
- Recent outbreaks
- Detection methods
- Surveillance
- Molecular epidemiology
- Significance of non-O157 serotypes
 Speakers: Bill Reilly, Scottish Center for Infection and Environmental Health, Glasgow, UK; Flemming Schuetz, The International Escherichia and Klebsiella Centre (WHO), Denmark

The Biology of STEC
- Virulence factors
- Animal models
- Genomics/population genetics
 Speakers: Gad Frankel, Department of Biological Sciences, Flowers Building, Imperial College, London, UK; James Kaper, University of Maryland School of Medicine, USA; Herbert Schmidt, University of Dresden, Germany; Tetsuya Hayashi, Miyazaki Medical College, Japan

Clinical aspects
- Pathophysiology
- Treatment
- Human vaccines
- Renal, gastrointestinal, neurological manifestations
 Speakers: Diana Karpman, Lund University, Lund, Sweden; Phillip I. Tarr, Children’s Hospital and Regional Medical Center, Seattle, USA

Outline programme
Sunday 8 June
18.00 Welcome Reception, EICC

Monday 9 June
8.00 Registration and Exhibition Opens
9.00 Opening Remarks
10.30 Tea/Coffee
11.00 Plenary Sessions
12.30 Lunch and Poster Viewing
13.30 Plenary Sessions
15.30 Tea/Coffee
16.00 Plenary Sessions
17.30 End of Sessions

Evening Free

Tuesday 10 June
8.00 Registration and Exhibition Opens
9.00 Plenary Session
9.00 Simultaneous Session
10.30 Tea/Coffee
11.00 Plenary Sessions
11.00 Simultaneous Session
12.30 Lunch and Poster Viewing
13.30 Plenary Sessions
13.30 Simultaneous Session
15.30 Tea/Coffee
16.00 Plenary Sessions
17.30 End of Sessions
19.00 Midnight Conference Dinner and Entertainment, Assembly Rooms

Wednesday 11 June
8.00 Registration and Exhibition Opens
9.00 Plenary Session
9.00 Simultaneous Session
10.30 Tea/Coffee
11.00 Plenary Sessions
11.00 Simultaneous Session
12.30 Lunch and Poster Viewing
13.30 Plenary Sessions
13.30 Simultaneous Session
15.30 Tea/Coffee
16.00 Close

Local Organising Committee
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Michael Doyle - USA
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David Acheson - USA

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Valeria Prado - Chile
Henry Smith - UK
Haruo Watanabe - Japan

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Gad Frankel - UK
James Kaper - USA
Cliff Lingwood - Canada
Alison O'Brien - USA
Chihiro Sasaki - Japan
Herbert Schmidt - Germany
Thomas Whittam (or Nicola Perna) - USA

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Marguerite Neill - USA
Thomas Obrig - USA
James Paton - USA
Phil Tarr - USA
Mark Taylor - UK
Nicole van de Kar - The Netherlands

International Steering Committee
James Kaper (Chair) - USA

Registration
You can register electronically via the web-site at www.vtec2003.com

Fees are as follows: conference fee before 31st March 2003 £ 375; after 31st March 2003 £ 450
The fee for registered participants includes:
- Attendance at the scientific sessions
- Entry to the exhibition
- Delegate bag and Conference material
- Book of Abstracts
- Attendance at the Welcome Reception
- Attendance at the Conference Dinner
- Catering - morning and afternoon refreshments, lunches

Conference organisers
(from whom further information can be obtained)

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