



**BioMediTech**  
Institute of Biosciences  
and Medical Technology

# Annual Report 2016



**UNIVERSITY  
OF TAMPERE**



**TAMPERE UNIVERSITY OF TECHNOLOGY**



## Director's Review

2016 was an active year for the BioMediTech Institute, and you can find the financial indicators for the year in this annual report. In February 2016, TUT made a decision in the spirit of Tampere3 to found a faculty of biomedical science and engineering. It began operating on 1 January 2017 with the aim of strengthening the cooperation between universities in one of TUT's focal fields of research. The structure and composition of the faculty were assembled during 2016, and because all of the research groups in this faculty are also part of the Institute, the Institute gained some excellent new members. The composition of the Institute has changed in other ways, too, due to retirements, new recruitments and other changes to the personnel, which is typical in today's academic research.

During 2015, the funding from the Academy of Finland, intended for raising the universities' profile (the so-called Profi project), transformed into concrete action as the people in the new tenure track and post doc positions began their work at UTA and TUT. The real impact of the recruitments will not become evident for a few years, but already we can see the new researchers actively taking on various university tasks. They have also shown exemplary passion for conducting their research by producing quality publications and drawing up several applications for research funding. In 2016, we managed to gain a significant amount of new research funding, for example in the form of the Academy of Finland's research positions granted. Therefore, I wish to extend my thanks to all the people who actively applied for funding. Research and its utilisation are almost completely funded by outside, competition-based funding, and without it our operations could not be continued successfully.

The research tempo in 2016 was somewhat slowed down by the move from FinnMedi's facilities to the new Arvo building at the Kauppi campus. Moving is always taxing for the people involved, and that was also true here. Not everything went according to plan, and some defects have already required fixing, but now – as we stand in the fifth month of 2017 – the situation is beginning to look a good deal brighter. The laboratories are already working efficiently for the most part, the teaching rooms have been found to be excellent, and new research ideas have been formed, now that we are in these new, shared facilities where researchers can interact in new ways, so things are constantly improving. The operators and operations from the former units in BioMediTech and the medical field, as well as the facilities and researchers related to the Institute's operation that used to be located at TUT's Kauppi campus, moved to the Arvo building, thus making this a major change compared to our former operations, which were spread out across several buildings. In the short term, the majority of TUT's operations will remain at the Hervanta campus as before, which must be taken into account in the Institute's operation. The people involved in our key innovation and utilisation services will, therefore, also visit the Hervanta campus in order to support the researchers there.

In November, we held our traditional BioMediTech Research Day, which was a great success. The large hall housed a full audience, the exhibitors in the commercial session were satisfied and the researchers gained information on their products, and the poster session was packed with interested participants, as usual, so the organisers were also pleased. The evening's highlight was our traditional Christmas party, where we gave our thanks to Hannu Hanhijärvi, who has been the director of our Institute since the beginning, for the successful launch of our operations. After enjoying a holiday, at the end of the year he continued on to his well-earned retirement. Starting on 1 January 2017, I moved from being a vice director to director of the Institute, and Professor Anne Kallioniemi from UTA has been appointed as the new Vice Director. Please feel free to approach either of us to talk about research and its utilisation, teaching, or anything else regarding BioMediTech. Developing our operations in a constantly changing world while Tampere's new university is also being formed should be done in cooperation!



Minna Kellomäki, Director

## Missions

BioMediTech (BMT) is a joint institute of the University of Tampere and Tampere University of Technology. The mission of the Institute is to expedite the integration of TUT's work in natural sciences and technology with UTA's efforts in biomedical engineering. Additional goals are furthering related education and research along with distributing and utilising research data on a national and international level. The Institute has brought technological and bioscientific research closer together in a manner that is conducive to collaboration.

## Objectives

BMT's aim is to carry out internationally recognised research in the field of biotechnology. The Institute's interdisciplinary research environment will be developed and the operating conditions for research strengthened. Strengthening the preconditions for high-level basic research is a requirement for the development of applied and commercially viable research. BMT's innovation operations aim at creating an operating culture that furthers the identification of innovations found through research and their development in order to create new business opportunities. Educational cooperation will be carried out in biotechnology education within the framework of the agreement between the universities. The key aspects of developing the quality of education are the smooth progress of studies and relevance to working life. The goal is to further tighten educational cooperation. The BioMediTech units of both universities operate as pilot organisations in the development of joint administrative and educational practices. In 2016, TUT made a decision to found a new faculty of biomedical science and engineering.

## Organisation

BMT has a director and vice director. Both are in a part-time employment relationship with both universities. Hannu Hanhijärvi served as the director until the end of 2016, and the vice director was Minna Kellomäki. BMT has a Board of Directors with six members, each of whom has a deputy member. The members and deputy members are presented in the table at the bottom of the next page. The Board convenes at least three times a year. The director serves as the presenting official for the Board of Directors. Among other matters, the Board processes plans concerning BMT's operations, approves new research groups for the Institute and approves the annual report to be delivered to the universities.

**The Board's criteria for approving new research groups are as follows:**

1. The research topic is encompassed by BioMediTech's vision/mission
2. Capacity and willingness for strategic research and innovation efforts
3. Evidence of high-level research, ability to obtain funding and sustain said funding
4. Demonstrable space for progress (and safeguards) in the operating environment
5. Sufficient independence with regard to potential business operations
6. Commitment to BioMediTech's operating principles

Two new research groups were approved for the Institute in 2016. At the end of 2016, the Institute had a total of 32 research groups and approximately 300 employees.

**Board members in 2016**

**Member**

Martti Syrjälä, Director, Finnish Red Cross

Anne Kallioniemi, Professor, UTA

Harri Melin, Vice Rector, UTA, Deputy Chair

Kari Varkila, Managing Director, Tampereen lääkärikeskus Oy, Koskiklinikka

Minna Kellomäki, Professor, TUT, Vice Director

Ulla Ruotsalainen, Vice President, TUT, Chair

**Deputy member**

Kari Aranko, Director, European Blood Alliance

Jorma Isola, Professor, UTA

Matti Lehto, Dean, UTA

Jyrki Liljeroos, Managing Director, Santen Oy, Chair of the Board, Pharma Industry Finland PIF

Jukka Lekkala, Professor, TUT

Tiina Äijälä, Director of Administration, TUT

## Research Groups by Area

### Biotechnology

Vesa Hytönen – Protein Dynamics

Markku Kulomaa – Molecular biotechnology

### Cancer Groups

Jorma Isola – Cancer Biology

Anne Kallioniemi – Cancer Genomics

Tapio Visakorpi – Molecular Biology of Prostate Cancer

G Steven Bova – Personalised Cancer Medicine (PELICAN)

Daniela Ungureanu – Cancer Signalling

### Imaging and Biosystems

Matti Nykter – Computational Biology

Frank Emmert-Streib – Computational Medicine and Statistical Learning

Olli Yli-Harja – Computational Systems Biology

Jari Hyttinen – Computational Biophysics and Imaging Group

Soile Nymark – Biophysics of the Eye

Andre Ribeiro – Biosignals in Cells

Ulla Ruotsalainen – Methods and Models for Biological Signals and Images

Marja-Leena Linne – Theoretical and Computational Neuroscience Group

Hannu Eskola – Quantitative Analysis of Medical Imaging

### Mitochondrial Research

Howy Jacobs – Mitochondrial Genetics – Mitochondrial Biology

Laurie Kaguni – Mitochondrial Biogenesis in Health and Disease

### Molecular Immunology

Marko Pesu – Immunoregulation Mika Rämetsä – Experimental Immunology

Mika Rämetsä – Experimental Immunology

### **Cell and Tissue Engineering and Biomaterials**

Katriina Aalto-Setälä – Heart Group

Susanna Miettinen – Adult Stem Cell Group

Susanna Narkilahti – Neuro Group

Heli Skottman – Eye Group

Minna Kellomäki – Biomaterials and Tissue Engineering Group

Jonathan Massera – Biomaterials and Tissue Engineering

### **Sensors, Measurement Methods and Stimulation Equipment**

Hannu Nieminen – Personal Health Informatics

Jari Viik – Physiological Measurement Systems and Methods

Jukka Lekkala – Sensor Technology and Biomeasurements

Pasi Kallio – Micro- and Nanosystems

Leena Ukkonen – Wireless Identification and Sensing Systems Research Group

Sampo Tuukkanen – Sensor Technology and Biomeasurements

### **Biological Physics**

Ilpo Vattulainen – Biological Physics Group

### **Affiliated Groups**

Johanna Schleutker – Genetic Predisposition to Cancer

## Activities

In 2015, the Academy of Finland granted Tampere University of Technology and the University of Tampere Profi funding for promoting the profiling efforts of the universities. The funding primarily supports research development at the BioMediTech Institute. At its meeting on 27 August 2015, the Institute's Board of Directors approved a development plan that takes this funding into account. The funds were used to fill a total of seven tenure track positions and two postdoc positions. Four tenure track positions were filled in 2016. The areas at TUT were microsystems in cellular and tissue engineering, and biomaterials in cellular and tissue engineering. At UTA, the areas were cellular and molecular biology, and cellular and tissue engineering. The preparatory groups involved representatives of both universities, and the application processes were prepared in cooperation. In 2016, there was a tenure track position open for applications in the field of bioinformatics.

The Institute's research groups engage in close research cooperation. The number of joint publications in 2016 exceeded 60. An example of close multi-group cooperation is the expansive and multi-disciplinary Human Spare Parts project, which works to develop methods for using a person's own cells to construct spare parts to replace damaged or deteriorated body parts.

Educational cooperation has been carried out in biotechnology education within the framework of the agreement between the universities. The education steering group is in the process of planning and developing even closer cooperation, particularly in the context of Master's level studies. The annual number of admissions stands at 25 students + separate admissions for UTA and 25 for TUT. At the moment, 35% of bachelor's studies are joint. The joint educational technology pilot with the theme "Developing teaching in bioinformatics using lecture videos and new teaching methods" continued in 2016. The goal is to record videos of one course per university and offer these courses to the students of both universities as online studies through a MOOC platform.

BMT organises an annual Research Day event, where researchers can network as well as present and demonstrate their research. A business exhibit for companies in the field is also arranged in conjunction with the event.

Regular group leader meetings for groups in BioMediTech are held at TUT and UTA. Events aiming to improve occupational well-being and community spirit among the Institute's entire staff have been held in Varala, for example. In this way, the Institute has also sought to make all employees aware of its objectives and services at regular intervals. The joint weekly meetings cover topical matters for the Institute, under the leadership of the Director and Vice Director. Communications meetings are also held on a regular basis.

BMT has offered the Institute's researchers legal services for preparations and negotiations related to research agreements, along with services regarding matters pertaining to inventions and commercialisation. TUT implemented an electronic idea and invention tool (Greip), which is also used by the Institute as a management tool for joint invention disclosures. Prior to this, the universities had already prepared a joint invention disclosure template and related principles

## Social influence

In 2015, the BMT Institute signed a service agreement with a Belgian business incubator called BioVille. This cooperation provides the Institute with a wealth of financing and commercialisation possibilities and cooperation networks, in addition to opportunities for international research collaboration. In order to develop these operations, BMT received ERDF funding from the Council of Tampere Region for 2016–2018. The ERDF project aims to create significant new research and business collaboration contacts and an operating model for the BMT Institute's activities in the region. The current ERDF funding continues the funding from the Council of Tampere Region, which began in 2011 and is intended for developing the Institute's operations and infrastructure. Over the years, ERDF funding has been used to develop innovation services for the Institute, including specialists in contract, IPR and regulatory requirements in the fields of biotechnology and medical technology. The Council of Tampere Region has also supported the development of BMT's research infrastructure with millions of euros through ERDF funding, enabling the procurement of equipment for imaging, cell culture and analyses, to name a few.

In 2016, the Institute was running a total of six preparatory projects for TuTLi commercialisation, funded by Tekes, one of which ended in 2016, four of which will end by the end of 2017, and one which will continue in 2018. Previously, the Institute had one TuTLi project, now ended, whose technology could not be directly commercialised, and instead more IPR has been accumulated around it and commercialisation has been continued as part of the development process. It is expected that some of the TuTLi projects ending in 2017 will lead to new businesses, and for the rest we can negotiate further development with the commercial parties.

In 2016, we also began preparing an Erasmus student exchange agreement with the University of Hasselt, with the aim of realising the first student exchanges during the academic year 2017–2018.

## Supplementary Funding Expenses by Financier

Financier	2016			2015			2014		
	UTA	TUT	in Total	UTA	TUT	in Total	UTA	TUT	Total
Tekes	2 835 580	2 579 237	5 414 817	3 809 161	2 875 918	6 685 079	3 512 009	2 566 622	6 078 631
TutLi	454 292	81 6754	1 271 046	832 845	616 350	1 449 195	713 459	236 123	949 582
Academy of Finland	5 398 186	1 747 716	7 145 902	5 443 104	1 107 572	6 550 676	4 903 031	513 372	5 416 403
EU	243 015	588 289	831 304	363 146	336 928	700 074	865 487	584 955	1 450 442
ERDF	10 937	13 501	24 438	270 218	100 682	370 900	304 311	356 862	661 173
Foundation	794 165	276 437	1 070 602	604 561	185 934	790 495	659 882	N/A	659 882
Others	1 453 723	0	1 453 723	2 686 899	111 277	2 798 176	2 611 841	158 615	2 770 456
<b>Total</b>	<b>11 189 898</b>	<b>6 021 933</b>	<b>17 211 831</b>	<b>14 009 933</b>	<b>5 334 661</b>	<b>19 344 594</b>	<b>13 570 020</b>	<b>4 416 549</b>	<b>17 986 569</b>

## Completed Degrees

Degrees	2016			2015			2014		
	UTA	TUT	in Total	UTA	TUT	in Total	UTA	TUT	in Total
Master's	24	44	68	23	51	74	22	36	58
Doctoral	8	11	19	10	13	23	6	13	19

## Publications by Class of Publication Forum (JUFO)

Tasot	2016				2015				2014			
	UTA	TUT	in Total	of which joint	UTA	TUT	in Total	of which joint	UTA	TUT	in Total	of which joint
Highest level 3	10	7	17	1	21	17	38	2	34	24	58	5
Leading level 2	26	31	57	11	47	68	115	38	44	21	65	1
Basic level 1	87	97	184	37	97	24	121	10	49	38	87	4
Others	8	21	29	2	6	12	18	15	5	24	29	2
<b>Total</b>	<b>131</b>	<b>156</b>	<b>287</b>	<b>51</b>	<b>171</b>	<b>121</b>	<b>292</b>	<b>65</b>	<b>132</b>	<b>107</b>	<b>239</b>	<b>12</b>

## Invention Disclosures

In 2016: 13

In 2015: 10

In 2014: 8

## Patents 2016

Applications: 3 new patent applications  
1 Finnish patent application forwarded as a utility model application  
(China, Japan, Germany, France)

Granted: 2 European patents

## Patents 2015

Applications: 1 new patent application  
3 PCT phase applications  
3 PCT applications forwarded to the international phase

## Patents 2014

Applications: 5 new parent applications  
5 PCT phase applications

Granted: European patent

