EUROPEAN CHITIN SOCIETY

NEWSLETTER

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- New EUCHIS members
- New textbook
- EUCHIS'09
- 11th ICCC/8th APCCS
- PhD-thesis
  Christian Gorzelanny

January, 2009
No. 26

EDITORIAL

There are two major conferences this year, the first being our own EUCHIS '09 meeting on San Servolo Island, Venice on 23rd-26th May. Full conference details can be accessed through our Society's website http://www.isf.univpm.it/euchis2009/ but some important deadlines and dates to note are:

- Submission of abstracts: February 16, 2009
- Notification of acceptance: March 13, 2009
- Advance registration: March 27, 2009
- Grant request: March 27, 2009
- Refund request: April 04, 2009
- Manuscript due: April 27, 2009
- On site registration: May 23, 2009

The second is the joint 11th ICCC/8th APCCS meeting to be held in Taipei, Taiwan on 6th-9th September. Elsewhere in the *Newsletter* there is a letter from the President of the joint meeting, Professor Rong Huei Chen, inviting all researchers in chitin and chitosan to attend the meeting. There are some details of the meeting on the EUCHIS website, but fuller information is now available on http://taiwan11thiccc.ntu.edu.tw/

We continue to steadily recruit new members and it has been decided to include in each January issue of the *Newsletter* a list of members joining the Society during the preceding year. The first such list is part of the current issue. Keeping track of members leaving the Society is more difficult, as several years of non-payment of membership fees may precede actual notification of resignation.

One important piece of EU legislation coming into force is REACH, which is an attempt to control the manufacture within the EU, or importation into the EU, of all chemicals. Although natural polymers are perhaps more easily treated than low molecular weight organic and inorganic chemicals, chitosan may face some problems as to the best of my knowledge all current commercial supplies of chitosan are obtained by chemical modification of chitin and did not occur naturally. Perhaps one of the European chitosan producers could explain the likely impact of REACH on chitin and chitosan supplies within Europe.

Finally, I am glad to be able to report that our Honorary President, Professor Olav Smidsrød, continues to progress and hopefully it will not be too long before he is well enough to attend chitin conferences. In the meantime one can still benefit from his insight and knowledge as the English translation of his co-authored book on biopolymers has just been published. A review of the book appears elsewhere in the *Newsletter*.

George A F Roberts

Honorary Secretary

Bremen. 02.01.2009

Treasurers Report 2008:

Fig.1:

In 2008 EUCHIS we had 156 members differentiated in 6 member's categories: active, active (East), collective, donor and student members and one Honorary President. Fig 1 shows the total numbers of members according to categories from 2006 to 2008 (except HP).

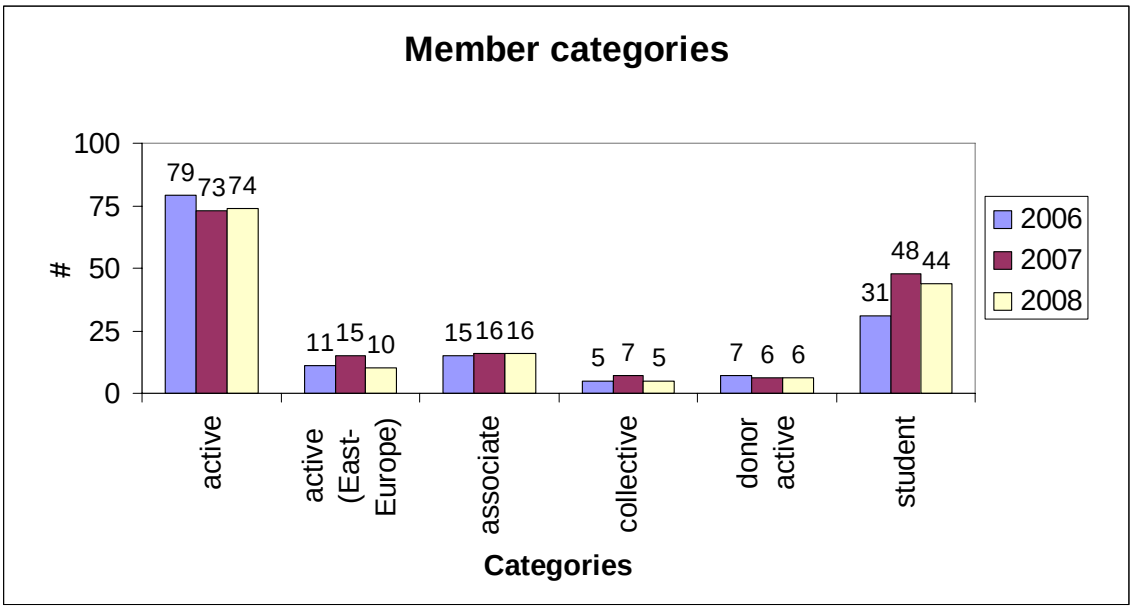


Fig. 2:

Although Euchis was founded as an European society, Euchis is more or less an international community of chitin researchers, users and companies. The five major fractions are from Germany, France, Norway, Spain, and the since last year Turkey (15 members) having alltogether 82 members. There are representatives from all continents except Australia.

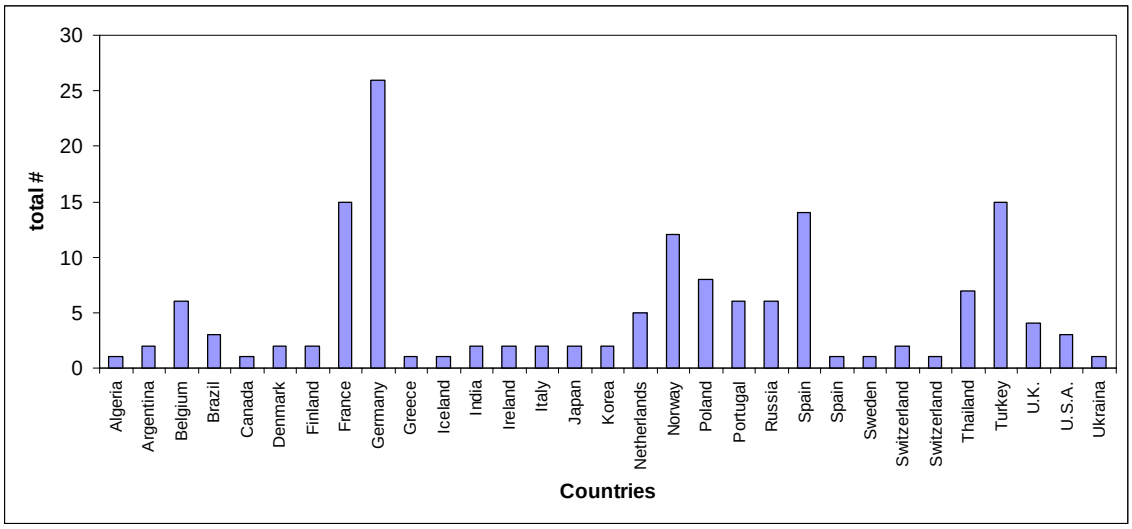


Table 1:

In 2008 the total income from membership fees was EUR 2.305,50. Together with the balance of 2007 (EUR 11.905,22) our total positiva made up EUR 14.210,72.

In 2008 Euchis paid EUR 1.000,00 for three poster prices, which were awarded during the conference in Antalya 2007. Running costs were office expenses (EUR 300,00), bank charges (EUR 349,27) and internet charges with EUR 219,80. The running costs remained almost stable. In 2008 there was less income from members fees compared to 2007 (EUR 1.071,50). Due to unbalanced accounts since 2004, 16 memberships will be cancelled per Dec. 31. 2008. For 2009, improvement of the payment moral of our members should be discussed during the Euchis board meeting.

POSITIVA					
Balance per 31.12.2007				**EUR**	**11.905,22**
Members fee					
- collective members		EUR	360,00		
- active members		**EUR**	**1.619,50**		
- associate members		**EUR**	**150,00**		
- student members		**EUR**	**176,00**		
				EUR	**2.305,50**
total				**EUR**	**14.210,72**
NEGATIVA					
Bank charges		**EUR**	**-349,27**		
Office expenses		**EUR**	**-300,00**		
Internet charges		**EUR**	**-219,80**		
Euchis Poster Price 2007	**paid in 2008**	**EUR**	**-1000,00**		
total				**EUR**	**-1,869,07**
Balance per December 31, 2008				**EUR**	**12.341,65**

The balance per December 31 2008 was EUR 12.341,65

Bremen, January 02, 2009

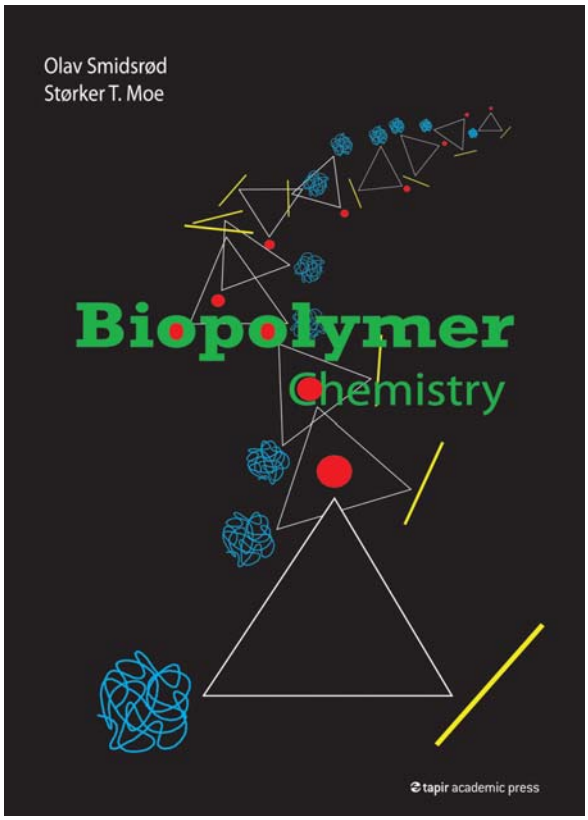
Dr. Martin Graeve

NEW MEMBERS

Below is a list of new members who joined the European Chitin Society during 2008, together with their e-mail addresses. On behalf of the Society I would like to extend a very warm welcome to them all.

Surname	Name	Email-Name	date of entry
Agust	Stefan H.	saah4@hi.is	29.08.2008
Aytekin	Ali Ozhan	ozhanaytekin@gmail.com	28.10.2008
Berghoff	Carla F.	cberghoff@inifta.unlp.edu.ar	05.11.2008
Boonlertnirun	Suchada	Kittihuntra@hotmail.com	01.08.2008
Dragan	Jocic	d.jocic@utwente.nl	07.04.2008
Falcone	Franco	Franco.Falcone@nottingham.ac.uk	08.05.2008
Goycoolea	Francisco M.	fm.goycoolea@usc.es	09.12.2008
Jayakumar	Rangasamy	rjayakumar@aims.amrita.edu	12.11.2008
Lavertu	Marc	marc.lavertu@polymtl.ca	01.07.2008
Pelagia	Glampedaki	p.glampedaki@utwente.nl	07.04.2008
Renault	Francois	francios.renault@univ-fcomte.fr	17.11.2008
Suvarnasara	Raweewon	Raweewun99@yahoo.com	12.11.2008
Tourette	Audrey	a.tourette@utwente.nl	07.04.2008
Wiweger	Malgorzata	M.Wiweger@lumc.nl	04.02.2008

George A F Roberts



New textbook: "Biopolymer Chemistry"

Title: "Biopolymer Chemistry"
Olav Smidsrød & Størker T. Moe
Tapir Academic Press (www.tapirforlag.no), Trondheim, 2008
(398 pages, ca. Euro 80)
ISBN: 82-519-2384-2

There are several text-books available within physical (bio-)chemistry dealing with the physical-chemical properties of macromolecules. However, most of them are written by physicists and are not suitable for students of (bio)chemistry or molecular biology in view of their background knowledge. The strength of this text-book is that it deals with relatively complicated subjects such as ideal solutions, polyelectrolytes, second virial coefficients, chain statistics, radius of gyration, excluded volume, Donnan equilibrium etc. in a way that is readily understood by these students, and represents a new perspective on biomacromolecules that they do not get from the other courses that are part of traditional molecular biology studies.

The book is divided into 3 parts (Part 1: Chemical structure of biopolymers, Part 2: Conformation of biopolymers and Part 3: Physical properties of biopolymers). A more detailed list of the contents of the fourteen chapters is given in the following Table.

Reflecting the scientific interest of the authors, the emphasis of this textbook is on polysaccharides, especially alginates. Chitin and chitosan are mentioned in several chapters, such as in the chapter on oligo- and polysaccharides (4.2), ordered conformations (fibrous and crystalline structures; 8.2) and phase behaviour of two polymers in solution (14.5).

Researchers within the chitin/chitosan field will also find the textbook useful for the characterization of chitosan samples as it includes detailed descriptions of relevant methods such as viscosity (including intrinsic viscosity and relation to conformation and molecular weight), and methods for molecular weight determination such as light scattering, osmosis, and size exclusion chromatography.

The book also deals with biopolymers such as proteins and nucleic acids in addition to polysaccharides, although other textbooks might cover this part better.

Kjell M. Vårum

9th International Conference of The European Chitin Society

23-26 May 2009
San Servolo Island
Venice, Italy
http://www.isf.univpm.it/euchis2009/

Welcome message

Dear Colleagues,
It is a great honor and privilege for us to invite you to participate at the 9th International Conference of European Chitin Society, the main event of EUCHIS this year, to be organized in Venice (Italy) between May 23 and 26, 2009.
In addition to a very exciting program, our guests will also have the chance to enjoy Venice, defined as an "Unbelievable city to be approached only by boat and coming from far away". The interaction of participants from both academia and industry has a great potential to generate new ideas and collaborations.
We look forward to seeing you all in Venice!

Franco Rustichelli
Chair of EUCHIS'09

Kjell M. Vårum
President of the EUCHIS

Conference Chairs

Franco Rustichelli, Polytechnic University of Marche, Italy	Chair
Carla Caramella, University of Pavia, Italy	Co-Chair
Sevda Senel, Hacettepe University, Turkey	Co-Chair
Kjell M. Vårum, Norw. Univ. Science & Technol., Norway	Co-Chair

International Advisory Board

Rong H. Chen, National Taiwan Ocean University, Taiwan
Paolo Colombo, Interuniversity Consortium TEFARCO Innova, Italy
Emir B. Denkbas, Hacettepe University, Turkey
Alain Domard, Universite Claude Bernard, France
Vincent G.H. Eijsink, Norwegian University of Life Sciences, Norway
Massimiliano Fenice, University of Tuscia, Italy
Eric Guibal, Ecole des Mines d'Alès, France
Malgorzata Jaworska, Warsaw University of Technology, Poland
Yong-Beom Kim, Seoul National University of Technology, South Korea
Bruno M. Moerschbacher, University of Münster, Germany
Gregory F. Payne, University of Maryland, USA
Martin G. Peter, Potsdam University, Germany
Henryk Pospieszny, Institute of Plant Protection, Poland
George, A.F. Roberts, Nottingham University, UK
Telma Teixeira Franco, State University of Campinas, Brazil
Valery P. Varlamov, Russian Academy of Science, Russia

Local Organizing Committee

Flavio Carsughi, Polytechnic University of Marche, Italy Conference Secretary
Francesco Federiconi, Ancona, Italy
Maria Chiara Girombelli, Ancona, Italy

Caterina Mokrousova, Ancona, Italy
Vittorio Rozzi, Ancona, Italy

Plenary speakers

Akikazu Ando, Japan, *Structure and function of chitosanase*
Lisbeth Illum, United Kingdom, *A nose for chitosan*
Third speaker to be confirmed

Keynote speakers

Ryszard Brzezinski, Canada, *Chitosan hydrolysis and beyond*
Laurent David, France, *From chitosan solutions to hydrogels: role of sub-micrometric heterogeneities*
Giacomo Di Colo, Italy, *Chitosans as permeation enhancers*
Vincent G. H. Eijsink, Norway, *Structure and Function of chitinolytic enzymes*
Sam Hudson, USA, *The Hemostatic Properties and Uses of Chitosan*.
R. Jayakumar, India, *Novel Biodegradable Chitin and Chitosan Based Nanomaterials for Drug Delivery and Tissue Engineering Applications*
Maria Jose Alonso Fernandez, Spain, *Chitosan based nanoparticulate systems: classificatio, challenges, opportunities*
Ick Chan Kwon, South Korea, *Self assembled nanoparticles for cancer imaging and targeting*
Claus Michael Lehr, Germany, *Chitosan particles and pulmonary applications*
Sevda Senel, Turkey, *Veterinary applications of chitosan*
Sabina P. Strand, Norway, *Chitosans and gene delivery*
Igor Tikhonovich, Russia, *Role of chitin-like compounds in microbe-plant signalling*
Kjell M. Vårum, Norway, *Tailoring of chitosans for biomedical applications*
Yuriy Yevdomikov, *Chitosan as multifunctional regulator of liquid-crystalline ordering DNA molecules*

Conference Topics

1. Physico-chemical
2. Enzymatic
3. Chitooligosaccharides
4. Biomedical applications
5. Food, Textile and diverse applications

The conference will be organized with both oral and poster presentations. Registration will be from 17.00-19.30 on the afternoon of May 23, followed by a welcoming reception at 18:30. There will be an additional opportunity to register prior to the opening ceremony at 09.00 on May 24.
There will be three plenary lectures, nine sessions of two parallel sessions for the oral presentations (four sessions on May 24, two on May 25 and three on May 26) and three poster sessions (one session per day). A free afternoon on May 25 is reserved for visiting the city. The closing ceremony begins at 16:30 on May 26. For the accompanying persons a social program is organized.
Details are available under the Conference web portal.
Three poster prizes will be awarded at the conference. Full details for submission of abstracts, the Braconnot Prize and travel grants available for research students, and full details for registration and booking accommodation, can be found on the conference web portal:

http://www.isf.univpm.it/euchis2009

ARRIVEDERCI IN VENICE!

Letter from Professor Rong Huei Chen
President of the joint 11th ICCC/8th APCCS meeting

Dear Colleagues:

On behalf of the organizers, I cordially invite all those who are interested in various aspects of Chitin and Chitosan academic research and industrial development to participate in the joint 11th International Chitin and Chitosan Conference (11th ICCC) and 8th Asia-Pacific Chitin Chitosan Symposium (8th APCCS). The conference will be held in the International Building of National Taiwan University of Science and Technology (NTUST), Taiwan, from 6th-9th September 2009.

The Aims of the Symposium

The objectives of the joint congress are to provide a forum for scientists and engineers from academia, research laboratories, and industry from all over the world who are involved in the field of chitin and chitosan to exchange ideas and to extend further cooperation among participants. The joint conferences should foster collaborative links between researchers and engineers by bringing them to one place, where they present their achievements and conduct discussions.

Program

The scientific program will start in the morning of the 7th of September and end on the 9th of September, 2009. The program will include several parallel sessions and the topic areas for papers include, but are not limited to, the following:

Section A: Resources and production

Section B: Biological and ecological aspects

Section C: Chemical aspects

Section D: Physical and physicochemical aspects

Section E: Enzymatic aspects

Section F: Nanotechnology

Section G: Applications in life science

Section H: Applications in other fields

Section I: Industrial, Commercial and Regulatory aspects

A number of papers accepted for oral presentation at joint 11th ICCC/8th APCCS will be selected by the Scientific Committee for publication as a special issue in a well recognized, highly ranked, academic journal.

Important Dates

Abstract deadline	**April 15, 2009**
Notification of acceptance	**May 15, 2009**
Full paper due	**July 31, 2009**

For more information, please go to the website at: http://taiwan11thiccc.ntu.edu.tw/

I am looking forward to your valuable participation and contribution to this important event on Chitin and Chitosan, and proud to have the opportunity to host this event in Taiwan. Please do not hesitate to contact us if you need any more information regarding the conference.

Sincerely yours,

Rong Huei Chen, president
The 11th International Chitin and Chitosan Conference and
The 8th Asia-Pacific chitin and Chitosan symposium
TEL: 886-2-24622192 ext. 5104, Fax: 866-2-24631977

THESIS ABSTRACTS

Chitin, chitosan, and human chitotriosidase in innate immunity and wound repair

Abstract of PhD thesis of **Christian Gorzelanny**

Supervisors: Prof. Dr. Stefan Schneider, Dept Dermatol, Univ Münster, Germany;
Prof. Dr. Bruno Moerschbacher, Dept Plant Biochem Biotechnol, Univ Münster, Germany

Multicellular organisms are potentially ideal habitats for microorganisms so that they had to develop sophisticated barriers to penetration, and multi-layered systems of defense against pathogens and parasites. In humans, the skin and mucous epithelia represent the main defensive barriers, equipped with components of both the evolutionary ancient innate immune system and the more recently developed adaptable immune system. The innate immune system which is related to similar defense systems in animals and even plants and fungi, has been the subject of intensified research in recent years. This thesis deals with the skin barrier and its repair upon wounding, focusing on the role of the chitinolytic and chitosanolytic enzyme chitotriosidase, its substrates and products, and their involvement in innate immunity and wound repair.

A crucial part of the human skin barrier is the uppermost cell layer of the skin epidermis, the stratum corneum, which is composed of corneocytes embedded into a hydrophobic matrix of lipids and proteins. Skin aging or disease-related barrier defects facilitate penetration by pathogens and, thus, establishment of an infection. This thesis presents the application of high-resolution atomic force microscopy (AFM) to reveal age-related morphological changes of the stratum corneum correlating with a reduced physical skin barrier. The results establish AFM as a new research tool to analyse human skin and will serve as a basis to investigate skin penetration by pathogens such as the fungus *Candida albicans*.

Once a fungus such as *C. albicans* has successfully overcome the epidermal barrier, it will try and colonise the host tissue. In healthy individuals, however, fungal infections usually proceed harmlessly, but they can develop into severe or even life-threatening infections in patients with a compromised immune system. A prerequisite for successful immune response is the molecular recognition of the pathogen based on tell-tale pathogen-associated molecular patterns (PAMP). One such molecule typically recognised as foreign is chitin as a structural component of human pathogens such as *C. albicans* or the parasite *Wucheria bancrofti*. In a fresh wound, the immune response is mostly represented by neutrophiles and macrophages. Both cell types belong to the innate immunity and express various pattern recognition receptors recognizing diverse PAMPs such as fungal β-glucans. Upon stimulation, the immune cells react with the secretion of cytokines and hydrolytic enzymes such as matrix-metalloproteases (MMPs) or lysozyme. While cytokines further activate the immune response, hydrolytic enzymes attack the invading pathogen directly.

Interestingly, chitosan, a close derivate of chitin produced from chitin by partial de-acetylation, is known to assist wound healing and to even enable healing of chronic wounds. Development of chronic wounds is related to a failed regulation of MMPs leading to elevated protease activity hindering proper healing. Therapeutic downregulation of MMP activity during wound treatment, consequently, supports the healing process. The present thesis has investigated the influence of chitosan on matrix-metalloprotease 2 (MMP2) expression and

activity. The results show that chitosan polymers are able to bind MMP2 resulting in inhibition of enzyme activity while gene expression was not affected. Application of an *in vitro* model of a cell-based MMP2-dependent migration assay proved the functioning of MMP2 inhibition by chitosan also within a complex biological system, indicating that MMP inhibition by chitosan might play a pivotal role during chitosan-mediated improved wound healing.

Another macrophage-derived hydrolytic enzyme exhibiting altered expression after recognition of PAMPs is a human chitinase named chitotriosidase. Although hydrolysis of chitin by chitotriosidase has been shown previously, the exact mode of action remained unknown. To investigate the substrate and cleavage specificities of chitotriosidase in detail, water soluble chitosans with different degrees of acetlyation were used as a substrate. A computer program was developed to simulate chitotriosidase activity and to model the results obtained using MALDI-TOF mass spectrometry and polyacrylamide gelelectrophoresis of the products obtained experimentally. These studies clearly showed that chitotriosidase acts as a processive endo-enzyme with the ability for non-productive binding, requiring two N-acetylglucosamine residues per cleavage event.

This type of action of chitotriosidase results in the production of small and even-numbered oligomers during early time points of hydrolysis. Further experiments investigating the inflammatory potential of chitotriosidase-produced chitosan oligomers indicated that especially such small oligomers have the strongest immunological activity, activating human derived monocytes/macrophages. Activation of monocytes/macrophages was characterised by increased expression of pro-inflammatory cytokines such as TNFα and increased expression of chitotriosidase itself. This immunological study clearly demonstrates a feed-back up-regulation of chitotriosidase and an inflammatory activity of chitotriosidase products. Since signal transduction is mediated by the transcription factor NFκB, recognition of chitin/chitosan oligomers by pattern recognition receptors such as Toll-like receptors is likely.

The above described results provide significant insight into biocompatibility and bioactivity of chitosans towards human tissues, leading to a molecular understanding of the mode of action of chitin and chitosan in human innate immunity and wound repair. Both the inhibition of matrix-metalloprotease 2 (MMP2) by chitosan polymers and the autocatalytic induction of chitotriosidase by chitosan oligomers combined with the pro-inflammatory activity of chitotriosidase products provide promising opportunities for the development of reliable, chitin- and chitosan-based medical products.