



**COST ACTION B28**  
**“Array technologies for BSL3 and BSL4**  
**pathogens”**

**6<sup>th</sup> Management Committee and**  
**WG1, WG2, WG3, WG4 and WG5 meetings**

**September 10 – 12, 2007**  
**Bucharest, Romania**

**Venue:**

**Rin Grand Hotel**  
**Bl. Vitan Barzesti 7D, Sector 4, Bucharest,**  
**Phone/Fax: +40 (0)31 106 1111**

**Local Organiser:**

Prof. Dr. Petre Calistru [pcalistru@yahoo.com](mailto:pcalistru@yahoo.com)  
President of Dr Victor Babes Foundation

Iuliana Apostol, MD [japostol@cdt-babes.ro](mailto:japostol@cdt-babes.ro)  
[iuliana\\_a@yahoo.com](mailto:iuliana_a@yahoo.com)

Dr Victor Babes Foundation  
Sos Mihai Bravu, Nr 281, Sector 3, Bucharest, Romania  
Phone:0040.021.317.95.03  
Fax: 0040.021.317.95.02

## Wednesday, 10.09.2008

Invited speakers session I

15:00 – 17: 00 registration of attendances

### 15:45 – 18:00 Invited speakers session I

15:45-16:00 COST B28 welcome & opening Patrick Butaye;

16:00 – 16:45 Plenary lecture: Dr Tony Barbuzzi – Bio MEMS Application. Use of microtechnology for DNA chips implementation

16:45 – 17:30 Plenary lecture: Prof. Syed Hashsham- Parallel detection and quantification of pathogens using DNA biochips, on-chip PCR, and hand-held devices

## Thursday, 11.09.2008

Invited speakers session II, Array technologies, Antigenicity, Proteomics and Glycomics

07:00 – 08:00 *breakfast*

### 08:00 – 10:15 Invited speakers session II

08:00 – 08:45 Plenary lecture: Dr Stephan Gunther- Molecular detection techniques for hemorrhagic fever viruses

08:45 – 09:30 Plenary lecture: Prof. Dr Simona Ruta – Development of Early Warning and Response System (EWRS) for West Nile virus infection surveillance at the national and European level

09:30 – 10:15 Plenary lecture: Prof. Lucian Negrutiu – NIPAH virus- from the pathogen to biological weapon

Invited speakers to reimburse

1	Dr. Barbuzzi Tony	Italy	To be reimbursed as an invited speaker
2	Prof. Hashsham Syed A.	USA	To be reimbursed as an invited speaker
3	Dr. Stephan Gunther	Germany	To be reimbursed as an invited speaker
4	Prof. Negrutiu Lucian	Romania-Timisoara	To be reimbursed as an invited speaker
5	Prof. Dr. Ruta Simona	Romania-Bucharest	Not reimbursed

10:15 – 10:45 *coffee*

### 10:45 – 12:45 WG1: Array technologies (2 hours)

- Introduction WG1 chair Jacques Schrenzel (replaced by Tanja Kostic)

-Kempesell Karen **“Pan-pathogen Microarrays for Diagnosis of Infectious Agents in Patient Clinical Material”**

-Sanoussi Souzan-to be announced

-Piskin Erhan **“Diagnostic Test Kits, Biosensors and Array Platforms”**

-Nordstrom Henrik **“DNA Microarray Technique for Detection and Identification of Viruses Causing Encephalitis and Hemorrhagic Fever”**

- Cornelis Schoen –to be announced

- Lekbira Hasib-**“Development of molecular diagnostics for emerging European arboviruses”**

-Future activities and planning of actions of WG1

WG1 participants to reimburse:

1.	Kostic Tanja	Austria	To be reimbursed as a MC member
2.	Sanoussi Souzan	Austria	To be reimbursed as a WG1 member
3.	Jean-Luc Gala	Belgium	To be reimbursed as a MC member
4.	Hasib Lekbira	Germany	To be reimbursed as a WG1 member
5.	Pierre-Alain Fonteyne	Belgium	To be reimbursed as a WG1 member
6.	Nordstrom Henrik	Sweden	To be reimbursed as WG1 member
7.	Jasper Kieboom	The Netherlands	To be reimbursed as MC member
8.	Cornelis Schoen	The Netherlands	To be reimbursed as a WG1 member
9.	Piskin Erhan	Turkey	To be reimbursed as MC member
10.	Kempesell Karen	UK	To be reimbursed as WG1 member

12:45-14:45 lunch

**14:45 – 16:15 WG2: Antigenicity (1 hours 30 min)**

-introduction WG2 chair Claude P. Muller (replaced by Kainov Denis)

-Kainov Denis- **“Rapid detection of influenza H5N1 viruses”**

-Abad Morejon de Giron Francesc-Xavier- **“Environmental persistence of highly pathogenic H7N1 avian influenza virus”;**

-Alexandrescu Viorel-to be announced

-Future activities and planning of actions of WG2

WG2 participants to reimburse:

1	Patricia Renesto Audiffren	France	To be reimbursed as MC
2	Kainov Denis	Luxemburg	To be reimbursed as WG2 member
3	Glisic Sanja	Serbia	To be reimbursed as WG2 member
4	Alexandrescu Viorel	Romania	Not reimbursed
5	Abad Morejon de Giron Francesc-Xavier	Spain	To be reimbursed as WG2 member
6	Mariano Domingo	Spain	To be reimbursed as WG2 member

16:15 - 16:45 coffee

**16:45 – 18:15 WG3: Proteomics and Glycomics (2 hours)**

-introduction WG3 chair Stulik Jiri

-Stulik Jiri **“FTT 1103 the new factor of virulence of intracellular pathogen Francisella tularensis”**

-Macela Ales **“The role of antibodies in Francisella tularensis infection”**

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Hübschen Judith –**“Pathogens in ticks**

-Toman Rudolf -to be announced

-Gil Gil Horacio **“Simultaneous detection of Francisella tularensis, Coxiella burnetii and Rickettsia spp by a multiplex PCR combined with Reverse Line Blot”**

-Willy Zorzi & Elmoualij Benaissa **“The 2D-LC-SERPA-MS-MS, a original multiple-dimension immuno-proteomic strategy to characterize immune sera”**

-Future activities and planning of actions within WG3

WG3 participants to reimburse:

1	Willy Zorzi	Belgium	To be reimbursed as WG3 member
2	Elmoualij Benaissa	Belgium	To be reimbursed as WG3 member
3	Stulik Jiri	Czech Republic	To be reimbursed as MC member
4	Macela Ales	Czech Republic	To be reimbursed as WG3 member
5	Veljko Veljko	Serbia	To be reimbursed as MC member
6	Hübschen Judith	Luxemburg	To be reimbursed as WG3 member
7	Toman Rudolf	Slovakia	To be reimbursed as MC member
8	Ihnatko Robert	Slovakia	To be reimbursed as WG3 member
9	Gil Gil Horacio	Spain	To be reimbursed as WG3 member
10	<a href="#">Ayub Darji</a>	Spain	To be reimbursed as WG3 member

20:00 conference dinner

Friday, 12.09.2008

Genomics, Microbiology, Management Committee Meeting

07:00 - 08:00 breakfast

**08:00 – 09:30 WG4: Genomics (1 hours 30 min)**

-introduction WG4 chair Stefan Panaiotov

-Stefan Panaiotov-to be announced

-Janse Ingmar **“Detection of biotreat microorganisms by using suspension microarrays”**

-Levterova Victoria-to be announced

-Anna Stöger **“High Resolution Melting (HRM) Curve Analysis: A new method for differentiation of the Ames strain from other Bacillus anthracis strains**

-Future activities and planning of actions within WG4

WG4 participants to reimburse:

1.	Stöger Anna	Austria	To be reimbursed as WG4 member
2.	Panaitov Stefan	Bulgaria	To be reimbursed as MC member
3.	Levterova Victoria	Bulgaria	To be reimbursed as WG4 member
4.	Hufert Frank	Germany	To be reimbursed as WG4 member
5.	Sjöstedt Anders	Sweden	To be reimbursed as MC member
6.	Irengé Léonid	Belgium	To be reimbursed as a WG4 member
7.	Janse Ingmar	The Netherlands	To be reimbursed as WG4 member

09:30 - 10:00 coffee

10:00 – 12:15 WG5: Microbiology (2 hours 15 min)

-introduction WG5 chair Mandy Elschner

-Mandy Elschner **“Problems in serodiagnosis of Glanders”**

-Manuela Manolescu –to be announced

-Pilo Paula **“Strains of Francisella tularensis subsp. holarctica from Switzerland belong to an emerging Western European clone”**

-Ekinci Yesim **“Microbial Contaminations in Food Products”**

-Marian Negut **“Risk assessment of bioaggression”**

- Alexander Web **“Application of the PathogenMip Assay for the identification of Brucella isolates to the species level”**

-Cornelia Ceianu – **“Challenges of vector-borne agents in Romania”**

-Future activities and planning of actions of WG5

WG5 participants to reimburse:

1	Butaye Patrick	Belgium	To be reimbursed as MC chair
2	Brankova Nadya	Bulgaria	To be reimbursed as WG5 member
3	Elschner Mandy	Germany	To be reimbursed as MC member
4	Weidmann Manfred	Germany	To be reimbursed as MC member
5	Apostol Iuliana	Romania	Not reimbursed (MC member)
6	Nica Maria	Romania	Not reimbursed (MC member)
7	Negut Marian	Romania	Not reimbursed (other)
8	Manolescu Manuela	Romania	Not reimbursed (other)

9	Ceianu Cornelia	Romania	Not reimbursed (other)
10	Manolescu Loredana	Romania	Not reimbursed (other)
11	Tudor Alma	Romania	Not to be reimbursed (WG5 member)
12	Calistru Petre	Romania	Not reimbursed (other)
13	Ceausu Emanoil	Romania	Not reimbursed (other)
14	Pilo Paula	Switzerland	To be reimbursed as WG5 member
15	Ekinici Yesim	Turkey	To be reimbursed as WG5 member
16	Web Alexander	UK	To be reimbursed as WG5 member
17	Raquel Escudero	Spain	To be reimbursed as MC member

12:15 - 14:15 lunch

#### 14:15-17:15 6<sup>th</sup> Management Committee Meeting

1. **Welcome**  
Patrick Butaye, the Chair of COST ACTION B28 welcomed the participants to the 6th Management Committee Meeting.
2. **Adoption of the Agenda - P. Butaye**
3. **Adoption of the Minutes of the 6th MC – Vienna- P. Butaye**
4. **Report of the Chair of the Working Group 1 - J. Schrenzel (replaced by Tanja Kostic)**
5. **Report of the Chair of the Working Group 2 - C. Muller (replaced by Kainov Denis)**
6. **Report of the Chair of the Working Group 3 - J. Stulik**
7. **Report of the Chair of the Working Group 4 - S. Panaiotov**
8. **Report of the Chair of the Working Group 5 - M.Elschner**
9. **Annual report - P. Butaye**
10. **Operation of COST B28 web site <http://www.cost-b28.be/> – P. Butaye**
11. **STSMs: current status. R. Toman**
12. **Other subjects**
13. **Discussion on the place and programme of next meetings**

#### **B28 COST ACTION**

"Array technologies for BSL3 and BSL4 pathogens"  
Registered participants for the meeting 10-12 Sept 2008, Bucharest, Romania  
Version: 10 June 2008

#### **AUSTRIA**

**Tanja KOSTIC**  
Austrian Research Centers GmbH-ARC  
Department of Bioresources  
Environmental Molecular Analytics  
A-2444 Seibersdorf, Austria  
Tel: +43 50 550 3635

**TO BE REIMBURSED**

Email: [Tanja.Kostic@arcs.ac.at](mailto:Tanja.Kostic@arcs.ac.at)

**Souzan SANOUSSI**

Austrian Research Centers GmbH-ARC  
Department of Bioresources  
A-2444 Seibersdorf, Austria  
Tel: +43 (0) 50 550 3558  
Email: [Souzan-Chrysanthi.Sanoussi@arcs.ac.at](mailto:Souzan-Chrysanthi.Sanoussi@arcs.ac.at)

**TO BE REIMBURSED**

**Anna STÖGER**

Austrian Agency for Health and Food Safety  
Spargelfeldstrasse 191  
Vienna, Austria  
Tel: 00435055532206  
Email: [anna.stoeger@ages.at](mailto:anna.stoeger@ages.at)

**TO BE REIMBURSED**

**BELGIUM**

**Patrick BUTAYE**

Veterinary and Agrochemical Research Center  
Dept of Bacteriology and Immunology  
Groeselenberg 99  
B-1180 Brussels, Belgium  
Tel : +32 2 379 04 28  
Fax : +32 2 379 04 01  
Email : [pabut@var.fgov.be](mailto:pabut@var.fgov.be)

**TO BE REIMBURSED**

**Jean-Luc GALA**

Center for Applied Molecular Technologies, UCL  
Clos Chapelle-aux-Champs 30/46-B1200  
Brussels, Belgium  
Tel: 32(0)27643332  
Email: [jean-luc.gala@uclouvain.be](mailto:jean-luc.gala@uclouvain.be)

**TO BE REIMBURSED**

**Willy ZORZI**

Center of Research on Prion Proteins - University of Liège  
Bat 36, n°1 Avenue de lič½Hôpital  
Liège, Belgium  
Tel: +32 4 366 43 27  
Fax: +32 4 366 43 21  
Email: [Willy.Zorzi@ulg.ac.be](mailto:Willy.Zorzi@ulg.ac.be)

**TO BE REIMBURSED**

**Elmoualij BENAÏSSA**

University of Liège  
Human histology-CRPP, 1 Avenue de lič½hôpital, CHU-Sart Tilman, 4000  
Liège, Belgium  
Tel: 0032 4 366 43 28  
Fax: 0032 4 366 43 21  
Email: [b.elmoualij@ulg.ac.be](mailto:b.elmoualij@ulg.ac.be)

**TO BE REIMBURSED**

**Pierre-Alain FONTEYNE**

Center for Applied Molecular Technologies,UCL  
Clos Chapelle-aux-Champs 30/46-B1200

**TO BE REIMBURSED**

Brussels, Belgium  
Tel: +32 2 764 3157  
Fax: +32 2 764 3332  
Email: [pierre-alain.fonteyne@uclouvain.be](mailto:pierre-alain.fonteyne@uclouvain.be)

**Irengé LÉONID**

Center for Applied Molecular Technologies,UCL  
Clos Chapelle-aux-Champs 30/46-B1200  
Brussels, Belgium  
Tel: +32 2 764 3174  
Fax: +32 2 764 3959  
Email: [leonid.irenge@uclouvain.be](mailto:leonid.irenge@uclouvain.be)

**TO BE REIMBURSED**

**BULGARIA**

**Stefan PANAIOTOV**

Bulgarian Association of Microbiologist  
Department of Microbiology  
Janko Sakazov 26  
1504 Sofia, Bulgaria  
Tel./fax: (+359 2) 8465520  
Fax: (+359 2) 9861724  
Email: [spanaiotov@yahoo.com](mailto:spanaiotov@yahoo.com)

**TO BE REIMBURSED**

**Nadia BRANKOVA**

NCIPD-Department of Microbiology  
Janko Sakazov 26  
1504 Sofia, Bulgaria  
Tel./fax: (+359 2) 8465520  
Fax: (+359 2) 9861724  
Email: [nbrankova@abv.bg](mailto:nbrankova@abv.bg)

**TO BE REIMBURSED**

**Victoria LEVTEROVA**

NICPD-Department of Microbiology  
Janko Sakazov 26  
1504 Sofia, Bulgaria  
Tel./fax: (+359 2) 8465520  
Fax: (+359 2) 9861724  
Email: [vikis@abv.bg](mailto:vikis@abv.bg)

**TO BE REIMBURSED**

**CZECH REPUBLIC**

**Jiri STULIK**

University of Defence  
Facility of Military Health Service  
Trebesska 1575  
CZ- 500 01  
Hradec Kralove,Czech Republic  
Tel: + 420 495518833  
Fax: +420 495512451  
Email: [jstulik@pmfhk.cz](mailto:jstulik@pmfhk.cz)

**TO BE REIMBURSED**

**Ales MACELA**  
University of Defence  
Facility of Military Health Service  
Trebesska 1575  
CZ- 500 01  
Hradek Kralove, Czech Republic  
Tel: +420 973 253 245  
Fax: +420 495 513 018  
Email: [amacela@pmfhk.cz](mailto:amacela@pmfhk.cz)

**TO BE REIMBURSED**

**DENMARK**

-

**FRANCE**

**Patricia RENESTO AUDIFFREN**  
Unité des Rickettsies, CNRS UMR6020  
27 Bd Jean Moulin  
(33) 4 91 32 46 30  
Email: [patricia.renesto@medecine.univ-mrs.fr](mailto:patricia.renesto@medecine.univ-mrs.fr)

**GERMANY**

**Mandy ELSCHNER**  
Frederich-Loeffler-Institut  
Bundesforschungsinstitut für Tiergesundheit  
Institut für Bakterielle Infektionen und Zoonosen  
Naumburger Straße 96a  
07743 Jena, Germany  
Tel.: +49 (0)3641 804-262  
E-mail: [mandy.elschner@fli.bund.de](mailto:mandy.elschner@fli.bund.de)

**TO BE REIMBURSED**

**Manfred Weidemann**  
Institute of Virology  
Kreuzberggring 57  
Göttingen, Germany  
Tel: ++495513899440 / as of June 9th +49551395872  
Fax: 49551394471  
Email: [mweidma@gwdg.de](mailto:mweidma@gwdg.de)

**TO BE REIMBURSED**

**Frank HUFERT**  
Institute of Virology  
Kreuzberggring 57  
Göttingen, Germany  
Tel: +49551395872  
Fax: +49551394471  
Email: [mweidma@gwdg.de](mailto:mweidma@gwdg.de)

**TO BE REIMBURSED**

**Lekbira HASIB**  
Institut of Virology  
Kreuzberggring 57  
Göttingen, Germany  
Tel: +495513910556

**TO BE REIMBURSED**

Email: [hasib@gwdg.com](mailto:hasib@gwdg.com)

**GREECE**

-

**LUXEMBOURG**

**Denis KAINOV**

Institute of Immunology  
20A, rue Auguste Lumière  
Luxembourg, Luxembourg  
Tel: +352-490604-241  
Email: [Denis.Kainov@LNS.ETAT.LU](mailto:Denis.Kainov@LNS.ETAT.LU)

**Judith HÜBSCHEN**

Institute of Immunology  
20A, rue Auguste Lumière  
Luxembourg, Luxembourg  
Tel: +352-490604-241  
Email: [Judith.Huebschen@Ins.etat.lu](mailto:Judith.Huebschen@Ins.etat.lu)

**NETHERLANDS**

**Jasper KIEBOOM**

TNO Defence, Security and Safety  
P.O. Box 45  
2280 AA Rijswijk, Netherlands  
Tel: +31 15 28 43011  
E.mail: [Martien.broekhuijsen@tno.nl](mailto:Martien.broekhuijsen@tno.nl)

**TO BE REIMBURSED**

**Ingmar JANSE**

RIVM  
Anthonie van Leeuwenhoeklaan 9  
Bilthoven, Netherlands  
Tel: +31 (0)30 2743666  
Fax: +31 (0)30 2744434  
Email: [ingmarja@yahoo.com](mailto:ingmarja@yahoo.com)

**TO BE REIMBURSED**

**Cornelis SCHOEN**

Plant Research International  
Droevendaalse steeg 1, 6708PB  
Wageningen, Netherlands,  
Tel: +31. 0630.453.260  
Fax: +31 0317.418.094  
Email: [cor.schoen@wur.nl](mailto:cor.schoen@wur.nl)

**TO BE REIMBURSED**

**PORTUGAL**

-

**ROMANIA**

**Iuliana APOSTOL**

Dr Victor Babes Foundation  
Sos Mihai Bravu, Nr 281, Sector 3.  
Bucharest, Romania  
Tel: +40 021 3179503  
Fax: +40 021 31 79502  
E-mail: [iuliana\\_a@yahoo.com](mailto:iuliana_a@yahoo.com), [iapostol@cdt-babes.ro](mailto:iapostol@cdt-babes.ro)

**NOT TO BE REIMBURSED****Maria NICA**

Clinical Hospital for Infections and Tropical Diseases Dr. Victor Babes  
Sos Mihai Bravu, Nr 281, Sector 3.  
Bucharest, Romania  
Tel: +40 021 3172727  
Fax: +40 021 3172721  
E-mail: [nicamaria\\_lab@yahoo.com](mailto:nicamaria_lab@yahoo.com)

**NOT TO BE REIMBURSED****Petre CALISTRU**

Dr Victor Babes Foundation  
Sos Mihai Bravu, Nr 281, Sector 3.  
Bucharest, Romania  
Tel: +40 021 3179503  
Fax: +40 021 31 79502  
E-mail: [pcalistru@yahoo.com](mailto:pcalistru@yahoo.com)

**NOT TO BE REIMBURSED****Emanoil CEASU**

Clinical Hospital for Infections and Tropical Diseases Dr. Victor Babes  
Sos Mihai Bravu, Nr 281, Sector 3.  
Bucharest, Romania  
Tel: +40 021 3172727  
Fax: +40 021 3172721  
Email: [simonacazacu@yahoo.com](mailto:simonacazacu@yahoo.com)

**NOT TO BE REIMBURSED****Manuela MANOLESCU**

Regional Center for Higher Studies for Preventing Bioterrorism  
8 Procopie Dumitrescu sector 2,  
Bucharest, Romania  
Tel: +40 722 193 616  
Fax: +40 021 6192063  
Email: [manolescu@mlaw.ro](mailto:manolescu@mlaw.ro)

**NOT TO BE REIMBURSED****Loredana MANOLESCU**

St. S.Nicolau Institute of Virology  
Sos. Mihai Bravu nr 285  
Bucharest, Romania  
Tel: +40 021 3242590  
Email: [manolesculoredana@yahoo.com](mailto:manolesculoredana@yahoo.com)

**NOT TO BE REIMBURSED****Marian NEGUT**

Institutul National de Cercetare Dezvoltare  
pentru Microbiologie si Imunologie "Cantacuzino"  
Str Splaiul Independentei 103, Sector 6  
Bucharest, Romania

**NOT TO BE REIMBURSED**

Tel: +40 021 306 9108, +40 021 528 7108  
Email:

**Viorel ALEXANDRESCU**

Institutul National de Cercetare Dezvoltare  
pentru Microbiologie si Imunologie "Cantacuzino"  
Str Splaiul Independentei 103, Sector 6  
Bucharest, Romania  
Tel: +40 0722 259 164  
Email: [roinfluenza@cantacuzino.ro](mailto:roinfluenza@cantacuzino.ro)

**NOT TO BE REIMBURSED**

**Cornelia CEIANU**

Institutul National de Cercetare Dezvoltare  
pentru Microbiologie si Imunologie "Cantacuzino"  
Str Splaiul Independentei 103, Sector 6  
Bucharest, Romania  
Tel: +40 021 528 7127  
Email: [cornelia\\_ceianu@yahoo.com](mailto:cornelia_ceianu@yahoo.com)

**NOT TO BE REIMBURSED**

**Alma TUDOR**

Dr Victor Babes Foundation  
Sos Mihai Bravu, Nr 281, Sector 3.  
Bucharest, Romania  
Tel: +40 021 3179503  
Fax: +40 021 31 79502  
Email: [alma\\_Gabriela@yahoo.com](mailto:alma_Gabriela@yahoo.com)

**NOT TO BE REIMBURSED**

**SERBIA**

**Veljko VELJKOVIC**

Institute of Nuclear Sciences VINCA  
Mihajla Petrovića Alasa 12-14  
Belgrade, Serbia,  
Tel: +381 11 2453686  
Fax: +381 11 3440100  
Email: [vv@vin.bg.ac.yu](mailto:vv@vin.bg.ac.yu)

**TO BE REIMBURSED**

**Sanja GLISIC**

Institute of Nuclear Sciences VINCA  
Mihajla Petrovića Alasa 12-14  
Belgrade, Serbia,  
Tel: +381 11 2453686  
Fax: +381 11 3440100  
Email: [sanja@vin.bg.ac.yu](mailto:sanja@vin.bg.ac.yu)

**TO BE REIMBURSED**

**SLOVAKIA**

**Rudolf TOMAN**

Laboratory for Diagnosis and Prevention  
of Rickettsial and Chlamydial Infections

**TO BE REIMBURSED**

Institute of Virology  
Slovak Academy of Sciences  
Dubravská cesta 9  
SK – 845 05 Bratislava, Slovakia  
Tel: +421 2 593 02418  
Fax: +421 2 547 4284  
Email: [Virutoma@savba.sk](mailto:Virutoma@savba.sk)

**Robert IHNATKO**

Laboratory for Diagnosis and Prevention  
of Rickettsial and Chlamydial Infections,  
Institute of Virology,  
Slovak Academy of Sciences  
Dubravská cesta 9  
SK – 845 05 Bratislava, Slovakia  
Tel: +421 2 593 02418  
Fax: +421 2 547 4284  
Email: [robert.ihnatk@savba.sk](mailto:robert.ihnatk@savba.sk)

**TO BE REIMBURSED**

**SPAIN**

**Horacio GIL GIL**

Centro Nacional de Microbiología. Instituto de Salud Carlos III  
Laboratorio de Espiroquetas y Patógenos Especiales  
Servicio de Bacteriología  
Ctra/Majadahonda-Pozuelo Km 2.5  
Majadahonda, Spain  
Tel: 34918223952  
Email: [hgil@isciii.es](mailto:hgil@isciii.es)

**TO BE REIMBURSED**

**Francesc-Xavier ABAD MOREJÓN DE GIRÓN**

Centre de Recerca en Sanitat Animal  
CReSA Building Campus UAB 08193 Bellaterra,  
Barcelona, Spain,  
Tel: 34 93 581 45 6  
Fax: 34 93 581 44 90  
Email: [xavier.abad@cresa.uab.cat](mailto:xavier.abad@cresa.uab.cat)

**TO BE REIMBURSED**

**Escudero Raquel**

Laboratorio de Espiroquetas y Patógenos Especiales  
Servicio de Bacteriología  
Centro Nacional de Microbiología  
28240 Majadahonda, Madrid  
email: [rescude@isciii.es](mailto:rescude@isciii.es)

**TO BE REIMBURSED**

**TO BE REIMBURSED AS MC MEMBER**

**Ayub Darji**

Centre de Recerca en Sanitat Animal  
Campus de la UAB, Edifici CReSA,  
08193 Bellaterra, Barcelona  
SPAIN

**TO BE REIMBURSED**

Tel. +34, (93) 581 4558  
Fax.+34, (93) 581 4490  
E-mail. ayub.darji@cresa.uab.es

**Mariano Domingo**

CReSA (Centre de Recerca en Sanitat Animal)  
Campus de la Universitat Autònoma de Barcelona  
08193 Bellaterra (Barcelona) Spain  
Telf. (34) 93 5813284  
Fax.: (34) 93 5814490  
[mariano.domingo@uab.es](mailto:mariano.domingo@uab.es)

**TO BE REIMBURSED**

**SWEDEN**

**Anders SJÖSTEDT**

Umeå University  
Department of Clinical Bacteriology  
SE-90185  
Umeå, Sweden  
Tel: +46 90 785 1120  
Fax: +46 90 785 2225  
Email: [anders.sjostedt@climi.umu.se](mailto:anders.sjostedt@climi.umu.se)

**TO BE REIMBURSED**

**Henrik NORDSTROM**

Swedish Institute for Infectious Disease Control  
Nobelsväg 18  
Solna, Sweden  
Tel: +46 08 4572581  
Fax: +46 08 307957  
E.mail: [henrik.nordstrom@smi.ki.se](mailto:henrik.nordstrom@smi.ki.se)

**TO BE REIMBURSED**

**SWITZERLAND**

**Paola PILO**

University of Berne  
Institute of Veterinary Bacteriology  
Laenggassstrasse 122  
CH-3012 Berne, Switerland  
Tel: +41 316312491  
Fax: +41 316312634  
Email: [Paola.pilo@vbi.unibe.ch](mailto:Paola.pilo@vbi.unibe.ch)

**TO BE REIMBURSED**

**TURKEY**

**Erhan PISKIN**

Department of Chemical Engineering  
Faculty of Engineering  
Hacette University  
Ankara, Turkey  
Tel : +90 3122977473

**TO BE REIMBURSED**

E-mail : [erhanpiskin@biyomedtek.com](mailto:erhanpiskin@biyomedtek.com)

**Yesim EKINCI**

Yeditepe University  
Yeditepe University, Food Engineering Dept.  
Istanbul, Turkey  
Tel +90 2165780000-3187  
Email: [yekinci@yeditepe.edu.tr](mailto:yekinci@yeditepe.edu.tr)

**TO BE REIMBURSED**

**UNITED KINGDOM**

**Karen KEMPESELL**

HPA CEPR  
Diagnostic Technologies  
Department of Novel and Dangerous Pathogens  
Porton Down,  
Salisbury Wilts. SP4 0JG, U.K.  
Tel: 01980 619816  
Email: [Karen.Kempesell@hpa.org.uk](mailto:Karen.Kempesell@hpa.org.uk)

**TO BE REIMBURSED**

**Alexander Webb**

University of East London  
School of Health & Bioscience, University of East London, Romford Road, Stratford,  
London, E15 4LZ, UK  
Tel: 020 8223 4360  
Email: [a.webb@uel.ac.uk](mailto:a.webb@uel.ac.uk)

**TO BE REIMBURSED**

**COST OFFICE**

**Kalliopi KOSTELIDOU**

SO Biomedicine and Molecular Biosciences  
149, Av Louise  
B1050 Brussels  
Belgium

**TO BE REIMBURSED**

**NON-COST COUNTRIES-**

**INVITED SPEAKERS:**

**GERMANY**

**Stephan GÜNTHER**

Bernhard-Nocht Institute for Tropical Medicine,  
Department of Virology -Bernhard-Nocht-Strasse 74,  
20359 Hamburg, Germany  
Tel: +49 40 42818 421  
Fax: +49 40 42818 378  
Email: [guenther@bni.uni-hamburg.de](mailto:guenther@bni.uni-hamburg.de)

**TO BE REIMBURSED**

**ITALY**

**Tony BARBUZZI**

**TO BE REIMBURSED**

Core I.P. Manager  
Microfluidics Division Lab-On-Chip R&D Unit  
Computer Peripherals Group  
STMicroelectronics Srl  
Email: [tony.barbuzzi@st.com](mailto:tony.barbuzzi@st.com)

**USA**

**TO BE REIMBURSED**

**Syed A. HASHSHAM**  
Michigan State University  
Civil and Environmental Engineering  
A126 Engineering Research Complex  
East Lansing, MI 48824  
Phone: (517) 355-8241  
Fax: (517) 355-0250  
Email: [hashsham@msu.edu](mailto:hashsham@msu.edu)

**ROMANIA**

**NOT TO BE REIMBURSED**

**Simona RUTA**  
St.S. Nicolau Institute of Virology,  
"Carol Davila" University of Medicine and Pharmacy  
285, Sos. Mihai Bravu  
Bucharest, Romania  
Tel: +40 213242590  
Fax: +40 213242590  
Email: [simonaruta@b.astral.ro](mailto:simonaruta@b.astral.ro)

**Lucian NEGRUTIU**  
University of Medicine & Pharmacy Timisoara  
Clinic I of Infectious Diseases "Victor Babes" Hospital,  
38, Gh. Adam Street ,  
Timisoara, Romania  
Tel: +40 721425704  
Fax: +40 256207735  
Email: [lucian\\_negrutiu@yahoo.com](mailto:lucian_negrutiu@yahoo.com)

**TO BE REIMBURSED**

**Total list of participants:**

No	Name	Country	Status
	<b>Tanja KOSTIC</b>	Austria	To be reimbursed as a MC member
	<b>Souzan SANOUSSI</b>	Austria	To be reimbursed as WG1 member
	<b>Anna STÖGER</b>	Austria	To be reimbursed as WG4 member
	<b>Patrick BUTAYE</b>	Belgium	To be reimbursed as MC chair
	<b>Jean-Luc GALA</b>	Belgium	To be reimbursed as a MC member
	<b>Willy ZORZI</b>	Belgium	To be reimbursed as WG3 member
	<b>Elmoualij BENAÏSSA</b>	Belgium	To be reimbursed as WG3 member
	<b>Irengé LÉONID</b>	Belgium	To be reimbursed as WG4 member
	<b>Stefan PANAIOTOV</b>	Bulgaria	To be reimbursed as MC member
	<b>Victoria LEVTEROVA</b>	Bulgaria	To be reimbursed as WG3 member
	<b>Nadia BRANKOVA</b>	Bulgaria	To be reimbursed as WG5 member
	<b>Jiri STULIK</b>	Czech Republic	To be reimbursed as a MC member
	<b>Ales MACELA</b>	Czech Republic	To be reimbursed as WG3 member
	<b>Patricia RENESTO AUDIFFREN</b>	France	To be reimbursed as MC member
	<b>Stephan GÜNTHER</b>	Germany	To be reimbursed as invited speakers
	<b>Manfred Weidmann</b>	Germany	To be reimbursed as MC member
	<b>Mandy ELSCHNER</b>	Germany	To be reimbursed as MC member
	<b>Frank HUFERT</b>	Germany	To be reimbursed as WG4 member
	<b>Lekbira HASIB</b>	Germany	To be reimbursed as WG1 member
	<b>Tony BARBUZZI</b>	Italy	To be reimbursed as an invited speaker
	<b>Denis KAINOV</b>	Luxembourg	To be reimbursed as WG2 member
	<b>Judith HÜBSCHEN</b>	Luxembourg	To be reimbursed as a WG3 member
	<b>Jasper KIEBOOM</b>	The Netherlands	To be reimbursed as MC member
	<b>Ingmar JANSE</b>	The Netherlands	To be reimbursed as WG4 member
	<b>Cornelis SCHOEN</b>	The Netherlands	To be reimbursed as WG1 member
	<b>Iuliana APOSTOL</b>	Romania	Not reimbursed (MC member)
	<b>Maria NICA</b>	Romania	Not reimbursed (MC member)
	<b>Simona RUTA</b>	Romania	Not reimbursed (invited speakers)
	<b>Lucian NEGRUTIU</b>	Romania-Timisoara	Reimbursed as a invited speaker
	<b>Marian NEGUT</b>	Romania	Not reimbursed (other)
	<b>Manuela MANOLESCU</b>	Romania	Not reimbursed (other)
	<b>Loredana MANOLESCU</b>	Romania	Not reimbursed (other)
	<b>Viorel ALEXANDRESCU</b>	Romania	Not reimbursed (other)
	<b>Cornelia CEIANU</b>	Romania	Not reimbursed (other)
	<b>Alma TUDOR</b>	Romania	Not reimbursed (WG5 member)
	<b>Petre CALISTRU</b>	Romania	Not reimbursed (other)
	<b>Emanoil CEASU</b>	Romania	Not reimbursed (other)
	<b>Veljko VELJKOVIC</b>	Serbia	To be reimbursed as MC member
	<b>Sanja GLISIC</b>	Serbia	To be reimbursed as WG2 member
	<b>Rudolf TOMAN</b>	Slovakia	To be reimbursed as MC member
	<b>Robert IHNATKO</b>	Slovakia	To be reimbursed as WG3 member
	<b>Horacio Gil GIL</b>	Spain	To be reimbursed as WG3 member
	<b>Francesc-Xavier ABAD MOREJÓN DE GIRÓN</b>	Spain	To be reimbursed as WG2 member
	<a href="#">Ayub Darji</a>	Spain	To be reimbursed as WG3 member

	<b>Mariano Domingo</b>	Spain	To be reimbursed as WG2 member
	<b>Raquel Escudero</b>	Spain	To be reimbursed as MC member
	<b>Anders SJÖSTEDT</b>	Sweden	To be reimbursed as MC member
	<b>Henrik Nordstrom</b>	Sweden	To be reimbursed as WG1 member
	<b>Paola PILO</b>	Switzerland	To be reimbursed as WG5 member
	<b>Erhan PISKIN</b>	Turkey	To be reimbursed as MC member
	<b>Yesim EKINCI</b>	Turkey	To be reimbursed as WG5 member
	<b>Karen KEMPELL</b>	UK	To be reimbursed as WG1 member
	<b>Alexander Webb</b>	UK	To be reimbursed (other)
	<b>Syed A. HASHSHAM</b>	USA	To be reimbursed as invited speaker

Total number of participants (including invited speakers): 55  
Participants to be reimbursed (including invited speakers): 44

# Invited speakers

## 1 Dr Tony BARBUZZI

CURRICULUM VITAE DR. TONNY BARBUZZI

## Tony Barbuzzi

### Education

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- 2001 **PhD in Medicinal Chemistry** – Polytechnic University Brooklyn New York (USA)/ NSF Center for Biocatalysis and Bioprocessing of Macromolecules – Tutor Prof. Richard Gross  
“Synthesis and Characterization of biocompatible and biodegradable polyesters”.
- 1998 **Master in Chemistry and Pharmaceutics**– University of Catania (Italy).  
“Synthesis, *in vitro* and *in vivo* evaluation of polyoxyethylene esters of ketoprofen, naproxen and diclofenac as dermal pro-drugs”.

### Career history

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#### *Actual position*

#### **ST Microelectronics – Microfluidics Division:**

Core Intellectual Property Development Manager. Management of advanced research projects in the fields of new technology for IVD.

Topic: Detection strategy; Human/system interface (sample preparation); Integrated systems for diagnostic testing; new applications

#### *Previous positions:*

**Serono S.A.**-Division for innovative small molecules and biopharmaceuticals of Merck KGaA  
Analytical Chemistry Development – head of chemical-physical characterization Dpt. (Geneva, Rome)

Topic: Pre-clinical/Phase I-II-II studies of drugs substances and drug products development

**C.N.R.I** – Institute of Polymer Chemistry and technology, Catania (Italy)

Post Doctoral Fellowship – Prof. Giorgio Montaudo Laboratory

Topic: Synthesis and characterization of biopolymers for medical/biomedical application

**NSF Center for Biocatalysis and Bioprocessing of Macromolecules**, Polytechnic University, Brooklyn, NY (USA).

PhD student / Post doctoral Fellowship – Prof. Richard Gross Laboratory

Topic: Selective enzymatic synthesis of unsaturated sugar based polyesters for pharmaceutical application

**University of Catania, Department of Polymers Chemistry**, Catania, Italy.  
Fellowship

Topic: biocompatible and biodegradable co-polymers engineering for pharmaceutical application;  
Characterization techniques

**C.N.R.I.** Institute for Advanced Bio analytical Technology, Segrate, Milan (Italy).

Fellowship

Topic: synthesis and characterization of pro-drugs for drug targeting (dermal and blood brain barrier)

**University of Catania, Department of Medicinal Chemistry**, Catania, Italy.

Thesis Fellowship

Topic: synthesis of pro-drugs for drug targeting (blood brain barrier)

### **Publications, oral communications and posters:**

- T. Barbuzzi, V. Van Axel Castelli, G. Trovieri, I. Zucchelli, L. Brambilla, C. Castiglioni, M. Paci, G. Zerbi, M. Zanol, “Inclusion complex between Cladribine and 2-hydroxypropyl- $\beta$ -cyclodextrin: the development of a stable oral tablet formulation for use in patients affected by Multiple sclerosis”. *J. Pharm. Sci* **2007**
- G.Impalomeni, A.Steinbuchel, T.Lutke-Eversloh, T. Barbuzzi and A.Ballistreri. “Sequencing Microbial Copolymers of 3-Hydroxybutyric and 3-Mercaptoalkanoic Acids by NMR, Electrospray Ionization Mass Spectrometry, and Size Exclusion Chromatography NMR” *Biomacromolecules* **2007**.
- T. Barbuzzi, G. Impalomeni, M. Giuffrida, A. Ballistreri and S. P. P. Guglielmino, “Microbial Synthesis of Poly(hydroxyalkanoates) by *Pseudomonas aeruginosa* from Fatty Acids: Identification of Higher Monomer Units and Structural Characterization.” *Biomacromolecules* **2004**.
- T.Barbuzzi. “MALDI-TOF and ESI Mass Spectrometry of Biodegradable copolymers”. XVI National Meeting on Science and Technology of Macromolecules. Pisa, September 21-25, **2003**.
- T.Barbuzzi, V.Catara, A.Ballistreri, A.Catara “Biosynthesis of poly(hydroxyalkanoates) by *Pseudomonas corrugata* and *P. mediterranea*”. 6<sup>th</sup> National Conference on Biotechnology, 4-6 may **2003**, Padova- Italy.
- Tony Barbuzzi “MALDI-TOF Mass Spectrometry Characterization of biodegradable copolymers obtained by exchange reaction.. Workshop on MALDI and ESI Mass Spectrometry after 2002 Chemistry Nobel Prize. Catania, February 11-12, **2003**
- G.Impalomeni, M.Giuffrida, T.Barbuzzi, G.Musumarra and A.Ballistreri “Acid Catalyzed Transesterification as a Route to Poly(3-hydroxybutyrate-co- $\epsilon$ -caprolactone) Copolymers from Their Homopolymers”. *Biomacromolecules* **2002**

- G.Impallomeni, M.Giuffrida, T.Barbuzzi, G.Musumarra, A.Ballistreri “Acid catalized transesterification as a route to poly(3-hydroxybutyrate-*co*- $\epsilon$ -caprolactone) copolymers from their homopolymers”, 7<sup>th</sup> World Conference on Biodegradable Polymers and Plastics”, Tirrenia (PI), June 5-8, **2002**.
- Tony Barbuzzi. “Incorporation of cross-linkable groups into sugar-polyesters”. NSF center of Biocatalysis and Bioprocessing of Macromolecules, Polytechnic University, Brooklyn NY, May 3<sup>rd</sup> **2002**
- Impallomeni, G.; Giuffrida, M.; Barbuzzi, T.; Musumarra, G.; Ballistreri, A.- Acid Catalyzed Transesterification as a Route to Poly(3-hydroxybutyrate-*co*- $\epsilon$ -caprolactone) Copolymers from Their Homopolymers *Biomacromolecules* **2002**
- F.Bonina, C.Puglia , T.Barbuzzi , P. de Caprariis , F.Palagiano , A.Saija “In vitro and in vivo evaluation of polyoxyethylene esters of ketoprofen, naproxen and diclofenac as dermal prodrugs”. *European Journal of Pharmaceutical Sciences* **2001**
- Tony Barbuzzi “Synthesis and Characterization of polyhydroxyalkanoates obtained by fermentation of *Pseudomonas aeruginosa* grown on renewable carbon sources”. *Macrogiovani* (AIM) , Gargnano (BS), June 1-3, **2001**
- Francesco Paolo Bonina, Carmelo Puglia, Tony Barbuzzi, Paolo de Caprariis, Francesco Palagiano, Maria Grazia Rimoli and Antonella Saija In vitro and in vivo evaluation of polyoxyethylene esters as dermal prodrugs of ketoprofen, naproxen and diclofenac” *European Journal of Pharmaceutical Sciences*, **2001**
- Ballistreri, T. Barbuzzi, G. A. Tomaselli and R. M. Toscano “Insulin mimesis of vanadium derivatives. Oxidation of cysteine by V(V) oxo diperoxo complexes” *Journal of Inorganic Biochemistry* **2000**
- A.Saija, D.Tomaino, A.Trombetta, A.De Pasquale, N.Uccella, T. Barbuzzi, D.Paolino, F.Bonina “In vitro and in vivo evaluation of caffeic and ferulic acids as topical photoprotective agents”. *Int. J. Of Pharmaceutics* **2000**
- A.Saija, D.Tomaino, A.Trombetta, A.De Pasquale, N.Uccella, T. Barbuzzi, D.Paolino, F.Bonina “In vitro and in vivo evaluation of caffeic and ferulic acids as topical photoprotective agents” *International Journal of Pharmaceutics* **2000**
- F.Bonina, T.Barbuzzi, C.Puglia, N.Uccella “Olive biophenols. Antiradical and photo protective activity in vivo of oleuropein and hydroxytyrosols”. *Cosmetic Technology* **1999**
- Weinstock, I. A.; Cowan, J. J.; Barbuzzi, T.; Zeng, H.; Hill, C. L - Equilibria between and Isomers of Keggin Heteropolytungstates” *J. Am. Chem. Soc.* **1999**;

- Weinstock, I. A.; Cowan, J. J.; Barbuzzi, T.; Zeng, H.; Hill, C. L - Equilibria between and Isomers of Keggin Heteropolytungstates. *J. Am. Chem. Soc.* **1999**

## **Professional Affiliations**

---

Italian Chemical Society (*SCI*), Medicinal Chemistry division

Italian society of Macromolecular Science (*AIM*),

American Chemical Society (*ACS*)

## **Bio MEMS Application. Use of microtechnology for DNA chips implementation**

Dr Tony Barbuzzi

– ST Microelectronics Microfluidics R&D -

Nucleic acids chips are considered as powerful tools, allowing massively parallel gene analysis. Thanks to these devices, the ability to obtain rapid identification of human, animal or plant pathogens or to detect genetic disorders is now realistic. These studies find broad applications in different fields such as biomedical research, diagnostic, pharmacogenomics, pharmacology, environment, or food industry.

The present work describes the ST multidisciplinary approach to develop a complete technological platform (bio chips, microarray, software and instrumentation) dedicated to molecular diagnosis using biochips, its applications and benefits.

## 2 Prof. Syed A. Hashsham

### SYED A. HASHSHAM

*Edwin Willits Associate Professor, Department of Civil and Environmental Engineering*  
*Adjunct Associate Professor, Center for Microbial Ecology*  
*Adjunct Associate Professor, Department of Crops and Soil Sciences*  
Michigan State University  
A-126, Research Complex-Engineering  
East Lansing, MI-48824

Phone: (517) 355-8241

Fax: (517) 355-0250

E-mail: [hashsham@msu.edu](mailto:hashsham@msu.edu)

Lab webpage: <http://www.egr.msu.edu/~hashsham/>

Department webpage: <http://www.egr.msu.edu/cee/people/hashsham.html>

#### 1. EDUCATION

1996	Ph.D.	Environmental Engineering and Science	University of Illinois at Urbana-Champaign
1986	M.S.	Environmental Science and Engineering	Indian Institute of Technology, Bombay
1984	B.S.	Civil Engineering	Aligarh Muslim University, Aligarh, India

#### 2. PROFESSIONAL EXPERIENCE

2005-present	Edwin Willits Associate Professor	Michigan State University
1999-2005	Assistant Professor	Michigan State University
1998-99	Post-doctoral Res. Associate	Stanford University
1996-98	Visiting Research Associate	Michigan State University
1991-96	Graduate Assistant	University of Illinois at Urbana-Champaign
1990-91	Graduate Assistant	University of Texas at Arlington
1986-90	Lecturer	Aligarh Muslim University, India
1985-86	Project Assistant	Indian Institute of Technology, Bombay

#### 3. RESEARCH INTERESTS

My current research interests include development of in situ synthesized and glass slide based biochips for water safety, microbial ecology, and biotechnology and mathematical modeling of molecular data. I am interested in developing and using genomic and molecular tools to solve environmental engineering problems. Currently two post-doctoral (shared), seven doctoral (out of which two are shared), three masters, and one undergraduate student are part of my research group. In addition, two visiting scholars and one research technician are also part of the group. Details of their individual research interest can be seen at the lab webpage listed above.

#### 4. TEACHING INTERESTS

I teach Biological Processes in Environmental Engineering, Environmental Microbiology, and Feasibility Studies in Environmental Engineering to graduate and undergraduate students. I am also developing learner's modules as a tool to teach molecular biology to environmental engineers (named MOBEE, short for Molecular Biology Explorer for Engineers). The modules will be equally useful to anyone interested in learning the basics of molecular biology with a focus on detection and waterborne pathogens. It is still under development but its general approach can be seen at [http://www.egr.msu.edu/~hashsham/mobee\\_dev](http://www.egr.msu.edu/~hashsham/mobee_dev).

## 5. PUBLICATIONS

**Summary:** A total of 37 peer-reviewed journal articles (34 published, 2 under review), 7 peer-reviewed book chapters (6 published, 1 under review), 11 peer-reviewed conference proceedings, 58 peer-reviewed abstracts, 8 non-reviewed (invited) conference proceedings, and 17 submitted conference proceedings were published. The rate of peer-reviewed publications (including the journal articles and book chapters and during my career at MSU) is **~5 per year**. In 2008, I have also signed a contract to serve as the Editor-in-chief of a 300-page book titled '**Microfluidic Systems for Nucleic Acids Based Detection of Pathogens**' to be published by Springer. In addition, 33 sponsored or invited platform presentations were also made (**~4 per year**).

### 5.1 Reviewed archival journal publications

1. Robert D. Stedtfeld, Samuel M. Baushke, Amanda Herzog, Tiffany Stedtfeld, Erdogan Gulari, James M. Tiedje, and Syed A. Hashsham. Development and experimental validation of a predictive threshold cycle (Ct) equation for quantification of virulence and marker genes using high-throughput nanoliter PCR on OpenArrays™. ***Applied and Environmental Microbiology***, 74(12):3831-3838, **2008**.
2. Sarah M. Miller, Dieter M. Turlousse, Robert D. Stedtfeld, Samuel M. Baushke, Amanda B. Herzog, Lukas M. Wick, Jean Marie Rouillard, Erdogan Gulari, James M. Tiedje, and Syed A. Hashsham. An *In Situ* Synthesized Virulence and Marker Gene (VMG) Biochip for the Detection of Waterborne Pathogens. ***Applied and Environmental Microbiology***, 74: 2200-2209, **2008**.
3. Xianda Zhao, Reem Musleh, Seth Maher, Milind V. Khire, Thomas C. Voice, Syed A. Hashsham Start-Up Performance of a Bioreactor Landfill Cell Under Cold-Climate Conditions. ***Waste Management***, Mar, **2008**.
4. Turlousse, DM, Stedtfeld, RD, Baushke, SW, Wick, LM, and SA Hashsham. Virulence Factor Activity Relationships (VFAR): Challenges and Development Approaches. ***Water Environment Research***, 79(3):246-59, **2007**.
5. Stedtfeld, RD, Turlousse, DM, Baushke, SW, Chai, B, Cole, JR, and SA Hashsham. Multiplex Approach for Screening Genetic Markers of Microbial Indicators. ***Water Environment Research***. 79(3):260-9, **2007**.
6. Robert D. Stedtfeld, Dieter M. Turlousse, Gregoire Seyrig, Elizabeth W. Alm, and Syed A. Hashsham. Detection and Occurrence of Indicator Organisms and Pathogens. ***Water Environment Research***, 1085-1108(24). **2007**.
7. Pozhitkov AE, Stedtfeld RD, Hashsham SA, Noble PA. Revision of the nonequilibrium thermal dissociation and stringent washing approaches for

- identification of mixed nucleic acid targets by microarrays. ***Nucleic Acids Research***, 2007;35(9):e70. **2007**.
8. Stedtfeld, R.D., Jean-Marie Rouillard, Erdogan Gulari, James M. Tiedje, and Syed A. Hashsham. 2006. Influence of dangling end and surface proximal tail of targets on probe- target duplex formation in 16S rRNA gene-based diagnostic arrays. ***Applied and Environmental Microbiology***. 73(2): 380-389. **2007**.
  9. Maqbool, S.B., A. Ahmad, M.B. Sicklen, and S.A. Hashsham. Real time PCR assay for polyphosphate kinase genes in activated sludge. 2007. ***Research Journal of Environmental Sciences*** 1 (5): 229-236, **2007**.
  10. Syed A. Hashsham, Erdogan Gulari, and James M. Tiedje. Microfluidic Systems Being Adapted for Microbial and Molecular Biological Analysis. ***Microbe***, 2911):531-536: **2007**.
  11. Parnell J.J., Park, J., Deneff, V., Tsoi, T., Hashsham, S., Quensen, J., and J.M. Tiedje. Coping with PCB toxicity: Physiological and genome-wide responses of *Burkholderia xenovorans* LB400 to PCB (polychlorinated biphenyl)-mediated stress. ***Applied and Environmental Microbiology***. doi:10.1128/AEM.01129-06. **2006**.
  12. Alok Dhawan, Julian S. Taurozzi, Alok K. Pandey, Wenqian Shan, Sarah M. Miller, Syed A. Hashsham, and Volodymyr V. Tarabara. Stable colloidal dispersions of C<sub>60</sub> fullerenes in water: Evidence for genotoxicity. ***Environmental Science and Technology***. (40) 7394-7401. **2006**.
  13. Stedtfeld, R.D. Duran M., Alm, E.W., and Hashsham, S.A. Detection and occurrence of indicator organisms and pathogens. ***Water Environment Research***. 78(10) 1054-1077: **2006**.
  14. Wick, Lukas M<sup>1,3</sup> Jean-Marie Rouillard, Thomas S. Whittam, Erdogan Gulari, James M. Tiedje, and Syed A. Hashsham. On-chip non-equilibrium dissociation curves and dissociation rate constants as methods to assess specificity of oligonucleotide probes. ***Nucleic Acids Research***. 34(3):e26; doi:10.1093/nar/gnj024. **2006**.
  15. Maqbool S.B., Ahmad A., Dhawan A., Callister S.J., Tsoi T., Sticklen M.B., and Hashsham S.A. Response of selected genes of *Burkholderia xenovorans* strain LB400 to onion extract using a DNA:RNA hybrid capture detection system. ***Research Journal of Microbiology***, 1(5): 378-391. **2006**.
  16. Duran M., Alm, E.W., Stedtfeld, R.D., Haznedaroglu, B., and Hashsham, S.A., Detection and occurrence of indicator organisms and pathogens. ***Water Environment Research***. 77: 659-717: **2005**.
  17. Hashsham, S.A., Wick, L.M.<sup>1</sup>, Rouillard<sup>1</sup>, J-M., Gulari, E., and J.M. Tiedje, Potential of DNA microarrays for developing parallel detection tools (PDTs) for microorganisms relevant to biodefense and related research needs. ***Biosensors and Bioelectronics***. Volume 20, Issue 4, Pages 668-683; **2004**.

18. Hashsham, S.A., Alm, E.W., Stedtfeld, R.D., Traver, R.G., and M. Duran. Detection and occurrence of indicator organisms and pathogens. *Water Environment Research*. Vol. 75, No. 6. 2004.
19. Jenkins, T.M., T.M. Scott, J.R. Cole, S.A. Hashsham, and J.B. Rose, Assessment of virulence-factor activity relationships (VFARs) for waterborne diseases. *Water Science and Technology*. 50(1):309-314. 2004.
20. Denev VJ, Park J, Tsoi TV, Rouillard JM, Zhang H, Wibbenmeyer JA, Verstraete W, Gulari E, Hashsham SA, Tiedje JM., Biphenyl and benzoate metabolism in a genomic context: outlining genome-wide metabolic networks in *Burkholderia xenovorans* LB400., *Applied and Environmental Microbiology*. 70 (8):4961-70. 2004.
21. Dollhopf SL, Pariseau ML, Hashsham SA, Tiedje J.M., Competitive and cooperative interactions affecting a fermentative spirochete in anaerobic chemostats. *Microbial Ecology*. 46 (1): 1-11. 2003.
22. Callister, S.J., Ayala-del-Rio H.L., and S.A. Hashsham. Quantification of a single population in a mixed community using a laser integrated microarray scanner. *Environmental Engineering and Science*. 2(4):247-253. 2003.
23. Hashsham, S.A. and D.L. Freedman, Adsorption of vitamin B<sub>12</sub> to alumina, kaolinite, sand and sandy soil. *Water Research*. 37: 3189-3193. 2003.
24. Musarrat J. and S.A. Hashsham. Customized cDNA microarray for expression profiling of environmentally important genes of *Pseudomonas stutzeri* strain KC. *Teratogenesis Carcinogenesis and Mutagenesis*. 283-294. Suppl. 2003.
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56. Dollhopf S.L., S. Hashsham, F. Dazzo, C. Criddle, R. Hickey, and J. Tiedje. Novel community structure in a model methanogenic system: implications for carbon and energy flow. *Proceedings of the 8th International Symposium on Microbial Ecology*. Halifax, Canada, August 9-14, 1998.
57. Hashsham S., T. Marsh, S. Seston, F. Dazzo, R. Hickey, C. Criddle, and J. Tiedje. Perturbed anaerobic microbial communities: structure and stability. *Proceedings of the 98th General Meeting of the American Society for Microbiology*. Atlanta, Georgia, May 14-19, 1998.
58. Fernandez A.T., J. Xing, S. Hashsham, C. Criddle, and R. Hickey. Diversity among glucose fermenters in methanogenic reactors. *Proceedings of the 97th General Meeting of the American Society for Microbiology*. Miami, Florida, May 19-23, 1997.
59. Hashsham, S.A., and D.L. Freedman. Enhanced biotransformation of carbon tetrachloride by *Acetobacterium woodii* using hydroxocobalamin. *Proceedings of the 96th General Meeting of the American Society for Microbiology*, New Orleans, LA, May 19-23, 1996.

## **5.4 Non-reviewed conference proceedings**

### **5.4.1 Invited papers/presentations**

1. Hashsham, S., X. Zhao, R. Musleh, S. Maher, and T. Voice. "Bioreactor landfill research and demonstration project at the Northern Oaks Landfill, MI" In National Solid Wastes Management Association's WasteTech 2003 Landfill Conference, New Orleans, Louisiana, Feb 16-18, 2003.
2. "GeneScreen: A high-density biochip for phylogenetic and functional analysis of microbial communities" Environmental Genomics Workshop, Idaho Falls, Idaho. Sponsored by the Environmental Biotechnology Institute at the University of Idaho and the Biotechnology Department at the Idaho National Engineering and Environmental Laboratory, September 19-20, 2002.
3. Callister, S.J. and S.A. Hashsham, Modulus of stability and genome expression data. 2002. Poster to be presented at the "*Environmental Genomics Workshop*", sponsors: University of Idaho and Idaho Engineering and Environmental Laboratory's Biotechnology Department. Idaho Falls, Idaho, September 19-20, 2002.
4. Molecular Data and Mathematical Modeling in Biological Wastewater Treatment. Invited lecture at the NSF Sponsored U.S.-Egypt Workshop in Microbial Ecology, National Research Center, Cairo, Egypt, May 6-11, 2001.
5. Development of DNA microarray technology for environmental applications. Invited lecture presented to the Biotechnology Group, Idaho National Engineering and Environmental Laboratory, May, 2001.
6. Microarray technology for mixed microbial communities. Invited Seminar presented at the Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI. August 2001.
7. DNA chip technology and environmental applications. Invited lecture presented to the Biotechnology Group, Idaho National Engineering and Environmental Laboratory, April, 2000.
8. Relating function and community structure of complex microbial systems using neural networks. COE Symposium on Establishment and Evaluation of Advanced Water Treatment Technology Systems Using Functions of Complex Microbial Community The University of Tokyo, Japan. March 6-8, 2000.

### **5.4.2 Submitted papers/presentations**

1. Hashsham, S. (presented for J. Rose). A bioinformatics database to assess risk from waterborne pathogens. 104<sup>th</sup> General Meeting of the Society for Microbiology, New Orleans, May 22-27<sup>th</sup>, 2004.

2. S. Dobbelaere, N. Boon, H. Vervaeren, J. Matthys, K. Sys V. Deneff, S. Hashsham and W. Verstraete. 2004. Development and validation of a microarray for the identification of microorganisms responsible for bulking and foaming in WWTPs. European Symposium on Environmental Biotechnology, 25-28 April 2004, Oostende, Belgium.
3. Issues Related to the development of a virulence factor activity relationships (VFARs) biochip for waterborne pathogens. American Water Works Association's 2004 Annual Conference and Exposition, Orlando, Florida. June 13-17<sup>th</sup>, 2004.
4. Voice, TC, Hashsham, S., Khire, M., Maher, S., Musleh, R., and X. Zhao, Full-scale evaluation of bioreactor landfill technology. 8<sup>th</sup> Conference on Environmental Science and Technology (CEST), Lemnos Island, Greece, September 8<sup>th</sup> – 10<sup>th</sup>, 2003.
5. Zhao, X., Maher, S., Khire, M., Musleh, R., Voice, T., and Hashsham, S., "Bioreactor Landfill Research and Demonstration Project at the Northern Oaks Landfill, MI," *Proceedings of the Waste Tech Landfill Conference 2003*, New Orleans, Louisiana, Feb. 16-18.
6. D. M. Kirk, WG Bickert, S. Hashsham, S. Davies. Methane generation potential of processed liquid dairy manure. 2003. American Society of Agricultural Engineers Annual International Meeting Las Vegas, NV.– July 27-30, 2003.
7. Zhao, X., TC Voice, M. Khire, P Heerwani, R. Musleh, S. Maher, and S. Hashsham. Full-scale evaluation of bioreactor landfill technology. 8<sup>th</sup> Annual Landfill Management Symposium. Atlantic City, New Jersey, June 16-20<sup>th</sup>, 2003.
8. Park, Joonhong, Tamara Tsoi, Syed A. Hashsham, Jim Cole, Stephen Callister, and James M. Tiedje. 2002. Design of specific nucleotide probes for genomic microarrays that explore gene expression patterns in a polychlorobiphenyl-degrading bacterium. "Bioremediation and biodegradation: current advances in reducing toxicity, exposure and environmental consequences" June 9-12. Asilomar, CA. (poster presentation).
9. Callister, Stephen, Joonhong Park, Tamara Tsoi, James Cole, James Tiedje, and Syed Hashsham. 2002. Examining DNA-DNA hybridization between chlorinated compounds oxidizing species using a combination PCR/oligo microarray. "Bioremediation and biodegradation: current advances in reducing toxicity, exposure and environmental consequences" June 9-12. Asilomar, CA.
10. Deneff, Vincent<sup>1,3</sup>, Bergholz, P.<sup>1</sup>, Joonhong Park<sup>1</sup>, Syed Hashsham, Tamara Tsoi, James Tiedje. 2002. Assessing the sensitivity of oligonucleotide microarrays when studying bioaugmented bacterial communities in the environment. "Bioremediation and biodegradation: current advances in reducing toxicity, exposure and environmental consequences" June 9-12. Asilomar, CA.

11. Hashsham, Syed<sup>3</sup>: Development of DNA microarray technology for mixed microbial communities. Platform presentation at the 9<sup>th</sup> International Society for Microbial Ecology, Amsterdam, Netherlands, August 27-September 1, 2001.
12. Dollhopf, S.L., S.A. Hashsham, A. Fernandez, F.B. Dazzo, and J.M. Tiedje. 2000. Microbial community structure as a function of hydraulic retention time length and number in lab-scale methanogenic chemostats. *COE Symposium on the Evaluation of Advanced Waster Water Treatment Technology Systems using Functions of Complex Microbial Communities*. Tokyo, Japan.
13. Dollhopf, S.L., S.A. Hashsham, A. Fernandez, F.B. Dazzo, and J.M. Tiedje. 2000. Spirochete populations in methanogenic chemostats: Population dynamics and ecophysiology VAAM Microbiology 2000 Meeting. Munich, Germany.
14. Seston, S., Hashsham, S., Dazzo, F., Criddle, C., Hickey, R., and Tiedje, J. 1998. Comparison of spirochete populations in three anaerobic reactors using ARDRA and cultivation techniques. Midwest Molecular Microbial Ecology Meeting 1998. Michigan State University, East Lansing, MI.
15. Seston, S. Fernandez, A., Hashsham, S., Criddle, C., Hickey, R., and Tiedje, J. 1997. Community change during stable reactor function: A phylogenetic analysis. Midwest Molecular Microbial Ecology Meeting 1997. University of Wisconsin-Milwaukee, Milwaukee, WI.
16. Hashsham, S. and D. L. Freedman . 1994. Cobalamin-enhanced biotransformation of carbon tetrachloride. Las Cruces, New Mexico. The 4<sup>th</sup> Annual WERC Technology Development Conference, 13-15 April 1994, Las Cruces, NM.
17. Hashsham, S. and D. L. Freedman. 1992. Enhanced biotransformation of carbon tetrachloride under methanogenic conditions," The University of Notre Dame Hazardous Waste Conference, Notre Dame, IN, (August 31-September 4).

## 5.5 Sponsored or invited lectures

1. BETHESDA, MD, The Joint U.S. Environmental Protection Agency and Department of Homeland Security Conference on Real-World Applications and Solutions for Microbial Risk Assessment, Evaluation of Quantum Dots as Surrogates for Pathogens, April 8 – Thursday, April 10, 2008.
2. LUCNOW, India, International Conference on Nanomaterial Toxicology, Emerging Genomic Tools for Nanotoxicology, February 5-7, 2008.
3. ALIGARH, India, International Symposium on Predictive, preventive, and Mechanistic Mutagenesis, Microbial Community Analysis and Pathogen Diagnostics in the Genomic Era, Janury 1-3, 2008.

5. NEW DELHI, INDIA. Dec 18, 2007. Department of Pharmacology, All India Institute of Medical Sciences. *Title: High Throughput and Low-Cost Genomic Tools for Parallel Screening of Pathogens. Invited Lecture.*
6. VIENNA, AUSTRIA, December 10-12, 2007. COST B28 Meeting (COST is a series of meetings on various topics under the system created by the European Union). *Title: Parallel Detection and Quantification of Pathogens using DNA Biochips, On-Chip PCR, and Hand-Held Devices. Keynote Speaker:*
7. HARBIN. CHINA, March 4-12, 2007. *Harbin Institute of Technology*, (Three lectures: *Titles: 1. DNA Biochip-Based Parallel Detection of Pathogens, 2. On-chip and micro-PCR: State of Science, 3. Genomic Tools to Explore Microbial Ecosystems*).
8. Washington, DC March 15-16, 2007. *In The Department of Homeland Security's Annual University Network Summit on Research and Education. Title: Nucleic Acids-Based Methods with Enhanced Sensitivity and High Sample Throughput.*
9. Cincinnati, OH, June 18-20, 2007. *The U.S. Environmental Protection Agency Workshop on Innovative Approaches for Detecting Microorganisms in Water. Title: On-chip PCR, Nanoparticles, and Virulence/Marker Genes for Simultaneous Detection of 20 Waterborne Pathogens.*
10. Baltimore, WA, June 25-27, 2007. *15<sup>th</sup> Annual Nucleic Acid- Based Technologies Conference. Title: DNA Biochips, microPCR, and Hand-Held Gene Analyzers: State of Science.*
11. San Diego, CA., October 8-10, 2007. *Genomes, Medicine, and the Environment-Craig Venter's Institute's Conference. Title: Understanding Microbial Community Succession in Response to Substrate Shock using Roche 454 GS FLX Sequencing System*
12. Lansing, MI, October 17, 2007. *In MichBioExpo: Convergence of Food, Nutrition, Health & Safety, Title: Hand-Held Gene Analyzer.*
13. Detection and genotyping of 20 waterborne pathogens in parallel using a microfluidic DNA biochip. Department of Agricultural & Biosystems Engineering, University of Arizona, Tucson, AZ. September 18, 2006.
14. Microfluidics Based Assays for Parallel Detection and Quantification of Infectious Agents. Lab-in-a-Box and Other Cutting-Edge Technology in Microbial Detection, 106<sup>th</sup> General Meeting of the American Society for Microbiology, Orlando, Florida, May 23, 2006.
15. Screening for All Pathogens in Parallel: Is It Possible? Nucleic Acid-Based Technologies, Arlington, VA, June 27, 2006.
16. Past, Present, and Future of Environmental Biotechnology. A one-day workshop sponsored by National University of Science and Technology (NUST) and held at Pakistan Navy College of Engineering, Karachi, December 31<sup>st</sup>, 2005. The Power and

- Beauty of Environmental Genomics. National Academy of Sciences, Central drug Research Institute, Lucknow, India, December 14<sup>th</sup>, 2005.
18. Microbial Community Analysis using Microarrays: Potential and Challenges. Symposium—Molecular Based Approaches to Soil Microbiology. The ASA-CSSA-SSSA International Annual Meetings (November 6-10, 2005), Salt Lake City, Utah. 2005.
  19. Next Generation Real Time Polymerase Chain Reaction (RT-PCR). SERDP/ESTCP Workshop on Molecular Biology Tools. August 9-10<sup>th</sup>, Charlottesville, Virginia. 2005.
  20. In situ Synthesized Biochips for Parallel Microbial detection and Community Fingerprinting: Realized Potential and Remaining Challenges. 4<sup>th</sup> Montreal Microarray Symposium, BRI, Montreal, Canada, March 17-18, 2005.
  21. Environmental Genomics: Challenges and Opportunities, Invited presentation to the students and faculty of the Center for Environmental Science and Engineering, Indian Institute of Technology, Mumbai, December 7<sup>th</sup>, 2004.
  22. Bioinformatics Tools and Techniques for Various Microarray Platforms and Applications Presented at the Workshop on Genetic Approaches to DNA Damage. Indian Toxicology Research Center, Lucknow, U.P., India. December 11<sup>th</sup>, 2004.
  23. Bioinformatics: Challenges and Business Opportunities; Presentation at the Bioinformatics Conference at Biotechnology Park, December 7-13<sup>th</sup>, 2004.
  24. Emerging Areas of Environmental Biotechnology and Nanotechnology, Presentation to the faculty and students of Biotechnology, Computer Science, Environmental Biotechnology, and Pharmacy, Integral University, Lucknow, December 29<sup>th</sup>, 2004.
  25. Full scale bioreactor landfill design, installation, and performance, WasteTech Landfill Technology Conference, May 23-25, 2004. Dallas, TX.
  26. Bioreactor landfill research and demonstration project at the northern Oaks Landfill, MI. Proceedings of the National Solid Waste Management Association, WasteTech 2002 Technical Landfill Conference. New Orleans, Louisiana, Feb 16-18, 2003. This is accompanied by publication of the manuscript in the corresponding proceedings.
  27. GeneScreen: A high density biochip for phylogenetic and functional analysis of microbial communities” Environmental Genomics Workshop, September 19-20, 2002. Idaho Falls, Idaho. Sponsored by the Environmental Biotechnology Institute at the University of Idaho and the Biotechnology Department at the Idaho National Engineering and Environmental Laboratory.
  28. Molecular data and mathematical modeling in biological wastewater treatment. Invited lecture at the NSF Sponsored U.S.-Egypt Workshop in Microbial Ecology, May 6-11, 2001. National Research Center, Cairo, Egypt.\*

29. Development of DNA Microarray technology for mixed microbial communities. 9<sup>th</sup> International Society for Microbial Ecology, Amsterdam, Netherlands, August 27-September 1, 2001.\*
30. Development of DNA microarray technology for environmental applications. Idaho National Engineering and Environmental Laboratory, May, 2001.
31. Microarray technology for mixed microbial communities. Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI. August 2001.
32. DNA chip technology and environmental applications. Invited lecture presented to the Biotechnology Group, Idaho National Engineering and Environmental Laboratory, April, 2000.
33. Relating function and community structure of complex microbial systems using neural networks. COE Symposium on Establishment and Evaluation of Advanced Water Treatment Technology Systems Using Functions of Complex Microbial Community March 6-8, 2000. The University of Tokyo, Japan. \*

\*Abstracts of these presentations were also published in the corresponding proceedings.

## 6. SUMMARY OF RESEARCH-RELATED ACTIVITIES

A summary of research proposals as per the Contracts and Grants information (4/15/2008) is given below. This indicates a success rate of approximately **62%** by dollar amount and **51%** by the number of proposals awarded. The sections that follow describe the title of the successful proposals and the corresponding granting agency.

Total Award Amount	Total Amount Requested	Award Count	Proposal Count
<b>\$10,502,434</b>	<b>\$16,849,582</b>	<b>27</b>	<b>53</b>

### 6.1 ACTIVE RESEARCH GRANTS

<b>Lead Investigator or Co-Principal Investigator</b>				
<i>PIs</i>	<i>Title</i>	<i>Granting Agency</i>	<i>Date</i>	<i>Funding</i>
Hashsham (50%) and Tiedje (50%)	A PCR-chip for simultaneous detection of 50 threat agents relevant to air and water safety	Michigan Economic Development Corporation	2006-2011	\$966,558
Tiedje (Project Leader), Hashsham, Cole, Quensen, and Cole	<u>Environmental, Microbial, and Mammalian Biomolecular Responses to Ahr Ligands: Director: Dr. Norb Kaminski</u>	NIEHS-SBRP	2006-2011	\$17M

JB Rose (25%), Hashsham (25%), C. Bolin (25%), and E. Todd (25%)	Center for Advancing Microbial Risk Assessment (CAMRA) (It is a 10 M Grant to MSU and partner institutions)	Environmental Protection Agency and Department of Homeland Security	2005-2010	\$1,970,833
Hashsham (34%), Tiedje (33%), and Tarabara (33%)	On-Chip PCR, Nanoparticles, and Virulence/Marker Genes For Simultaneous Detection Of 20 Waterborne Pathogens	Environmental Protection Agency	2006-2008	\$600,000
Rose (34%), Hashsham (33%), Gulari	Development of a virulence factor biochip and its validation for microbial risk assessment in drinking water	Environmental Protection Agency	2004-2008	\$600,000

### Recently Completed Grants:

Hashsham (34%), Cole, Klappenbach, Gulari, Tiedje	Flexible Biochip for Highly Parallel Microbial Detection	National Center for Research Resources, National Institutes of Health	2003-2006 <u>Ended</u>	\$1,370,788 <i>Aug 07</i>
Tiedje (34%), Hashsham (33%), Cole, Klappenbach, Gulari	GeneScreen: A low-cost and high-density DNA biochip for detecting up to 30,000 microorganisms (pre-proposal)	Michigan economic Development Corporation	2003-2007 <u>Ended</u>	\$1,151,562 <b>Sep 07</b>
Hashsham (100%)	Development of microarrays for evaluating phylogenetic and functional diversity of the microbial world	National Science Foundation (NSF)	2002-2007 <u>Ended</u>	\$25,000 <u>Aug 07</u>
Tiedje, Whittam, Lenski, Hashsham, and Gulari (Microbial detection group)	Center for Water Security	MSU Foundation Strategic Partnership Grant	2002-2007 <u>Ended</u>	\$900,000 <u>Sep 07</u>

## 6.2 COMPLETED RESEARCH GRANTS

<i>PIs</i>	<i>Title</i>	<i>Granting Agency</i>	<i>Date</i>	<i>Funding</i>
Tiedje, Boyd, Quensen, Tamara, Maltseva, Hashsham (5%), Kukor	Health Hazards from Groundwater Contamination	National Institute of Env Health Sc. (NIEHS)	2002-2005	\$244,241
Hashsham (100%), Tiedje	Real time scanning and hybridization capabilities at MSU for quantitative and parallel detection of microorganisms on DNA chips	Department of Defense (DOD)	2004-2005	\$150,495
Tiedje, Park, Ostrom, Hashsham (10%)	Probing microbial communities by stable isotope and RNA/DNA analyses	Environmental Protection Agency	2003-2005	\$397,454
Hashsham (100%)	Gift to be used for research at the bioreactor cell at northern oaks landfill	Daimler Chrysler Corp	2004-2005	\$50,000
Hashsham (100%)	Emerging microbial indicator technologies	Environmental Protection Agency	2003-2005	\$20,496
Zhao, Hashsham (15%), Khire, Voice	Development of aeration strategy for elevating temperature in bioreactor landfill	Waste Management, Inc.	2004-2005	\$127,263
Khire, Hashsham (15%), Voice	Evaluation of landfill gas emissions from an instrumented bioreactor landfill cell	National Science Foundation	2003-2004	\$44,652
Khire, Hashsham (15%), Voice	Evaluation of landfill gas emissions from an instrumented bioreactor landfill cell	National Science Foundation	2003-2005	\$43,772
Tiedje, Hashsham (32%)	Characterization and application of reductive dehalogenase genes in enhancement and monitoring of biodegradation of chlorinated pollutants	Environmental Protection Agency (EPA)	2002-2004	\$249,842

Hashsham (34%), Zhao, Khire, and Voice	Landfill Bioreactors: Field Scale Evaluation	Department of Energy (DOE) & Env Res & Ed Fdn	2001-2004	\$207,000
Hashsham (34%), Cole, and Rose	Bioinformatics Pilot Program for the Assessment of Virulence-Factor and Activity relationships (VFARs) for Waterborne Disease Microorganisms	Environmental Protection Agency	2002-2004	\$95,786
Hashsham (100%), Bickert	Pilot scale evaluation of sustainable manure management by struvite recovery	National Center for Manure Management	2002-2004	\$35,000
Khire, Hashsham (15%), Voice	Evaluation of landfill gas emissions from an instrumented bioreactor landfill cell	National Science Foundation	2003-2004	\$24,950
Hashsham (100%)	Development of Experimental & Computational Tools in Env Genomics	IRGP Grant (MSU)	2001-2003	\$49,923
Dybas, Tiedje, Wiggert, Voice, Hashsham (8%), Hyndman	Evaluation of Remediation in Schoolcraft Plumes G and F Contaminated with Chlorinated Solvents and Metals	Michigan Department of Environmental Quality (DEQ)	2000-2002	\$58,581
Hashsham (100%) with C. Criddle	Proof of Gene Expression during Bioremediation	EPA HSRC WR	1999-2002	\$84,388
Hashsham (100%) with W. Bickert	Phosphorous Removal from Dairy Manure	Michigan Animal Industry Coalition	2001-2002	\$30,000
Hashsham (100%)	State of Science: Landfill Bioreactors	EPA HSRC CR	2001-2002	\$25,000
Hashsham (100%)	Assessing Market Potential for GeneScreen: A Low Cost and High Density DNA Biochip for Parallel Detection of up to 30,000 Microorganisms	MSU Case Center's Management of Technology and Innovation program	2002-2002	\$5,000

## 7. SUMMARY OF TEACHING-RELATED ACTIVITIES

My teaching experience at MSU is focused on three biological courses: ENE804: Biological Processes in Environmental Engineering; ENE 806: Feasibility Studies in Environmental Engineering, and CE487: Environmental Microbiology. Occasionally, I have taught other courses as well.

### 7.1 COURSE DESCRIPTION:

**ENE 804: Biological Processes in Environmental Engineering:** This is a design course for environmental engineers focusing on the biological principles. Earlier this course used the 3<sup>rd</sup> edition Metcalf and Eddy: Wastewater Treatment Plant Design. I have changed it to a more suitable textbook by Rittmann and McCarty, 2001, Environmental Biotechnology: Principles and Applications.

**CE 487: Microbiology for Environmental Health Engineering:** This course is the only course that teaches microbiological principles to civil and environmental engineers. I use Brock Biology of Microorganisms by Madigan, Martinko, and Parker as the textbook but heavily supplement with handouts on quantitative aspects. This is the course in which I am incorporating learner's modules (e.g., MOBEE) as a teaching tool.

**ENE 806: Treatability Studies in Environmental Engineering:** This course is designed to provide and overarching experience in literature review, experimental design, laboratory scale reactor set up and operation, data collection and analysis (using gas chromatography, high performance liquid chromatography, atomic absorption spectrophotometer, ion chromatography, PCR, plate count, and other routine laboratory instruments), report writing, and presentation. It also requires group meetings, team effort, task scheduling and problem solving. Overall it provides a short exposure to many aspects of research and team approach within one semester. It does not have a formal textbook.

**CE 280: Introduction to Environmental Engineering:** This is the basic environmental engineering

course taken by many students on campus. It is considered as a service course and is taken by approximately 140 students in each of the Spring and Fall semester. During summer it is taken by ~40 students.

**ENE 800: Environmental Engineering Seminar:** A seminar in which 6-8 speakers over a given semester (external and internal) are invited to share their research.

## 7.2 GRADUATE STUDENT ADVISING:

During the period August 1999-March 2008, I have graduated two doctoral and six MS students. During the same period, I have also hosted a total of eleven visiting scholars and six post-doctoral associates. I am currently advising seven doctoral candidates, two of them are shared with other colleagues. I am currently serving as a committee member of three doctoral and MS students. In the past, I have served as a committee member for 12 MS thesis/projects and 13 doctoral students. The following table provides further details.

## 7.3 SIRS RATING:

**Key: For Availability, Explanation, Organization and Preparation the scale is:** Strongly Agree (SA) 1.0; Agree (A) 2.0; Disagree (D) 3.0; Strongly Disagree (SD) 4.0.

**For Overall Instructor Rating the scale is from 4.0-0.0 where 4.0 is excellent.**

SIRS – Composite Profile								
Semester (Year)	Course (Credits)	Enrollment	Course Structure	Availability	Explanation	Preparation	Organization	Overall Rating
Spring 2005	CE487 (3)	14	3-0	1.31	2.08	1.46	1.85	3.38
Fall 2005	ENE804 (3)	9	3-0	1.00	1.38	1.25	1.13	4.00
Spring 2006	ENE806 (3)	5	3-0	1.00	1.40	1.20	1.40	4.00
Fall 2006	ENE804 (3)							
Spring 2007	ENE806 (3)	9	3-0	1.22	1.44	1.33	1.22	4.00
Fall 2007	ENE804 (3)	11	3-0	1.10	1.30	1.10	1.10	3.78

## 8.1 AS ADVISOR

Name	Start date	Research Topic
<b>Doctoral</b>		
<i>Completed:</i>		
Musleh, Reem	2001-2005	Bioreactor landfill field scale design considerations

Callister, Stephen	1999-2003	Resistance and resilience of gene expression in biological systems
<i>Continuing:</i>		
Robert Stedtfeld	2004-contd.	High throughput validation strategies using synthetic targets
Dieter Turlousse	2004-contd.	Parallel microbial detection biochips using functional genes
Farhan Ahmad	2006-contd.	On-chip PCR for pathogens and indicator organisms
Muneer Ahsan	2005-contd.	Modeling of hybridization in microfluidic biochips
Yu Yang	2004-contd.	Nanomaterials and biosensors (with Jim Tiedje)
Gregoire Seyrig	2007-contd.	On-chip PCR assay for pathogens
Ewa Lukasik	2007-contd.	Melting curve approach for expression arrays
<i>Changed Dept/Univ:</i>		
Ruifeng Xu	2004-2006	Validation strategies to improve detection limit
Kamlesh Yadav	2004-2005	Innovative and cost effective array-based validation and detection
Maria Rodriguez	2000-2002	Change of research focus, program and advisor
<hr/>		
<b>Post-doctoral</b>		
Alok Pandey	2006-contd.	CAMRA: Quantum dots as surrogates and their genotoxicity
Lukas Wick	2003-2005	Development of strain fingerprinting biochips (Lukas Wick is shared with James Tiedje and Thomas Whittam)
Park, Joonhong	2001-2005	NIH PCB project (shared with Prof. James Tiedje and Dr. Tamara Tsoi)
Sun, Baolin	2000-2004	DEQ Plume G Schoolcraft project (shared with Prof. James Tiedje)
Maqbool, Shahina	2001-2002	Development of DNA Microarrays
Musarrat, Javed	2000-2001	Proof of gene expression during bioremediation
<hr/>		
<b>Visiting Scholars</b>		
Imran Hashmi	2006-2007	Microbial community structure analysis of anaerobic reactors
Angela Wang	2006-2007	Microbial Fuel Cell community structure (shared with J. Tiedje)
Abu-Bakr Gomaa	2007-2007	Microbial community analysis of rhizosphere roots
Alok Dhawan	2005-2006	On-chip melting curves for antibiotic resistance gene chips
Yu Xin	2005-2006	Genotyping biochips for <i>Cryptosporidium</i> and <i>Giardia</i>
Ian Marshall	2004-2004	Sample processing for PDT arrays (shared with J. Tiedje)
Tam N.T. Huynh	2004-2004	Fingerprinting of bioreactor landfill microbial communities
Matsumura, Yoshinobu	2002-2003	Antibiotic Resistance Gene chip (shared with Prof. James Tiedje)
Han Vervaeren	2003-2004	PDT arrays for wastewater treatment communities
Sys Kurt	2003-2004	PDT arrays for wastewater treatment communities
Tijdens, Marjoline	2000-2001	Source tracking using <i>E. coli</i> toxin gene microarrays
Denef, Vincent	2000-2001	Development of DNA Microarrays
<hr/>		
<b>Research Assistant</b>		
Tiffany Stedtfeld	2006-contd.	PCR chips
Sarah Miller	2005-2007	Biochips validation for parallel microbial detection
Jeff Weiss	2004-2005	Biochips for indicator microorganisms (Res. Tech.)

**Masters**

Amanda Herzog	2006-contd.	Detection limit and microbial risk assessment (CAMRA)
Bryant Miller	2004-contd.	Project topic not yet decided
Vidya Srinivasan	2005-2007	Use of Gold and silver Nanoparticles and Flatbed Scanner PDTs
Samuel Baushke	2005-2007	Design and validation of on-chip PCR
Arora, Salil	2001-2007	Exploration of unique genes in whole genome sequences
Yang, Yu	2003-2004	Sample concentration issues for DNA biochips (with J. Tiedje)
Siple, Scott	2002-2006	Project option, works with Dr. Terry Marsh for research advising
Heerwani, Priya	2001-2004	Dynamics of CH <sub>4</sub> , N <sub>2</sub> , CO <sub>2</sub> , and O <sub>2</sub> in a bioreactor landfills
Maher, Seth	2002-2003	Bioreactor landfills: field scale design and operation: DOE Project

**Undergraduates**

Fatima Folfonker	Spring 2007	Helicase-Dependent Isothermal Amplification
Farid Nossouni	2006-2007	Assessing Genotoxicity of Fullerene Nanoparticles
Herzog, Amanda	2004-2006	DNA biochip fingerprinting of activated sludge foam communities
Baushke, Sam	2004-2005	Automation of data analysis for parallel detection biochips
Aldrich, Keith	2004-2004	Establishment of a nuclear pore filter train for sample concentration
Kruszewski, Elizabeth	2004-2005	Validation of antibiotic resistance genes chip
Katherine M. Rubrich	2004-2004	Works on an hourly basis on waterborne pathogen chips

**High School**

Hon Chu	2006	Hand-held PCR chip
Asra Shaik	2006	Visualization of amplicons in a PCR-chip
Sarah Asrar	2006	Dispensing and amplification on a microfluidic chip

**8.2 AS COMMITTEE MEMBER**

Name	Date	Dept.	Primary advisor	Thesis/Dissertation Area
<b>Doctoral</b>				
Mike Anderson	2007-contd.	ChE	Pat Walton	Protein arrays
Brian Campbell	2006-contd.	CSS/CME	James Tiedje	Antibiotic resistance gene tracking
Mark Wang	2005-contd.	CSS/FWL	Joan Rose	Virus chip
Shawn McElmury	2004-contd.	CEE	Tom Voice	Organic contaminants and land use
Sangeetha Srinivasan	2007-contd.	CSS/FWL	Joan Rose	<i>E. coli</i> occurrence in the environment
Erick Cardenas	2005-contd.	CSS/CME	James Tiedje	Metal reduction at DOE sites
Fujimoto Masanori	2004-contd.	CEE	Thomas Voice	Water safety
James Wallace	2003-2007	AgE	Bill Bieckert	Anaerobic membrane reactor
Dana Kirk	2002-2007	AgE	William Bickert	Anaerobic digestion of manure
James Wallace	2004-2007	AgE/CEE	William Bickert	Fixed film digesters
Jacob Parnell	2002-2006	CME	James Tiedje	LB400 expression microarrays
Elica Monique Moss	2002-2005	CME	James Tiedje	Aerobic TCE community structure
Claribel Kruzgarc	2001-2005	CME	James Tiedje	<i>Shewanella</i> microarray studies

K. Konstantinidis	2001-2005	CME	James Tiedje	LB400 genome informatics
Xiayun Qiu	2002-2004	CME	James Tiedje	Effect of UV radiation on <i>Shewanella</i>
Tim Mayotte	2000-2004	CEE	Mike Dybas	TCE remediation- column studies
Hayk-Yung Kim	2000-2004	CEE	Mike Dybas	TCE transformation studies
Mohammad Sajjad	2003-2005	CEE	Thomas Voice	Bioavailability of PAHs in soil
Jaime Graulau	2000-2002	CEE	David Wiggert	Modeling of Plume G (changed to Dr. Phanikumar)
Jerry Wu	4/30/01	CEE	Susan Masten	Ozonation of lake water
Kyung-Hyuk Lee	4/30/01	CEE	Susan Masten	Ozonation of lake water

### **Masters**

Fan Wang	2005-2006	Micro	Terry Marsh	Chromium uptake by <i>Ralstonia</i>
Shashi Bhatta	5/2/00	CEE	Susan Masten	MTBE degradation
Dongwan Kim	12/7/00	CEE	Thomas Voice	Bioreactor landfills
Asad Qazi	5/10/00	CEE	Susan Masten	Manure management
Georgina Gavilan	6/30/00	CEE	David Wiggert	TCE remediation
Mohsin Mir	4/27/01	CEE	Voice/Hashsham	Anaerobic digestion
Adnan Javed	4/27/01	CEE	Voice/Hashsham	Anaerobic digestion
Ya-Yun Wu	12/14/01	CEE	Susan Masten	Ozonation of manure
Park Daewook	8/31/02	CEE	Thomas Voice	Arsenic removal from drinking water
Mike Ayallo	2002	CME	James Tiedje	TCE remediation- RT PCR
Dana Kirk	2001	AgE	William Bickert	Phosphorus removal from manure
Kevin Arthur Kowalk	2002	AgE	William Northcott	Wetland remediation of manure
Aruna Yellai	2004	CEE	Milind Khire	Field scale evaluation of landfill gas emissions

## **9. SUMMARY OF ACTIVITIES AS A REVIEWER**

Organization/Journal	Period or year	Number of manuscripts/proposals/books reviewed
<b>Manuscripts:</b>		
Environmental Science and Technology	2003-2007	6
Applied and Environmental Microbiology	2003-2007	13
Water Environment Research	2007	2
Journal of Bacteriology	2004	2
Critical Reviews in Microbiology	2004	1
Journal of Environmental Engineering	2003-2007	5
Journal of Microbiological Methods	2006	1
Water Research	2003-2006	5
Chemosphere	2002-2007	2
Biotechnology and Bioengineering	2002-2006	2

Journal of Environmental Engineering	2003-2007	3
Microbial Ecology	2002-2006	3
Ground Water Monitoring & Remediation	2007	1
Journal of Applied Microbiology	2007	1
Journal of Hazardous Materials	2007	1
	<b>Total</b>	<b>46</b>

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**Books:**

McGraw Hill Book Company, Metcalf & Eddy 4 <sup>th</sup> Ed, Wastewater Treatment	2000	1
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**Proposals:**

NIH NCRR	2008	5
NIH NCRR	2007	4
DOE SBIR	2007	3
USDA SBIR	2007	3
Ministry of Research and Innovation, Canada	2007	2
Oak Ridge Institute for Science and Education	2007	1
Maryland Industrial Partnerships Program	2007	1
Graham Environ. Sustainability Institute	2006	3
Singapore National Science Foundation	2005	1
National Science Foundation	2002-2006	20
National Sea Grant College Program	2001	2
United State Department of Agriculture	2004-2006	4
A proposal for National Center for Genomics, United Kingdom	2000	1
	<b>Total</b>	<b>50</b>

**MS Theses**

As member, AEESP review committee	2002	10
As member, AEESP review committee	2003	11
As chair, AEESP review committee	2004	12
	<b>Total</b>	<b>33</b>

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## 10. HONORS AND AWARDS

1. Withrow Distinguished (Junior) Scholar Award, Michigan State University, 2007
2. Edwin Willits Associate Professor Award, One of four chaired Associate Professors in the College of Engineering, 2005-2009

3. Session Chair, International Water Association's 2<sup>nd</sup> Leading Edge Conference on Sustainability, Nov 8-10, 2004, Sydney, Australia.
4. Distinguished Service Award for Outstanding Service as Chair of the Masters Thesis Award Subcommittee, Association of Environmental Engineering and Science Professors, 2004
5. Lilly Teaching Fellowship Award, Michigan State University, Office of the Vice President, 2003-2004
6. Racheff Travel Award, University of Illinois at Urbana-Champaign, 1995
5. Member, Tau Beta Pi, University of Texas at Arlington, 1991-contd.
6. Ranked 2<sup>nd</sup> in M.Tech., Indian Institute of Technology, Bombay. 1986
7. GATE Fellowship, Indian Institute of Technology, Bombay, 1984
8. Member, Vice Chancellor's Student Council for Academic Excellence, AMU, Aligarh, 1984
9. Ranked 2<sup>nd</sup>, Class of 1984.
- 10. Merit Scholarships during the last three years of B.Sc. Engineering. 1981-1984**

## 11. CURRENT COLLABORATIONS

1. James Tiedje, University Distinguished Professor and Director, The Center for Microbial Ecology, Michigan State University, MI.
2. Joan Rose, Homer Nowlin Chair, Fisheries and Wildlife, Michigan State University, MI.
3. Erdogan Gulari, Department of Chemical Engineering, University of Michigan.
4. James Cole, Center for Microbial Ecology, Michigan State University
5. Thomas Voice, Department of Civil and Environmental Engineering, Michigan State University.

## 12. COMMITTEE SERVICES

### Department Committees:

2007-contd.	Graduate Studies Committee
2005-contd.	Department's ENE Space Committee
2006-2008	Faculty search committee (Crops and Soil Sciences)
2006-2007	Faculty search committee (Biosystems Engineering)
2005-2006	Department's Advisory Committee
2004-2005	Faculty search committees (CEE)
2002-2004	Department's Advisory Committee
2002	Faculty search committees (Pathogen position, CEE)
2001	Graduate Studies Committee and ENE program Graduate Coordinator
2001	Faculty search committees (Fluids position in CEE)
2000	Faculty search committees (Chemical Engineering)
2000	Faculty search committees (Geo-environmental position in CEE)

### University Committee:

2006-contd.	Advisory Committee, Center for Water Sciences
2007-2008	ESPP Recruiting Fellowship Committee
2006-2008	Environmental Science and Policy Science Advisory Committee
2004	Invited Faculty Participant of Lilly Fellowship Selection Committee

2001 Genomic Technology User Committee

**National Committees:**

2007-contd Member, Editorial Board, Sensors & Transducers Journal  
2007-contd. Member, Editorial Board, Turkish Journal of Biology  
2007-2008 International Coordinator, "International Conference on Nanomaterials Toxicology" to be held at ITRC Lucknow, Feb 5-7, 2008  
2007-2008 Member, International Program Committee (IPC) for the IASTED International Conference on Modelling and Simulation (MS 2008)  
2004-contd. Chair, American Society for Testing Materials (ASTM) Committee on Microbial Corrosion of Concrete, C13.03  
2003-contd. Member, WEF (Water Environment Federation) Literature Review Committee for Indicator Organisms - Author for Indicator Organisms  
2004 Review Committee: VFAR Workshop Document organized by EPA, Nov 27-29, 2004  
2004 Chair, Montgomery-Watson-Herza MS Thesis Review Committee, AEESP  
2003-2004 Member, American Society for Testing Materials (ASTM) Committee on Microbial Corrosion of Concrete, C13.03  
2002-2003 Member, Montgomery-Watson-Herza MS Thesis Review Committee, AEESP

**13. PROFESSIONAL AFFILIATIONS**

1994-Contd. Association of Environmental Engineering and Science Professors (AEESP)  
1995-Contd. American Society for Microbiology (ASM)  
1999-2005 International Society for Microbial Ecology (ISME)  
2004-2005 International Water Association (IWA)  
2002-2004 Water Environment Federation (WEF)  
1999-2001 American Society of Civil Engineers (ASCE)

Last Revised: April 15, 2008

## PARALLEL DETECTION AND QUANTIFICATION OF PATHOGENS USING DNA BIOCHIPS, ON-CHIP PCR, AND HAND-HELD DEVICES

Syed A. Hashsham<sup>1</sup>, Robert D. Stedtfeld<sup>1</sup>, Farhan Ahmad<sup>1</sup>, Gregoire Seyrig<sup>1</sup>, Dieter M. Tourlousse<sup>1</sup>, Tiffany Stedtfeld<sup>1</sup>, Onnop Srivannavit<sup>2</sup>, Jean-Marie Rouillard<sup>2</sup>, Erdogan Gulari<sup>2</sup>, and James M. Tiedje<sup>1</sup>

<sup>1</sup>Michigan State University, East Lansing, MI 48824; <sup>2</sup>University of Michigan, Ann Arbor, MI 48109.

With the number of studies related to microfluidics averaging several hundred per year, it is now time to integrate them with high-end molecular biology protocols and develop tools that can screen for many pathogens or gene targets in parallel. The desired attributes for such tools include sensitivity, specificity, speed, cost, robustness, sample processing, portability, and the ability to quantify the pathogens. Optimizing all attributes in a single assay is difficult but it is possible to optimize a limited number of parameters for a set of pathogens/gene targets relevant to a given niche. Using a comprehensive virulence and marker (VMG) gene database encompassing 90 bacterial pathogens and 500 virulence and marker genes, we have developed three different types of parallel detection tools. These are: i) a microfluidic biochip using in situ synthesized 18-mer and 50-mer probes focusing on the specificity, ii) an on-chip PCR array focusing on quantification and enhancing the throughput with respect to the number of samples as well as target pathogens, and iii) a microPCR chip focusing on portability, speed, and sensitivity most suitable for hand-held device development. On the microfluidic biochip a highly specific assay for 20 waterborne pathogens with little or no false positives was developed. This was accomplished using three to six VMGs per organism and 5 to 20 probes per gene to make the call. To achieve a sensitivity of 0.01 to 0.001%, a multiplex PCR amplification step (combining up to 25 amplicons per reaction mixture) was necessary prior to fluorescent labeling and hybridization. For the on-chip PCR assay focusing on quantification, approximately 215 genes from 30 pathogens were used to examine the amplification and quantitative capacity of multiple primer sets in 33 nano-liter reaction holes for 12 to 36 samples in parallel. Quantification, sensitivity, and specificity were highly dependent on the genome size and GC content of the targeted organisms and primer characteristics. The third approach focused on developing a rapid microPCR chip for selected pathogens to be used with portable and point-of-use devices. The PCR chip consisted of microfluidic channels in doped silicon allowing rapid temperature control with minimal power, transparent base and cover for easy and real-time visualization with chemiluminiscent light source and CCD imaging, and lyophilized PCR reagents. To our knowledge, this is the first study reporting real time PCR amplification with lyophilized reagents in microchips. Using

these components, it is theoretically possible to develop less than 5-minute PCR based assays for multiple pathogens. Sample processing and freeze-drying of reagents are the two additional factors that are being developed to enable the use of these tools by personnel with minimal training in molecular biology. This presentation will share data related to the development of the above-mentioned tools and summarize the issues that must be addressed to develop a high throughput portable genetic analysis tool. We are thankful for support from the National Institutes of Health (1R01-RR018625), Michigan Economic Development Corporation (GR-476 PO 085P3000517 and 06-1-P1-0557), and MSU Foundation.

### 3. Dr. Stephan Günther

#### CURRICULUM VITAE

Name: **Stephan GÜNTHER**

Date of birth: 01.12.1963 Nationality: German

Address: Bernhard-Nocht-Institute for Tropical Medicine (BNI),  
Department of Virology-Bernhard-Nocht-Str. 74, 20359  
Hamburg, Germany

Phone: +49 40 42818 421

Fax: +49 40 42818 378

Email [guenther@bni.uni-hamburg.de](mailto:guenther@bni.uni-hamburg.de),

#### **Education/Degree:**

1985–1992 Study of Medicine, Humboldt-University Berlin (Charité), Germany

1993 Doctor of medicine (MD)

2003 Habilitation in Virology

2004 venia legendi for Virology (private lecturer) at the University of Hamburg

#### **Medical specialization:**

1993–1995 Resident (microbiology), Hamburg

1995 License to practice medicine

2007 Specialist in Medical Microbiology, Virology, and Infection Epidemiology

#### **Most recent positions held:**

Since 2005 Head of Department of Virology and BSL4 laboratory, BNI

1998-2005 Senior Scientist, Research group leader, Department of Virology, BNI

1993-1998 Post doc (virology), Heinrich-Pette-Institute of Experimental Virology  
and Immunology, Hamburg, Germany

**Research** is dedicated to applied and basic aspects of arenavirus biology, in particular the investigation of the virus life cycle by the use of reverse genetics techniques. Major focus of clinical virology is molecular epidemiology of arenaviruses and the development of novel diagnostic tools for the detection of known and unknown arenaviruses.

Coordination of research projects in clinical virology:

- FP6 research project “Development and commercial production of standardized PCR-assays for detection of viral hemorrhagic fever viruses and variola virus and their implementation in the diagnostic service of EU P4 laboratories“

- VW-foundation; “Molecular characterization and estimation of public health relevance of hemorrhagic fever viruses circulating in Ghana and Nigeria”

#### **Selected publications in tropical virology:**

**Günther**, S., B. Weisner, A. Roth, T. Grewing, M. Asper, C. Drosten, P.

Emmerich, J. Petersen, M. Wilczek and H. Schmitz. 2001. Lassa fever encephalopathy: Lassa virus in cerebrospinal fluid but not in serum. J. Infect. Dis.

184: 345-9.

Drosten, C., Götting, S., Schilling, S., Asper, M., Panning, M., Schmitz, H. and **Günther**, S. 2002. Rapid detection and quantification of RNA of Ebola and Marburg viruses, Lassa virus, Crimean-Congo hemorrhagic fever virus, Rift Valley fever virus, Dengue virus, and yellow fever virus by real-time reverse transcription-PCR. *J. Clin. Microbiol.* 40: 2323-2330.

Haas W. H, Breuer, T., Pfaff, G., Schmitz, H., Köhler, P., Asper, M., Emmerich, P., Drosten, C., Gölnitz, U., Fleischer, K., and **Günther**, S. 2003. Imported Lassa fever in Germany – Surveillance and management of contact persons. *Clin. Infect. Dis.*: 36(10):1254-8

Asper, M., Sternsdorf, T., Haß, M., Drosten, C., Rhode, A., Schmitz, H., and **Günther**, S. 2004. Inhibition of different Lassa virus strains by alpha and gamma interferon and comparison with a less pathogenic arenavirus. *J Virol* 78(6):3162-9.

Hass M, Gölnitz U, Müller S, Becker-Ziaja B, and **Günther** S. 2004. Replicon system for Lassa virus. *J Virol* 78:13793-803

Vieth, S., Torda, A. E., Asper, M., Schmitz, H., and **Günther**, S. 2004. Sequence analysis of L RNA of Lassa virus. *Virology* 318(1):153-68.

Hass, M., Westerkofsky, M., Muller, S., Becker-Ziaja, B., Busch, C. und **Günther**, S. (2006). Mutational analysis of the lassa virus promoter. *J Virol* 80(24), 12414-12419. Muller, S. und Günther, S. (2007). Broad-spectrum antiviral activity of small interfering RNA targeting the conserved RNA termini of Lassa virus. *Antimicrob Agents Chemother* 51(6), 2215-2218.

## **Molecular detection techniques for hemorrhagic fever viruses**

Stephan Günther

Bernhard-Nocht Institute for Tropical Medicine, Bernhard-Nocht-Strasse 74, 20359 Hamburg, Germany

Diagnosis of viral hemorrhagic fever such as Ebola-, Marburg, Lassa, and Crimean-Congo hemorrhagic fever (CCHF) virus mainly relies on molecular detection techniques. However, commonly used protocols are often based on sequence information published many years ago, are only specific for certain subtypes, or do not implement recent technological advances such as one-step RT-PCR, real-time PCR or array detection. In order to re-evaluate and improve existing assays, or to establish new assays, a network of all European BSL4 laboratories (Porton Down and London [UK], Lyon [France],

Stockholm [Sweden], Marburg and Hamburg [Germany]) was established (VHF/VARIOLA-PCR project funded by the European Commission from 2004-2006 and coordinated by Bernhard-Nocht Institute for Tropical Medicine). Available resources such as strains, sequence information and technologies were pooled.

In order to design reliable primers and hybridisation probes for real-time PCR or hybridisation arrays, sequences of the PCR target regions of available strains were generated: 30 sequences for Lassa virus GPC gene; 22 sequences for Lassa virus L gene; and 7 sequences for Ebola/Marburg virus L gene PCR. For evaluation of CCHF virus assays, 18 different CCHF virus strains representing all clinical relevant isolates as well as clinical samples from the National Institute for Communicable Diseases, South Africa (kindly provided by Janusz T. Paweska) were available. The consortium delivered the following assays: (1) a one-step real-time RT-PCR for Ebola- and Marburg virus detection targeting the L gene; (2) a one-step real-time RT-PCR for detection of CCHF virus targeting the S segment; (3) a one-step RT-PCR for detection of CCHF virus with post-PCR array hybridisation targeting the S segment; (4) a one-step RT-PCR for detection of Lassa virus with agarose gel-based detection targeting the GPC gene; (5) a one-step RT-PCR for detection of Lassa virus with post-PCR array hybridisation targeting the GPC gene; and (6) a one-step RT-PCR for detection of Old-World arenaviruses with agarose gel-based detection targeting the L gene. The assays and their potential field of application are discussed.

## 4 Prof. Dr. Simona RUTA

### CURRICULUM VITAE

Surname: **RUTA** Forename: **SIMONA-MARIA**

**Date of birth:** 1968, March 13, Bucharest, Romania

**Address:** "St S Nicolau" Institute of Virology, 285 sos Mihai Bravu, 030304, Bucharest, Romania,

**Phone:** +4021 324 2590/+40213245354, **Fax:** +4021 324 2590/+40213245354 , **Mobile phone:** +40744 525 525, **email:** [simonaruta@b.astral.ro](mailto:simonaruta@b.astral.ro); [simonarutavirusologie@yahoo.com](mailto:simonarutavirusologie@yahoo.com)

### PRESENT POSITION:

**Professor of Virology, "Carol Davila" University of Medicine, Bucharest, Romania**  
**Senior researcher and Scientific Director, HIV/AIDS International Laboratory Center of Excellence, Baylor International Paediatric AIDS Initiative, "St. S. Nicolau" Institute of Virology , Bucharest, Romania**

### FLUENT IN ENGLISH AND FRENCH

### EDUCATION

- 1992 - MD from the "Carol Davila" University of Medicine and Pharmacy Bucharest, Romania
- 1995 - PhD in medical sciences, virology, PhD topic: "Virological and immunochemical studies in pediatric AIDS encephalopathy"
- 1995 -1996 Postdoctoral fellow at the WHO Collaborative Center for Rickettsial Reference and Research, Marseille Faculty of Medicine.
- 1998- Visiting researcher at Baylor College of Medicine, Center for AIDS Research and Texas Children Hospital, Houston, Texas, USA

### SCIENTIFIC CAREER:

- 1991 - Research Associate "St. S. Nicolau", Institute of Virology, Romania
- 1993 - 2003 Assistant Professor of Virology, "Carol Davila" University of Medicine, Bucharest, Romania.
- 1998 -2000 Researcher "St. S. Nicolau" Institute of Virology , Bucharest, Romania
- 1999-present Specialist physician in clinical laboratory medicine- microbiology, haemathology, biochemistry,
- 2000- 2007 Head of the Emergent viral diseases department, "St. S. Nicolau" Institute of Virology , Bucharest, Romania
- 2000-2007 Senior researcher "St. S. Nicolau" Institute of Virology , Bucharest, Romania
- 2000- present member in the Scientific Council of the "St. S. Nicolau" Institute of Virology, Bucharest
- 2003- 2007 Associate Professor of Virology, "Carol Davila" University of Medicine, Bucharest, Romania.
- 2007- present Founding Director HIV/AIDS International Laboratory Center of Excellence, Baylor College of Medicine International Pediatric AIDS Initiative Houston, Texas, U.S.A and "St. S. Nicolau" Institute of Virology
- 2007-present Professor of Virology, "Carol Davila" University of Medicine, Bucharest, Romania.
- 2006- prezent Advisory Council Member IUMS-International Union Of Microbiological Societies, Virology Division

## **COURSES AND FELLOWSHIPS**

- 1992 - International Course in Infectious disease diagnosis organised by Pasteur Institute, France
- 1993 - Basic medical science component of the Foreign Medical Graduate Examination in The Medical Sciences (FMGEMS) administered by the ECFMG of USA.
- 1993 - Short term grant in the Hepatitis Department at Istituto Superiore di Sanita, Rome,
- 1994 - PhD fellow at the Marseille Faculty of Medicine, France -Tempus Programme
- 1996- International Course in Immunology and genetics CEFOR, TEMPUS-Phare programme of the EU(CME 01173-95)
- 1996- International Course in microbiology CEFOR, TEMPUS-Phare programme of the EU,
- 1997 - Phare Lien programme no. 96-0724 First vocational training and upgrading programme for medical staff, Bucharest, Romania
- 2002- International Course in Life Sciences CEFOR, TEMPUS-Phare programme of the EU, Romania
- 2002- Gene Vectors EuroLab Course- First Multidisciplinary theoretical and practical training in Vectorology, Genocentre- Genethon, Evry France

## **RESEARCH FIELDS:**

- 1992-present- Molecular epidemiology studies on the pediatric HIV epidemics in Romania
- 1993-1996 - Immunochemical and virological studies in the pediatric AIDS encephalopathy
- 1994-1997 - Recognition and cell signaling mechanisms implied in macrophage infections with different germs
- a. West Nile encephalitis as an emerging viral disease in Romania- serological and virological studies in the 1996 epidemic, and serosurveillance in the follow up years
- 1997-1999 The role of the blood brain barrier in viral encephalitis
- 1995- present Prevalence studies on parenterally transmitted viral hepatitis in the general population and in selected risk groups
- 1999 -present Molecular diagnosis in malignant opportunistic diseases involving EBV, HPV and HHV8 in HIV infected individuals
- 2000- present Antigenic diversity and replicative fitness of different HIV subtypes

## **AWARDS:**

- 1996- "Constantin Levaditi" prize of the Medical Sciences Academy of Romania for the PhD thesis (Pediatric HIV encephalopathy);
- 2000- "St. S. Nicolau" prize from the Romanian Academy of Sciences for the studies dedicated to the West Nile meningoencephalitis

## **OTHER ACTIVITIES**

- 1999-present- Evaluator for Grants of the Romanian Academy
- 2000- present - Evaluator for the National University Research Council, member of the European Science Foundation
- 2000- present Member in the Directory council of the Romanian-American Society for Laboratory Medicine
- 2004- present- Expert evaluator for the National research and development programme in Life Sciences (VIASAN)
- 2005- present Evaluator for Excellence research programme (CEEX) of the Ministry for research and education

2005- present Member in the Laboratory Medicine Commission, Ministry of Health, Romania  
2005- 2006 Representative of the "St. S. Nicolau" Institute of Virology as multiplier in UE funded project 512010LSH-- Mentoring of LifeSciHealth Multipliers in ACCs (LSH-ACC-Mentor)  
2006-present- member of the National University Research Council (NURC)  
2007 president, Medical Sciences Commission , NURC

## **PROJECTS**

**Director for 16 national research projects and partner in 30 research projects (Ministry of Research, Ministry of Health, Romanian Academy).**

**Co-investigator in 7 international projects:**

13. **2007-2008- European Commission Public Health Programme-DG SANCO** reference number 00002147483647 "*Young and HIV: European network to arrange an innovative prevention campaign and to exchange good practices-experiences in Europe*" acronym **SUNFLOWER**- director for the Romanian partner
14. **2006-2007 NIH grant** "*Diversity and fitness of maternally transmitted HIV-1*", collaboration between Baylor College of Medicine Texas Children's Hospital, Houston, USA and the "St. S. Nicolau" Institute of Virology- director for the Romanian partner
15. **2005-2009 NIH Grant 2P30 AI3611-06** - "*Core virology laboratory for HIV/AIDS Infection*" - collaboration between Baylor College of Medicine Texas Children's Hospital, Houston, USA and the "St. S. Nicolau" Institute of Virology- director for the Romanian partner
16. **2005-2006- SSA project in the FP6 Mentoring of LifeSciHealth Multipliers in ACCs (LSH-ACC- Mentor) Project ID: LSH-512010**- multiplier
17. **2003-2005-Bilateral project Romania-Greece** *Epidemiological evaluation of the incidence of genital Mycoplasmas by conventional culture and a new diagnostic kit developed in Greece and monitoring of antibiotic resistance in a Greek and a Romanian population of asymptomatic and symptomatic women*- collaboration between Technological Institution of Athens, European Network on Mycoplasma and "St. S. Nicolau" Institute of Virology- director for the Romanian partner
18. **2003-2004 – Contract Center for Disease Control, Atlanta, GA, USA – Genotyping of Varicella Zoster Virus (VZV) circulating strains**, collaboration between CDC Atlanta, GA, USA "St. S. Nicolau" Institute of Virology- director for the Romanian partner
19. **2001-2004 Fogarty International Center Grant** "*Pediatric HIV in Romania : Prognostic cohort study - Laboratory markers - ICD p24 Antigen and p24 antibody* collaboration between Baylor College of Medicine Texas Children's Hospital, Houston, USA and the "St. S. Nicolau" Institute of Virology- member

## **SELECTED PUBLICATIONS IN PEER REVIEWED JOURNALS (IN ENGLISH) out of a total of 78**

- I. **Ruta S**, Cernescu C, Factors responsible for the high frequency of West Nile neuroinvasive disease in recent urban outbreaks, *Proc. Rom. Academy, serie B*, **2007**, 9, 1-2, ISSN 1454-8267
- II. Bleotu C., Diaconu CC, Chivu M, Alexiu I, **Ruta SM**, Cernescu C. *Evaluation of TV cell line viral susceptibility using conventional cell culture techniques* Central European Journal of Medicine, 1, 1-11, 2006.

- III. **Ruta SM**, Matusa RF, **Cernescu C**, Low frequency of immune reconstitution inflammatory syndrome (IRIS) in patients with old HBV/HIV co-infection Proc. Rom. Academy. serie B, 2006, 8, 2-3,63-67
- IV. **Ruta SM**, Matusa RF; Sultana C, Manolescu L, Kozinetz CA, Kline MW, **Cernescu C** *High Prevalence of Hepatitis B Virus Markers in Romanian Adolescents With HIV Infection*, MedGenMed, 2005, 7, 1, 68-72
- V. Kozinetz C, Matusa R, **Ruta SM**, **Cernescu C**, Hacker C, Cazacu A. *Alternative to HIV-RNA and CD4 count to monitor HIV disease progression: A prospective cohort study in Romania*. J Med Virol. 2005;77(2):159-163
- VI. **Cernescu C**. **Ruta SM**. *About the founder effect of Human Immunodeficiency Virus type 1 subtype F in Romanian AIDS epidemic*. Proc. Rom. Academy serie B, 2005, 7, 1, 55-60.
- VII. Diaconu CC., Tone M., **Ruta SM.**, Bleotu C., **Cernescu C**, Volanschi E *Spectral study of the interaction of hemin with some HIV-1 V3 synthetic peptides*. Proc. Rom. Academy. serie B, 2005, 7, 1, 15-23 .
- VIII. **Ruta SM**, **Cernescu C** *Health related quality of life in symptomatic HIV infected adolescents*, Proc. Rom. Academy. serie B, 2005, 7, 2-3,135-141
- IX. **Ruta SM**, **Cernescu C** *SWOT analysis of HIV/AIDS research efforts in Romania* Proc. Rom. Academy. serie B, 2005, 7,2, 129-135.
- X. **Ruta SM**, Duiculescu D, Ene L, Toni M, Dache A, **Cernescu C**. *Challenges to delivering end of life care for adolescents with AIDS* Proc. Roum. Academy serie B, 2004, 3, 191-7.
- XI. Diaconu CC, Bleotu C, Chivu M, Alexiu I, Petrusca D, Anton G., Achim R., **Ruta SM**, **Cernescu C**. *The development of larger cells that spontaneously escape senescence- a step during the immortalization of a human cancer cell line*. J. Cell. Mol. Med. 8 (1), pp. 93-101, 2004.
- XII. CN Zaharia, A. Petrescu, **Ruta SM**, C. **Cernescu** *Analysis of influenza surveillance data in South Eastern Romania-season 2001-2002* Proc. Rom. Acad, Series B, 2, pp. 113-116, 2002
- XIII. **Ruta SM**, Abagiu A., **Cernescu C**. *Acute viral hepatitis in correctional facilities*, J. Clin. Virol, 22, 2,173, 2001.
- XIV. **Cernescu C**, Nedelcu I., Tardei G., **Ruta SM**, Tsai T. *Continued transmission of West Nile virus to humans in southeastern Romania 1997 - 1998*. J Inf Dis,18 (2), pp. 710-2, 2000
- XV. Tardei G, **Ruta SM.**, Chitu V., Rossi C. A., Tsai T.F., **Cernescu C**. *Evaluation of IgM and IgG Enzyme Immunoassay in the serologic diagnosis of West Nile virus infection*, J. Clin. Microb., 38, 6, pp. 2232-2239, 2000.
- XVI. **Ruta SM.**, C. Diaconu, C. Grancea, C. **Cernescu**, *A survey of hepatitis B virus infection in children from Romanian orphanages*, Proc. Rom. Acad.Series B; 1, pp. 67-71, 1999
- XVII. **Ruta SM**, N. Plasman, Y. Zaffran, C. Capo, J.L. Mege, B. Vray *Trypanosoma cruzi-induced tyrosine phosphorylation in murine peritoneal macrophages*. Parasitol. Res. 82, pp. 481-482, 1996.
- XVIII. Y. Zaffran, J.C. Escallier, **Ruta SM** , C. Capo, J.L. Mege; *Zymosan-triggered association of tyrosine phosphoproteins and lyn kinase with cytoskeleton in human monocytes*. J. Immunol., 154, 7, pp. 3488-3500, 1995.
- XIX. **Ruta SM**, **Cernescu C**. *Syncytium forming capacity of HIV 1 strains is inhibited by pretreatment of CD 4 expressing cells with 3'-azido-3'-deoxythymidine but not by alpha interferon*. Rev. roum. Virol., 45, pp. 3-4, 1994

- XX. Cernescu C., Tardei G., Necula A., **Ruta SM**, C.P. Pau. *The serologic significance of F viral genotype for Human Immunodeficiency Virus type 1 epidemic*. J Inf. Dis.,170, pp. 1043-44, 1994.

**NUMBER OF COMMUNICATIONS TO SCIENTIFIC MEETINGS: 108**

**NUMBER OF BOOKS and MONOGRAPHS: 6-most recent titles:**

- I. C. Cernescu, **Ruta SM** "*Laboratory biosafety manual*" (*Manual pentru bioprotectie in laborator*), in romanian Studii si cercetari de virusologie, , 26(2), 1996.
- II. C. Cernescu, **Ruta S.M.** "*Practical viral diagnosis*" (*Practica diagnosticului virusologic*), in romanian, edit. Concept Pbl, 1997
- III. **Ruta S.M.**, C. Cernescu, "*AIDS -the antiretroviral treatment*" (*SIDA-Tratamentul cu antiretrovirale*), in romanian, edit Concept Pbl, 1998.
- IV. C. Cernescu , **Ruta SM** "*Clinical Virology manual*" ( *Curs concis de virusologie*) in romanian Editura Universitara "Carol Davila" , 2002, 2003
- V. C. Cernescu, **Ruta SM** "*Antiviral drugs*" (*Medicamente antivirale*), in romanian Editura Universitara "Carol Davila", 2003.
- VI. C. Cernescu, **Ruta SM** "*Control and prevention of outbreaks caused by viral agents of bioterrorism*" (*Progrese in controlul si prevenirea virozelor cu potential bioterorist*), Editura Universitara "Carol Davila", 2004.

**Development of Early Warning and Response System (EWRS) for West Nile virus infection surveillance at the national and European level**

**Simona Ruta, MD, PhD**

“Carol Davila” University of Medicine and Pharmacy,  
“St.S. Nicolau” Institute of Virology, Bucharest, Romania

Due to environmental changes and the growing international travel, exotic emerging pathogens can extend rapidly, rising numerous challenges to medical personnel and public health authorities in the European Community.

Initially regarded as a minor arbovirolosis, human West Nile Virus (WNV) infection is now accepted as a significant re-emerging disease. In 1996, Romania has experienced a large outbreak of WNV meningoencephalitis, the first urban arboviral epidemic recorded in Europe, associated with infrastructural conditions that favoured an increase in the distribution and abundance of mosquito vectors. The careful monitoring of acute neurological human cases reported in districts previously affected by the outbreak

revealed a gradual decrease of viral transmission in the ten year period following the epidemic as well as the absence of recurrent outbreaks. This fact may reflect a lack of sensitivity in case detection or a change in the environmental patterns favouring viral transmission. Meanwhile, a dramatic resurgence and geographic spread of West Nile infections in humans, birds and horses was recorded throughout the Western hemisphere (Europe, Middle East, USA and Japan). The mechanism of West Nile virus persistence in disease-endemic foci of temperate Europe presents a challenge for further research, substantiating either evidences of periodic reintroduction or perennial transmission of WNV in new settings and highlighting an unfortunate confluence of viral variability and ecological diversity. New modes of transmission were also reported: through blood donations, organ transplant and by the intrauterine route.

Implementing new and sensible diagnostic techniques for arboviruses detection in all species participating in the epidemic cycle: mosquito vectors, birds, horses, humans, will greatly improve the national and European surveillance system, while providing results that can be used in the influenza surveillance activities or in challenges posed by weaponization of bioterrorism agents.

## **5 Prof. Dr. Lucian Negrutiu**

### **CURRICULUM VITAE**

**NAME: NEGRUȚIU LUCIAN PAUL HORIA**

**NATIONALITY:** Romanian

**ADRESS:** Cosminului street nr.38, 1900 Timisoara, Romania; Zip Code:300720.

**Phone:** +40256/488169; 0721425704

**DATE AND PLACE OF BIRTH:** 4.07.1948, Timisoara

**CURRENT POSITION:** Professor of Infectious Diseases: University of Medicine and Pharmacy (UMP), Timisoara; Chief of I-st Clinic of Infectious Diseases from UMP, Timisoara

**SPECIALITY:** Infectious Diseases and Epidemiology

#### **ACTIVITES UNDERTAKEN:**

1963-1966 : "CD Loga" College, Timisoara

1968-1974 :University of Medicine and Pharmacy Timisoara

1974 – 1976: Resident of Internal Medicine Timisoara

1976 – 1977: General physician, IFET, Curtea de Arges

1977 – 1990: Asistant professor in UMP Timisoara: Infectious Diseases Department.

1990-1993:Lecturer in the same Department

1994 : Doctor's degree in Infectious Diseases; Theme: The HLA/ MHC - Antigens implications in the chronical evolution of B Hepatitis.

1996-2008 : Professor of Infectious Diseases Department of UMP Timisoara

2008 : member of Senate of UMP, Timisoara.

#### **QUALIFICATION**

1990 - 1991 International Course of Immunology organized by Romanian Society of Immunology & The Academy of Immunology, USA

1990 - 1991 Internship in France: CHU Nantes: Infectious Diseases Department & "Guy Chaulliac" Hospital, HIV Department –Montpellier.

1993 International Course organised by of HID/AIDS "Cantacuzino" Institute Bucharest and WHO.

#### **PROFESSIONAL GOALS**

1. Member of The Romanian Academic Association of Interdisciplinary Studies
2. Member of Romanian Society of Hepatology Banat- Crisana
3. Member of Romanian Society of Immunology
4. Member of Romanian National Comitee of HIV/AIDS
5. Member of Romanian Journal of Infectious Diseases Boarding, Bucharest, Romania
6. "Timisoara" Medicala”, chief of the Department of Infectious Diseases Association
7. „Timisoara Medicala” Journal Timisoara Romania, member of board
8. Member of Scientific Comitee of „Infectio.ro.” Journal, Bucarest

9. Vicepresident of the Romanian Society of Infectious Diseases
10. President of the Western National Committee dealing with HIV/AIDS problems
11. Honoured Professor - University of Medicine Constanta – Romania and Oradea
12. President and chairman of the National Conferences of Infectious Diseases in:1999, 2001, 2002, 2004,2007.
13. 2006: Vicepresident of Infectious National Diseases Committee of Romanian Health Ministry
14. 2007-2008 member of boarding of Infectious National Diseases Committee of Romanian Health Ministry

**SCIENTIFIC PAPERS:**

15. More than 380 scientific papers, published in Romanian journals, in the following fields: Infectious diseases (antibiotherapy, immunomodulant therapy, viral hepatitis, acute pneumonia, sepsis, HIV/AIDS, molecular biology, viral pathogeny of infectious diseases, etc.)
16. Immunogenetics (The implication of HLA - Antigens in the evolution of infectious diseases)
17. International congresses and conferences of Infectious Diseases and Antibiotic Therapy, held in: Hamburg, Berlin, Madrid, Glasgow, Buenos Aires, Budapest, Jerusalem, Sydney, Toronto, Lisbon etc.
- 18. Author of many monographies and courses of infectous diseases:**
19. Mechanisms of Infectious Diseases, 1996. Ed. "Helicon" Timisoara.
20. Viral and Parasitic Hepatitis, 1998. Ed."Nero G" Timisoara.
21. Infectious and Tropical Diseases Ed. "Nero G" Timisoara.1998
22. Updates in infectious pathology; Constanta 2000
23. Fever of unknown origin Timisoara 2001
24. Gerontology - Ed. " Helicon" Timisoara,2005
25. Gene Therapy - in the papers of „National Congress of Infectious Disases. Craiova, 2004
26. The pathogeny of CMV infections - in the papers of „National Conference of Infectious Diseases Timisoara, 2007
27. HIV therapy with Entry Inhibitors, in the papers of IBI conference, Bucarest
28. Update in pathogenesis and therapy of AIDS; Editura de Vest, Timisoara, 2008.
29. Principal Investigator (coordination) of 4 International Clinical Studies in:
30. Acquired comunitare pneumonia
31. Therapy of chronic viral B hepatitis
32. Therapy of chronic viral C hepatitis
33. Coinvestigator of „LIPO – Study” - conducted by Romanian AIDS National Society.
34. Married, two children

**NIPAH virus- from the pathogen to biological weapon**

Prof.Lucian Negrutiu, Ph.D,M.D.  
University of Medicine and Pharmacy Timisoara, Romania

## **Overview**

Nipah virus is a newly recognized zoonotic virus. The virus was discovered in 1999. It has caused disease in animals and in humans, through contact with infectious animals. Nipah is closely related to another newly recognized zoonotic virus (1994), called Hendra virus, named after the town where it first appeared in Australia. Both Nipah and Hendra are members of the virus family Paramyxoviridae. Although members of this group of viruses have only caused a few focal outbreaks, the biologic property of these viruses to infect a wide range of hosts and to produce a disease causing significant mortality in humans has made this emerging viral infection a public health concern.

## **Transmission**

The mode of transmission from animal to animal, and from animal to human is uncertain, but appears to require close contact with contaminated tissue or body fluids from infected animals. Nipah antibodies have been detected in pigs, other domestic and wild animals. The role of species other than pigs in transmitting infection to other animals has not yet been determined.

It is unlikely that Nipah virus is easily transmitted to man, although previous outbreak reports suggest that Nipah virus is transmitted from animals to humans more readily than Hendra virus. Despite frequent contact between fruit bats and humans there is no serological evidence of human infection among bat carers. Pigs were the apparent source of infection among most human cases in the Malaysian outbreak of Nipah, but other sources, such as infected dogs and cats, cannot be excluded. Human-to-human transmission of Nipah virus has not been reported yet.

## **Clinical features**

The incubation period is between 4 and 18 days. In many cases the infection is mild or inapparent (sub-clinical). In symptomatic cases, the onset is usually with "influenza-like" symptoms, with high fever and muscle pains (myalgia). The disease may progress to inflammation of the brain (encephalitis) with drowsiness, disorientation, convulsions and coma. Fifty percent of clinically apparent cases die.

## **Treatment**

No drug therapies have yet been proven to be effective in treating Nipah infection. Treatment relies on providing intensive supportive care. There is some evidence that early treatment with the antiviral drug, ribavirin, can reduce both the duration of feverish illness and the severity of disease. However, the efficacy of this treatment in curing disease or improving survival is still uncertain.

## **Diagnosis**

Differential diagnosis for suspect swine include classical swine fever, PRRS (porcine reproductive and respiratory syndrome), Aujeszky's disease (pseudorabies), swine enzootic pneumonia (*Mycoplasma hyopneumoniae*) and porcine pleuropneumonia (*Actinobacillus pleuropneumoniae*). Laboratory diagnostic methods for Nipah virus infections include serology, histopathology, immunohistochemistry, electron microscopy, polymerase chain reaction (PCR), and virus isolation.

## **Nipah virus as a biological weapon**

Nipah virus has been listed by the Centers for Disease Control and Prevention as a Category C potential bioterrorist agent. This is described as an emerging pathogen which has a potentially high morbidity and mortality as well as a major health impact. Currently spread of the disease involves close contact with pigs. However, aerosolization may be a possible bioterrorist method of dispersal. Additionally, the potential for this virus to infect a wide range of hosts and produce significant mortality in humans makes this emerging virus one of public health concern. Due to the need to cull infected pigs, attack with this agent could produce a great economic impact in our pork industry. Additionally, during the Nipah outbreak in Malaysia, widespread panic and fear occurred until the outbreak was brought under control.

## **CONCLUSIONS**

NIPAV virus is:

1. included in NCDC Category C Bioterrorism Agent
19. Emerging pathogen
20. Potentially high morbidity  
and mortality
21. Major health impact

22. Aerosolization potential
23. Economic impact
24. Social disruption (fear, panic)