Curriculum Vitae – Professor Istvan Toth

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Date of birth: 25th April 1946, Male

Current Appointments

- 2003- Chair in Biological Chemistry, School of Molecular and Microbial Sciences, Faculty of Biological and Chemical Sciences, the University of Queensland – tenured.
- 2005- Director of Pharmaceutics, TetraQ, Centre for Integrated Preclinical Drug Development – ongoing.
- 2000- Professor, School of Pharmacy, Faculty of Health, the University of Queensland –tenured.
- 2006- Adjunct Professor, Institute for Molecular Bioscience, the University of Queensland. – 2006-2008.

Previous Appointments

- 1972-1975 Research Associate, Technical University, Organic chemistry department, Budapest, Hungary
- 1975-1976 Postdoctoral Fellow, Carleton University, Ottawa, Canada
- 1977-1979 Research Associate, Central Research Institute for Chemistry of the Hungarian Academy of Sciences (CRIC)
- 1979-1982 Senior Research Associate, CRIC, Hungary
- 1977-1987 Scientific advisor, Chinoin Pharmaceuticals Ltd. Budapest, Hungary
- 1982-1987 Scientific Group Leader, Department of Pharmaceutical Chemistry CRIC, Hungary
- 1987-1989 Royal Society Sponsored Senior Research Fellow, School of Pharmacy, University of London Department of Pharmaceutical Chemistry
- 1989-1995 Senior Lecturer, School of Pharmacy, University of London Department of Pharmaceutical Chemistry
- 1994 Sabbatical leave for 6 months, Centre for Drug Design and Development, University of Queensland, Brisbane, Australia
- 1995-1998 Reader in Medicinal/Organic Chemistry, School of Pharmacy, University of London, Department of Pharmaceutical & Biological Chemistry
- 1996-1999 Associate Professor, School of Pharmacy, The University of Queensland, Australia
- 1998-2000 Principle Scientist, Alchemia Pty Ltd, Brisbane, Australia
- 1998- Visiting Professor, University of London
- 2000- Professor, School of Pharmacy, The University of Queensland, Australia

Prizes and Awards

2002 Business/Higher Education Award for Outstanding Achievement in Collaborative R&D; 1987 Royal Society Sponsored Senior Research Fellow, University of London, UK; 1986 Ministry of Industry: Inventor Gold Medal; 1985 Ministry of Industry: Inventor Silver Medal; 1980 Hungarian Academy of Sciences: Academic Award.

Publications

I am a renowned chemist and an internationally recognised expert in drug delivery. I have about 210 publications, including 129 primary, 8 reviews, 1 edited book, 11 book chapters and 61 referred proceedings. I also have 41 patents. **2002-2006** itself has produced 69 papers (48 primary, 5 reviews, 1 edited book, 3 book chapters and 12 refereed proceedings) six patents have also been granted or filed. The quality of the journals in which I have published remains high (first rate speciality based), as confirmed by the 2005 edition of Journal Citation Reports (JCR) which ranks J Med Chem # 3 (the first two are review journals only), Curr Med Chem # 4, Bioorg Med Chem Lett # 9, Bioorg Med Chem # 10 and J Pharm Sci #12 (out of 34, in the category Chemistry, Medicinal Chemistry). In the Organic Chemistry category, J Org Chem comes #7 out of 55, and in the Immunology section, J Immunol is positioned #12 out of 115. ***Citations***. My research work is widely cited (on average 10 to 20 citations in recent years, with one paper reaching 67 citations); the 2002-2006 publications have more than 204 citations. The work appears in the top drug delivery, pharmaceutical science and medicinal chemistry journals.

Grants

I have ben involved in securing about $27 M grant funding over the last 7 years.
1. Major international grants: **Wellcome Trust** - 2 grants as Principal Investigator; US National Institute of Health Grant **NIH** – 1 as key personnel; *2. Major national grants:* **NHMRC** - 1 Program as CI, 4 Projects as sole CI as 3 as CIA, 1 Development as CIA; **ARC** - 1 Discovery as sole CI, 3 Linkage as CIA 1 Spirt as CIA, 2 LIEF as CI; *3. National grants from specialist agencies:* National Heart Foundation **NHF** – 2 grants as PI; The Prince Charles Hospital Foundation **PCHF** – 1 as PI; *4. Grants from other Government Sources:*- 1 Smart State Research Facilities Fund **SSRFF** as CI and 1 Innovation Projects Fund Research-Industry Partnerships Program **RIPP** Grant as CI; *5. Grants form other sources:* **Industry** – 3 grants (2 Alchemia, 1 Biotron as sole CI; Uniquest/**BIF**/Uniseed – 1 grant as CIA

Peer recognition: Invitation to speak

I have been regularly **invited** to give presentations including **plenary and keynote lectures**
● The World Chemistry Congress incorporating the 38th IUPAC Congress – Frontiers in Chemistry. 1-6th July 2001, Brisbane Australia ● 4th Australian Peptide Symposium Lindeman Island, 21-25 Oct **2001** ● XXIst International Carbohydrate Symposium, Cairns, Australia, 7-12th July **2002** ● Formulation and delivery of bioactives, Otago NZ Feb **2002** (Keynote) ● Annual Conference of Bioactives on Opioid Mimetic Analgesics 2002 Awaji Yumebutani, Hyogo Japan March 17-19 **2002** (Keynote) ● International Pacific RIM Biotechnology Conference, Auckland, New Zealand, 17-20th November **2002** ● 27th European peptide conference, Sorrento, Italy, 31st August - 6th September **2002** ● Carbohydrate Gordon Research Conferences Tilton School, NH, USA, 22nd-27th June **2003** (Keynote) ● 22nd International Carbohydrate Symposium, Glasgow, UK, 23rd-27th July **2004** ● Indo-Australian Conference on Biotechnology in Infectious Diseases, MAHE Manipal, 1st-3rd March **2005** (Plenary) ● 17th Singapore Pharmacy Congress Translating Science Optimizing Health Care, 1st-4th July **2005** (1 Keynote, 1 Plenary) ● The XVIth Lancefield International symposium on Streptococci and Streptococcal Diseases, Palm Cove, Cairns, Australia, 25-29th September **2005** ● RACI Qld Polymer Group Satellite Symposium **Brisbane** (Keynote) May **2005** ● Venoms to Drugs 2005, Heron Island, Australia, 28th Aug-2nd Sept 2005 ● Ninth International Symposium Solid Phase Synthesis Complimentary Solution Methods & Combinatorial Libraries, Norwich, England, 30th August - 3rd September **2005** ● 28th Australasian Polymer Symposium (APS2006) and Australasian Society For Biomaterials 16th Annual Conference, Rotorua, New Zealand, 5-9th February **2006** ● 10th Naples Workshop on Bioactive Peptides, Naples, Italy, 11-14th April **2006** (Plenary) ● Controlled Release Society's 33rd Annual Meeting and Exposition in Vienna, Austria, 22nd-26th July **2006** ● RACI Drug Design, Hunter Valley Gardens: Drug Design Amongst the Vines, Pokolbin, Hunter Valley NSW, Australia, 3rd - 7th December **2006** (Plenary).

Research Translation

I hold more than 40 patents, covering three major areas: (i) **Insecticides, pesticides and antifungal agents:** [16 patents]; (ii) **Berbane alkaloids:** [9 patents]; (iii) **Medicinal chemistry and drug delivery:** [16 patents] including (i) a novel and effective synthetic vaccine/adjuvant technology, the **Lipid-Core-Peptide (LCP) system**. This research has the potential to enable the **development of orally active synthetic vaccines**, a technology that would revolutionise the field of immunology and (ii) a novel charged liposaccharide based gene delivery system.

Commercial achievements. I have extensive experience in commercialization of intellectual property. I was one of the **co-founders of Alchemia Ltd**, a Brisbane based biotechnology company (ASX Code: ACL). http://www.alchemia.com.au/about/history/. The company started its activity in my laboratory at the University of London (UK) resulting in **IT patents 33-35**. Our gene delivery **IT patent 38** provides the basis for a potential gene therapy for treating corroidal neovasculization. I also **co-founded Implicit Bioscience Pty Ltd**, Brisbane, Australia, an immunology-focused drug development company established in early 2004 (**http://www.implicitbioscience.com/**). The company owns my patent on vaccine delivery: **IT patent 30**. I am the **co-founder and chief investigator** of the University of Queensland company **Neurotide** (**http://www.neurotide.com/**). Neurotide is creating the next generation of pain killers based on the body's own natural pain killer, endomorphin (**IT Patent 41**). I am one of the four **founder**s of **TetraQ** **http://www.tetraq.com.au/index2.htm**. TetraQ is the registered name of the University Centre for Integrated Preclinical Development (CIPDD). I am the Director of Pharmaceutics. TetraQ started its operation in mid 2005 after securing $8.1 Million Smart State Fund from the Qld Government**.**

Research Training

At the University of London (UL) 10 PhD students graduated under my primary and 2 under my joint supervision. At the University of Queensland (UQ) 3 PhD student graduated under my primary and 1 under my joint supervision. Presently I supervise 8 PhD candidates as a primary supervisor and 3 as co-supervisor. I supervised about 40 on course Honours students (15 at University of London, 25 at the University of Queensland) and 3 post graduate Honours students at UQ. I supervised 9 Occupational Trainees (5 from Sweden, 1 from Denmark, 1 from Columbia and 2 from France). I had 15 post doctoral researcher in my group at the UL (during 10 years period) and 12 at the UQ. Presently I am working with 5 post doctoral fellows and 2 MSc research assistants. We have group meetings weekly and we have a day long group retreat outside of the University three times a year. All the ex PhD students and Post Doctoral researchers that worked with me have **excellent jobs both in academia and in industry**.

Professional Activities

I review grant applications (about 5 yearly) for NHMRC (Australia), MRC, BBSRC, Wellcome Trust (UK) and the ACS Petroleum Research Fund (USA). I was a member of organizing committee of the Australasian Association of Pharmaceutical Sciences (APSA) Conference, (2001), the 5th and 6th Australian Peptide Conferences and I am also a member of he committee for the 7th Australian Peptide Conference (2007). I have organized the involvement of University of Queensland in the activities of GPEN. Since 2004 the UQ is a full member. I have been asked to organize the Drug Delivery Session of the 1st International Conference on Drug Design & Discovery (3rd - 6th February 2008, Dubai, UAE), where I have to invite four international plenary and ten ordinary speakers. I am also a paid **scientific advisor** for Implicit Bioscience Pty Ltd, Australia, and Proxima Concepts Ltd, UK, and I am a paid **expert patent declarant** for Fischer Adams & Kelly and Freehills Patent & Trademark attorneys and a paid **consultant** of Uniquest, UQ.

Editorial. I am the **Editor in Chief**: Current Drug Delivery; **Associate Editor**: Medicinal Chemistry; **Board Member**: Mini Reviews in Medicinal Chemistry and Recent Patents on Drug Delivery and Formulation.

Research interests

My major research interests are **drug delivery**, immunoadjuvants, carbohydrates, lipids, peptides, and gene delivery.

Many biologically active molecules are very active *in vitro*, but never reach the clinic because of lack of absorption and/or poor *in vivo* stability. Although a range of delivery systems is available, the delivery of sensitive drugs such as peptides, nucleic acid based therapeutics (including antisense DNA and siRNA), simple and complex carbohydrates, and synthetic vaccines presents a major challenge to the pharmaceutical industry. Industry experts agree that approximately 10% of the costs of drug development program should be allocated to aspects of drug delivery. New developments in drug delivery research are likely to have enormous economic impacts upon the pharmaceutical and biotechnology industries. In fact, drug delivery research represents a US$70 billion a year industry.

The research that comes out of my laboratory involves working towards the delivery of poorly absorbed biologically active molecules (e.g. peptides and proteins, nucleic acid based therapeutics, vaccines, and carbohydrates). Four main areas are the focus of our interest:

1) Development of vaccine and adjuvant;
2) Enhancement of the delivery, stability, and activity of peptide based drugs through the conjugation of lipids or sugars;
3) Creation of platform technologies for the oral delivery of poorly absorbed drugs;
4) Design and synthesis of charged lipophilic dendrimers for the delivery of DNA/RNA based therapeutics.

Techniques that have been investigated include lipidation (e.g. with lipoamino acids or lipids), carbohydrate conjugation, liposomes, nano- and micro-particulates, neutral and charged surfactant systems, and polymers. I am recognized to be a world expert in the use of lipids and carbohydrates for enhancing the delivery of biomolecules.

Most significant papers

1. Gibbons *et al*,, *Liebigs Ann. Chem.*, **1990**, 12, 1175-1183. **IF: replaced EurJOC 2.548** [67]. *As they possess both an amino acid core and a lipophilic side chain, lipoamino acids combine the properties of amino acids and lipids. Their physico-chemical properties are highly variable and adjustable, making them ideal candidates for drug/peptide delivery systems as they can be designed to meet both hydrophilic and hydrophobic biological requirements.* ***Lipoamino acids are today widely used for drug, peptide, gene and vaccine delivery.***

2. Zong *et al*, *J. Immunol.*, **1993**, 151(7), 3728-3736. **IF: 6.387** [30]. *Lipoamino acid based synthetic peptides derived from the variable domains of Chlamydia trachomatis outer membrane protein 1 were evaluated as potential candidate sequences in a vaccine. This is the* ***first paper on our patented vaccine adjuvant (LCP) system*** *and it clearly shows that polymerization of a synthetic antigen into the LCP system significantly enhanced immunogenicity compared with monomer alone.*

3. Toth *et al, J. Med. Chem.*, **1999**, 42(19), 4010-4013. **IF: 4.926** [19]. *Lipoamino acid and liposaccharide conjugates of a somatostatin analogue were synthesized to modify the physicochemical properties and enhance biological stability and uptake of the parent peptide. The relative position, number and nature of the lipid and/or saccharide were varied. In vitro experiments clearly showed that the compounds have enhanced biological stability and uptake, while retaining the biological activity of the parent compound.* ***This work was conducted as part of research towards oral peptide delivery.***

4. Marano *et al, Gene Ther.*, **2005**, 12, 1544–1550. **IF: 4.836** [1]. *This featured article by the Nature Publishing Group describes a long-term study into the use of a lipophilic amino-acid dendrimer to deliver an anti-vascular endothelial growth factor (VEGF) oligonucleotide (ODN-1) into the eyes of rats and inhibit laser-induced choroidal*

neovascularization (CNV). In addition, the uptake, distribution and retinal tolerance of the dendrimer plus oligonucleotide conjugates were examined. Ophthalmological examinations indicated that the dendrimers plus ODN-1 conjugates were well tolerated in vivo, which was later confirmed using immunohistochemistry, which showed no observable increase in antigens associated with inflammation. We conclude that the use of such dendrimers may provide a viable mechanism for the ***delivery of therapeutic oligonucleotides for the treatment of angiogenic eye diseases***.

5. Moyle *et al, J. Med. Chem.*, **2006**, 49(21), 6364-6370. **IF: 4.926**. ***Next generation vaccine against GAS infection****: the article describe the development of a highly pure, self-adjuvanting, triepitopic group A streptococcal vaccine based on the lipid core peptide system, a vaccine delivery system incorporating lipidic adjuvant, carrier, and peptide epitopes into a single molecular entity. Vaccine synthesis was performed in three steps, using native chemical ligation, to yield a highly pure product with an excellent overall yield. Subcutaneous immunization of B10.BR (H-2^k) mice with the synthesized vaccine, with or without the addition of an adjuvant, elicited high serum IgG antibody titres against each of the incorporated peptide epitopes*

[For a full list of publications, please see attached document]

List of publications (full)

Refereed Journal Articles

1- Szabo L, Honty K, Toke L, Toth I and Szantay C, Investigation on the chemistry of berbans, I; Synthesis of dimethoxydepyrroloyohimbine and dimethoxydepyrrolo-β-yohimbin, *Chem. Ber.*, **1972**, 105(10), 3215-3230. **IF: replaced EurJOC 2.548** [21].

2- Szabo L, Toth I, Honty K, Toke L, Tamas J and Szantay C, Investigation on the chemistry of berbans, III; Regiospecific synthesis of depyrroloyohimbinone by Dieckmann condensation of unsaturated esters, *Chem. Ber.*, **1976**, 109(5), 1724-1736. **IF: replaced EurJOC 2.548** [12].

3- Szabo L, Toth I, Toke L, Kolonits P and Szantay C, Investigation on the chemistry of berbans, IV; Synthesis of halogen containing depyrroloyohimbone derivatives with PG-like and PG-antagonistic effect, *Chem. Ber.*, **1976**, 109(10), 3390-3403. **IF: replaced EurJOC 2.548** [5].

4- Szabo L, Toth I, Toke L and Szantay C, Investigations on the chemistry of berbans, V; Synthesis of 18-acyloxy-10,11-dimethoxy(depyrrolo) alloyohimbinones, *Liebigs Ann. Chem.*, **1977**, 4, 634-641. **IF: replaced EurJOC 2.548** [3].

5- Szabo L, Toth I, Toke L and Szantay C, Investigations on the chemistry of berbans, VI; New synthesis of 10-methoxy(depyrrolo)reserpine and its stereoisomers, *Liebigs Ann. Chem.*, **1977**, 4, 642-663. **IF: replaced EurJOC 2.548** [5].

6- Toth I, Szabo L, Kajtar-Peredy M, Baitz-Gacs E, Radics L and Szantay C, Investigation on the chemistry of berbanes VII; Synthesis of 10,11-dimethoxy-despyrrolo-raunescine stereoisomers, *Tetrahedron*, **1978**, 34(14), 2113-2122. **IF: 2.610** [4].

7- Szabo L, Nogrady K, Toth I, Szantay C, Radics L, Virag S and Kanyo E, Synthesis of benzo[a]quinolizidine derivatives showing antiinflammatory activity without ulcerogen side effect, *Acta Chi. Acad. Sci. Hung. Tomus*, **1979**, 100(1-4), 19-36. **IF: n-k** [18].

8- Apsimon JW and Toth I, Approaches to triterpene synthesis. Methyl group migration during catalytic hydrogenation of some precursors, *J.C.S. Chem. Comm.(2)*, **1979**, 2, 67. **IF: now Chem Comm. 4.426** [1].

9- Toth I, Szabo L, Tamas J and Szantay C, Investigation on the chemistry of berbanes VIII. Synthesis of "inside" depyrrolo-yohimbine analogues, *Tetrahedron*, **1979**, 35(17), 2043-2047. **IF: 2.610** [1].

10- Toth I, Szabo L, Bozsar G, Szantay C, Szekeres L and Papp JG, Investigation on the chemistry of berbanes X; Synthesis of raunescine analogues with hypotensive and antihypertensive activity, *J. Med. Chem.*, **1984**, 27(11), 1411-1415. **IF: 4.926** [11].

11- Toth I, Bozsar G, Szabo L, Baitz-Gacs E, Tamas J and Szantay C, Investigation on the chemistry of berbanes XII. Synthesis of pseudo-despyrrolo-yohymbine analogues, *Liebigs Ann. Chem.*, **1987**, 3, 243-247. **IF: replaced EurJOC 2.548** [6].

12- Vizi SE, Toth I, Somogyi GT, Szabo L, Harsing LG and Szantay C, Berbanes, a new class of selective α-adrenoceptor antagonists, *J. Med. Chem.*, **1987**, 30(8), 1355-1365. **IF: 4.926** [43].

13- Toth I, Bozsar G, Szabo L, Tamas J, Baitz-Gacs E and Szantay C, Investigation on the chemistry of berbanes XIII. Selective reduction of normal, allo, pseudo and epiallo-depyrrolo-yohimbone analogues, *Liebigs Ann. Chem.*, **1987**, 12, 1021-1124. **IF: replaced EurJOC 2.548** [1].

14- Gaal J, Harsing LG, Somogyi GT, Szabo L, Toth I, Szantay C and Vizi SE, "CH-38083", a highly selective α_2-adrenoceptor antagonist, *Brit. J. Pharmacol*., **1987**, 90, 71. **IF: 3.410**.

15- Baldwin MA, Welham KJ, Toth I and Gibbons WA, Hydride abstraction in fast atom bombardment, *Org. Mass Spectrometry*, **1988**, 23(10), 697-699. **IF: n-k** [25].

16- Gibbons WA, Hughes RA, Szeto A, Charalambous M, Aulabaugh A, Mascagni P and Toth I, Lipidic Peptides I. Synthesis resolution and structural elucidation of fatty amino acids and their homo- and hetero-oligomers, *Liebigs Ann. Chem.*, **1990**, 12, 1175-1183. **IF: replaced EurJOC 2.548** [67].

17- Toth I, Hughes RA, Munday M, Mascagni P and Gibbons WA, Lipidic Peptides II. Synthesis, activity and transport of antiinflammatory benzoquinolizine lipidic peptide conjugates, *Int. J. Pharm.*, **1991**, 68(1-3), 191-198. **IF: 2.156** [12].

18- Toth I, Hughes RA, Ward P, Baldwin MA, Welham KJ, McColm AM, Cox DM and Gibbons WA, Lipidic Peptides IV. Penicillin and cephalosporin amide conjugates with lipidic amino acids and their oligomers, *Int. J. Pharm.*, **1991**, 73(3), 259-266. **IF: 2.156** [10].

19- Hughes RA, Toth I, Ward P, Ireland SJ and Gibbons WA, Lipidic Peptides III. Lipidic amino acid and oligomer conjugates of morphine, *J. Pharm. Sci.*, **1991**, 80(12), 1103-1105. **IF: 2.237** [9].

20- Toth I, Hughes RA, Ward P, Cox DM, McColm AM, Anderson GJ and Gibbons WA, Fatty Peptides VI. Penicillin and Cephalosporin esters with increased lipophilic character, *Int. J. Pharm.*, **1991**, 77(1), 13-20. **IF: 2.156** [4].

21- Richard A. Hughes, Istvan Toth, Peter Ward S.J. Ireland and William A. Gibbons, Lipidic Peptides III. Lipidic amino acid and oligomer conjugates of morphine, *J. Pharm. Sci.*, **1991**, 80(12), 1103-1105. **IF: 2.237** [9].

22- Hussain R, Toth I and Gibbons WA, Lipidic Peptides VII. Synthesis and structure elucidation of τ-amino-butyric acid conjugates with lipidic acids, lipidic amino acids and lipidic peptides, *Liebigs Ann. Chem.*, **1991**, 9, 963-966. **IF: replaced EurJOC 2.548** [4].

23- Hughes RA, Toth I, Ward P, McColm AM, Cox DM and Gibbons WA, Lipidic Peptides V. Penicillin and cephalosporin conjugates with increased lipophilic character, *J. Pharm. Sci.*, **1992**, 81(8), 845-848. **IF: 2.237** [11].

24- Fernandez ED, Toth I, Fonteh A and Gibbons WA, Lipid methyl transferases inhibitory activity of novel α-amino alkyl acid derivatives, *Int. J. Pharm*., **1992**, 81(2-3), 267-269. **IF: 2.156**.

25- Toth I, Griffith IP, Fernandez ED, Hafeez RA, Holley JL, Ward P and Gibbons WA, Lipidic Peptides VIII. Cellular uptake studies of lipidic amino acid, its oligomers and highly lipophilic drug conjugates, *Int. J. Pharm.*, **1992**, 79(1), 39-45. **IF: 2.156** [5].

26- Hussain R, Toth I and Gibbons WA, Lipidic Peptides IX. Synthesis and structural elucidation of lipophilic azydothymidine conjugates, *Liebigs Ann. Chem.*, **1992**, 2, 169-171. **IF: replaced EurJOC 2.548** [3].

27- Toth I, Anderson GJ, Hussain R, Wood IP, Fernandez ED, Ward P and Gibbons WA, Lipidic Peptides X. Synthesis, structural and physico-chemical elucidation of lipidic amino acid conjugates with hydrophilic compounds, *Tetrahedron*, **1992**, 48(5), 923-930. **IF: 2.610** [6].

28- Valko K, Toth I, Ward P, Slegel P and Gibbons WA, Lipidic Peptides XI. Quantitative structure-activity relationships of a series of lipidic amino acid conjugates of ß-lactam antibiotics, *Int. J. Pharm.*, **1992**, 83(1-3), 123-130. **IF: 2.156**.

29- Toth I, Fernandez ED, Hafeez RA, Holley JL, Wood IP and Gibbons WA, Lipidic Peptides XII. Cellular uptake studies of lipidic amino acid, oligomers and highly lipophilic drug conjugates on Ehrlich ascites tumor cells, *Int. J. Pharm.*, **1992**, 83(1-3), 131-138. **IF: 2.156** [3].

30- Anderson GJ, Chapman D, Harris PI, Romer JT, Toth G, Toth I and Gibbons WA, Conformational studies of membrane receptor proteins: The gamma subunit of the IgE receptor, *Eur. J. Biochem.*, **1992**, 207(1), 51-54. **IF: 3.164** [6].

31- Wood IP, Toth I, Holley JL and Gibbons WA, Lipidic Peptides XIII, Synthesis, structure elucidation and in vitro toxicity assesment of chloroambucil conjugates with lipidic acids, lipidic amino acids and their oligomers, *Int. J. Pharm.*, **1992**, 87(1-3), 141-147. **IF: 2.156** [5].

32- Kokotos G, Constantinou-Kokotou V, Fernandez ED, Toth I and Gibbons WA, Lipidic Peptides XIV. Conversion of lipidic amino acids to sphingisine and ceramide analogs and 1,2-diamines, *Liebigs Ann. Chem.*, **1992**, 9, 961-964. **IF: replaced EurJOC 2.548** [15].

33- Thomas RC, Anderson GJ, Ashton D, Drake AF, Toth I and Gibbons WA, Synthetic and conformational studies of the alpha subunit cytoplasmic domain of Immunoglobulin E receptor, *Biochem. Soc. Trans.*, **1992**, 20(4), 840-841. **IF: 3.099**.

34- Allen D, Toth I, Phillipson DJ, Wright CW, Kirby GC and Warhurst DC, In vitro antimalarial and cytotoxic activities of semisynthetic brusatol derivatives, *Eur. J. Med. Chem.*, **1993**, 28(3), 265-269. **IF: 4.926** [7].

35- Gao B, Anderson GJ, James CH, Danton M, Toth G, Toth I and Gibbons WA, Sequence specific anti-peptide antibodies that recognize different subunits of the high-affinity IgE receptor, *Biochem. Soc. Tans.*, **1993**, 21(2), 302-304. **IF: 3.099** [1].

36- Zong G, Toth I, Reid R and Brunham RC, Immunogenicity evaluation of a lipidic amino acid based synthetic peptide vaccine for Chlamydia trachomatis, *J. Immunol.*, **1993**, 151(7), 3728-3736. **IF: 6.387** [30].

37- Toth I, Danton M, Flinn N and Gibbons WA, A Combined adjuvant and carrier system for enhancing synthetic peptides immunogenicity utilising lipidic amino acids, *Tet. Lett*., **1993**, 34(24), 3925-3929. **IF: 2.477** [37].

38- Toth I, Hughes RA, Dekany G, Hillery AM and Ward P, Lipidic Peptides XV. Synthesis and oral uptake studies of lipidic and glyco-lipidic conjugates of ß-lactam antibiotics, *Liebigs Ann. Chem.*, **1994**, 7, 685-688. **IF: replaced EurJOC 2.548** [4].

39- Toth I, Flinn N, Hillery AM, Gibbons WA and Artursson P, Lipidic conjugates of LHRH and TRH that release and protect the native hormones in homogenates of human intestinal epithelial (Caco-2) cells, *Int. J. Pharm.*, **1994**, 105(3), 241-247. **IF: 2.156** [17].

40- Toth I, Hillery AM, Wood I, Magnusson C and Artursson P, Oral absorption of lipidic amino acid conjugates, *Int. J. Pharm.*, **1994**, 102(1-3), 223-230. **IF: 2.156** [16].

41- Korakas D, Valko K, Wood IP, Gibbons WA and Toth I, Structure-retention relationship of diastereomeric mixtures of lipidic amino acid conjugates on reversed phase stationary phases, *J. Chromatograpy A*, **1994**, 659(2), 307-315. **IF: 3.096**.

42- Toth I, Thompson G and Ward P, Lipophilic peptide inhibitors of ribonucleotide reductase enzyme of herpes simplex virus, *Int. J. Pharm.*, **1994**, 106(1), 85-88. **IF: 2.156** [1].

43- France LL, Piatti PG, Newman JFE, Gibbons WA, Toth I and Brown F, Circular dichroism, molecular modeling and serology indicate that the structural basis of antigenic variation in foot-and-mouth disease virus is α-helix formation, *Proc. Nat. Acad. Sci. U.S.A.*, **1994**, 91(18), 8442-8446. **IF: 10.231** [14].

44- Zloh M, Anderson GJ, Clark-Lewis I, Thomas R, Toth I and Gibbons WA, NMR studies of the cytoplasmic C-terminal ß-subunit of the high affinity IgE receptor, *Biochem. Soc. Trans.*, **1994**, 22(4), 1027-1029. **IF: 3.099**.

45- Nagy Z, Rajnavolgyi E, Hollosi M, Toth GK, Varadi G, Penke B, Toth I, Horvath A, Gergely J and Kurucz I, The intersubunit region of the influenza virus haemagglutinin is recognized by antibodies during infection, *Scand. J. Immunol.*, **1994**, 40(3), 281-291. **IF: 6.387** [13].

46- Flinn N, Danton M, Hillery AM, Wood IP, Gibbons WA and Toth I, A lipidic α-amino acid based carrier adjuvantpeptide complex for increasing immunogenicity of vaccines, *Biochem. Soc. Trans.*, **1994**, 22(4), 1055-1058. **IF: 3.099** [1].

47- Dekany G, Ward P and Toth I, Synthesis of fully and partially protected alkylthio-ß-l-fucopyranosides, *J.Carbohydrate Chem*., **1995**, 14(2), 227-236. **IF: 0.716** [2].

48- Anderson G, Biekofsky RR, Zloh M, Toth GK, Toth I, Benedetti E and Gibbons WA, Spectroscopy and modelling of the cytoplasmic domain of the gamma-subunit of high affinity immonoglobulin E receptor, *Biomedical Peptides, Proteins & Nucleic Acids*, **1995**, 1(1), 31-38. **IF: n-k** [1].

49- Toth I, Christodoulou M, Bankowsky K, Flinn N, Gibbons WA, Godeau G, Moczar E, and Hornebeck W, Design of potent lipidic-peptide inhibitors of human neutrophil elastase. In vitro and in vivo studies, *Int. J. Pharm.*, **1995**, 125(1), 117-122. **IF: 2.156** [7].

50- Flinn N, Coppard S and Toth I, Oral absorption studies of lipidic conjugates of thyrotropin releasing hormone (TRH) and luteinizing releasing hormone releasing hormone, *Int. J. Pharm*., **1996**, 137(1), 33-39. **IF: 2.156** [4].

51- Dekany G, Wright K, Ward P and Toth I, Synthesis of sialyl Lewis X analogs, *J. Carbohydrate Chem*., **1996**, 15(4), 383-398. **IF: 0.716** [8].

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100- McGeary RP, Tang VWS and Toth I, Reactions of carbohydrate tosylates and mesylates with nucleophiles: control of inversions of stereochemistry. XXIst International Carbohydrate Symposium, Cairns Australia, 7-12 July 2002 (**2002**), OP 05.

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112- Toth I, Horvath A, Blanchfield JT, Olive C, Good M, Wimmer N and Rakoczy PE, Lipid and Carbohydrate Based Macromolecules in Drug and Vaccine Delivery, Brisbane Biological and Organic Chemistry Symposium, Institute for Glycomics, Griffith university, Gold Coast campus, 28 November 2003 (**2003**). Page 37.

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115- Koda Y, Blanchfield JT, Okada Y, Lazarus LH, Kearns PS and Toth I, A novel liposaccharide system for the delivery of Endomorphin 1 and Leu-Enkephalin, Pharmaceutical Sciences World Congress, 2004; May 30 – June 3, 2004, Kyoto, Japan. (**2004**) Abstract No. P3A-IV-032.

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119- Liang MT, Davies NM and Toth I, Incorporation of lipoamino acid-peptide conjugates within liposomes: effect of alkyl chain length, number of alkyl chains and method of liposome preparation p120, Annual Conference of the Australasian Pharmaceutical Science Association; 4-7th, December, 2004; Melbourne, Australia (**2004**)

120- Liang MT, Davies N and Toth I, High entrapment of novel synthetic lipopeptide antigen within liposome, Brisbane Biological & Organic Chemistry Symposium; 26th, November, 2004 (p17); Brisbane, Australia (**2004**)

121- Toth I, Horvath A, Karpati L, Moyle PM, Olive C and Good MF, Liposaccharides for vaccine delivery. Indo-Australian Conference on Biotechnilogy in Infectious Diseases, MAHE Manipal, March 1-3, 2005 (**2005**) page 19 Oral presentation

122- Horvath A, Olive C, Barozzi N, Karpati L, Good MF and Toth I, A synthetic Group A Streptococcal vaccine of high purity and broad protective range. Indo-Australian Conference on Biotechnilogy in Infectious Diseases, MAHE Manipal, March 1-3, 2005 (**2005**) page 95, P-63

123- Toth I, Horvath A, Karpati L, Moyle PM, Olive C and Good MF, Liposaccharides for Vaccine Delivery. The XVIth Lancefield International symposium on Streptococci and Streptococcal Diseases, 25-29 September, 2005, Palm Cove Cairns, Australia (**2005**). Oral Presentation p 76

124- Moyle PM, Horvath A, Karpati L, Sun HK, Olive C, Good MF and Toth I, Synthesis of highly pure lipid-core-peptide (LCP) based Group A Streptococcal (GAS) vaccine. The XVIth Lancefield International symposium on Streptococci and Streptococcal Diseases, 25-29 September, 2005, Palm Cove Cairns, Australia (2005). Poster p.240.

125- Fujita Y, Moyle PM, Horvath A, Olive C, Good MF and Toth I, A synthetic Group A Streptococcal (GAS) Vaccine of broad protective range. The XVIth Lancefield International symposium on Streptococci and Streptococcal Diseases, 25-29 September, 2005, Palm Cove Cairns, Australia (2005). Poster p.241.

126- 28th Australasian Polymer Symposium (APS2006) and Australasian Society For Biomaterials. Synthetic macromoleculs for drug delivery16th Annual Conference at The Rotorua Convention Centre, Rotorua (New Zealand), 5-9 Feb 2006

127- Istvan Toth, Peter Moyle, Yasuko Koda, Colleen Olive, Michael Good, Liposaccharides in peptide and vaccine delivery, 10th Naples Workshop on Bioactive Peptides, 11-14 Apr 2006 (L8Plenary)

128- I Toth, Liposaccharides in drug delivery. Controlled Release Society's 33rd Annual Meeting and Exposition in Vienna (Austria), 22-26 July 2006 (Keynote)

129- I Toth, P Moyle, P Simerska, Y Fujita, C Olive, MF Good, Liposaccharides in Peptide, Gene and Vaccine Delivery, Hunter Valley Gardens: Drug Design Amongst the Vines (RACI), Pokolbin, Hunter Valley, NSW (Australia), 3-7 Dec 2006 (Plenary).

INVITED LECTURES

Invitations to National and International Meetings (from 2001 only):

I have been regularly **invited** to give presentations including **plenary and keynote lectures**

1) 4th Australian Peptide Symposium Lipids and Sugars: Application for peptide delivery and for enhancing synthetic peptide immunogenicity Lindeman Island, 21-25 Oct 2001
2) The World Chemistry Congress incorporating the 38th IUPAC Congress – Frontiers in Chemistry. Lipoamino acids and liposaccharides: enhanced peptide delivery 1-6th July 2001, Brisbane Australia
3) Formulation and delivery of bioactives, Otago NZ Feb **2002** (Keynote)
4) XXIst International Carbohydrate Symposium, Reactions of carbohydrate tosylates and mesylates with nucleophiles: control of inversions of stereochemistry Cairns Australia, 7-12 July **2002.**
5) Annual Conference of Bioactives on Opioid Mimetic Analgesics. Delivery of CNS peptides **2002** Awaji Yumebutani, Hyogo Japan March 17-19 27th (Keynote)
6) 27th European peptide conference, Lipid-core-peptides for vaccination; structure-activity relationship Sorrento Italy, 31 August-6 September **2002.**
7) International Pacific RIM Biotechnology Conference, Drug delivery systems. Auckland New Zealand, 17-20 November **2002**.
8) Carbohydrate Gordon Research Conferences, Liposaccharides in drug and vaccine delivery. Tilton School, NH, USA 22-27 June **2003** (Keynote)
9) 22nd International Carbohydrate Symposium, Solid phase carbohydrate synthesis Glasgow (The United Kingdom), 23-27 July **2004**.
10) The XVIth Lancefield International symposium on Streptococci and Streptococcal Diseases, Palm Cove Cairns, Australia, 25-29 September **2005**.
11) RACI Qld Polimer Group Satelite Symposium, Australian Institute for Bioengineering and Nanotechnology, Future materials focus on drug Delivery, Liposaccharides in drug and vaccine delivery.16 May **2005**, Qld Biotechnology Precinct. (Keynote**)**
12) Indo-Australian Conference on Biotechnology in Infectious Diseases, Mahe Manipal (India), 3-5 March2005 (Plenary)
13) 17th Singapore Pharmacy Congress Inter-varsity pharmacy symposium. Design and development of novel vaccine adjuvant/carrier systems, 1-4 July 2005 (**2005**) Grant Copthorne Waterfront Hotel Singapore. (Plenary)
14) 17th Singapore Pharmacy Congress Inter-varsity pharmacy symposium. Liposaccharides: application for drug, peptide and gene delivery 1-4 July 2005 (**2005**) NUS(Keynote)
15) Venoms to Drugs **2005**, **Delivery Systems** Heron Island 28 Aug-2 Sept 2005
16) Ninth International Symposium; Solid Phase Synthesis - Complimentary Solution Methods & Combinatorial Libraries, Norwich (England), 30 Aug - 03 Sept **2005**.
17) 28th Australasian Polymer Symposium (APS2006) and Australasian Society For Biomaterials. Synthetic macromoleculs for drug delivery16th Annual Conference at The Rotorua Convention Centre, Rotorua (New Zealand), 5-9 Feb **2006**
18) 10th Naples Workshop on Bioactive Peptides, 11-14 Apr **2006** (Plenary)
19) Controlled Release Society's 33rd Annual Meeting and Exposition in Vienna (Austria), 22-26 July 2006 (Keynote)
20) Hunter Valley Gardens: Drug Design Amongst the Vines (RACI), Pokolbin, Hunter Valley, NSW (Australia), 3-7 Dec **2006** (Plenary).

Invited Lectures at Universities

1- 14/4/2003 - Prof. Rosario Pignatello
Università degli Studi di Catania, Dipartimento di Scienze Farmaceutiche, Catania (Italy)

2- 7/4/2003 Prof. Franco Alhaique
Dipartimento di Studi di Chimica e Tecnologia delle Sostanze Biologicamente Attive, Faculty of Pharmacy, Università "La Sapienza", Roma (Italy)

3- 24/4/2003 Prof. Anna Maria Papini
Università degli Studi di Firenze, Dipartimento di Chimica Organica "Ugo Schiff", Polo Scientifico, Firenze (Italy)

4- 10/4/2003 Giovanni Sindona
Università della Calabria, Dipartimento di Chimica, Arcavacata di Rende (Italy)

5- 11/4/2003 Prof. Antonio Procopio
Università della Calabria, Dipartimento di Chimica, Arcavacata di Rende (Italy)

6- 5/11/2003 Prof. Yoshio Okada
Faculty of Pharmaceutical Sciences, Department of Medicinal Chemistry and High Technology Research Centre, Kobe Gakuin University, Nishi-ku, Kobe (Japan)

7- 4/11/2003 Prof. Saburo Aimoto
Institute for Protein Research, Osaka University, Osaka (Japan)

8- 8/11/2003 Prof. Yoshiaki Kiso
Kyoto Pharmaceutical University, Kyoto (Japan)

9- 12/4/2006 Kobe Gakuin University, Kobe (Japan)

10- 14/4/2006 Tokai University, Kanagawa (Japan)

11- 17/4/2006 Kyoto Pharmaceutical University, Kyoto (Japan)

12- 18/4/2006 Meijo University, Nagoya (Japan)

PATENTS

The following patents were obtained while I was working at the Central Research Institute for Chemistry of the Hungarian Academy of Sciences (CRIC) and as an advisor to the Chinoin Pharmaceutical Company. The patents refering to the insecticides, pesticides and antifungal agent cover novel procedures for the preperation of these compounds. These patents are owned by the Chinoin Co. The commercial value of these patents involves many millions of dollars. The patents refering to the berbane alkaloids are product and procedure patents for work carried out at the CRIC and protect lead compounds with potential pharmaceutical use as anti-inflammatory agents, anti-hypertensive agents and CNS antagonists. These patents are co-owned by the CRIC and the Chinoin Co. Most of the compounds are still undergoing further development. The miscellaneous patents protect single procedures for commercially useful products. One such miscellaneous patent (Anchored MAP) is owned by the School of Pharmacy and at present shows potential as a vaccine-adjuvant system.

(i) Insecticides, pesticides and antifungal agent

1. Toth, Geza; Toth, Istvan; Pasztor, Erzsebet; Tanko, Jozsef, Mrs.; Nadasy, Miklos: Preparation of fungicidal benzimidazole derivatives, HU 48100 A2 (29 May 1989) ICS C07D235-32; A61K031- 415, CA **112**(21):193765r

2. Toth, Geza; Toth, Istvan; Nadasy, Miklos; Pasztor, Erzsebet; Tanko, Jozsef, Mrs.: Fungicide comprising 2-aminobenzimidazole metal salt complexes as active ingredient and process for producing the active ingredient, HU 46191 A2 (28 Oct 1988) ICS C07D235-00, CA **110**(25):227152q

3.Toth, Geza; Toth, Istvan; Pasztor, Erzsebet; Tanko, Jozsef, Mrs.: Preparation of carbomethoxyaminobenzimidazoles as pesticides, HU 41011 A2 (30 Mar 1987) CA **108**(1):6008d

4.Toth, Geza; Szejtli, Jozser; Toth, Istvan; Szente, Lajos; Pasztor, Erzsebet; Radvany Hegedus, Erzsebet; Tanko Wertman, Erzsebet: Pesticidal cyclodextrin complexes, DE 3614275 A1 (6 Nov 1986) ICS A01N057-10; A01N065-00 CA **106**(13):98154h

5.Toth, Geza; Toth, Istvan; Pasztor, Erzsebet; Tanko, Wertman: Alkyl 2-benzimidazolecarbamate sulfonate salts, DE 3602881 A1 (7 Aug 1986) ICS A01N047-18; A01N043-52 CA **105**(21):191090y

6.Toth, Geza; Csaszar, Janos; Turcsan, Istvan; Jelinek, Istvan; Somfai, Eva; Szabo, Gabor; Nagy, Lajos; Toth, Istvan; Montay, Tibor: Industrial scale preparation of benzofuran derivatives, BR 8102692 A (14 Dec 1982) CA **98**(21):179203s

7.Toth, Geza; Szabo, Gabor; Marso, Miklos; Nagy, Lajos; Toth, Istvan; Montay, Tibor: Aryl N-substituted carbamates and thiocarbamates, HU 19949 O (28 May 1981) CA **96**(3):19852h

8.Toth, Geza; Toth, Istvan; Montay, Tibor: Carbamates, HU 18078 (28 Apr 1980) CA **94**(3):15748q

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