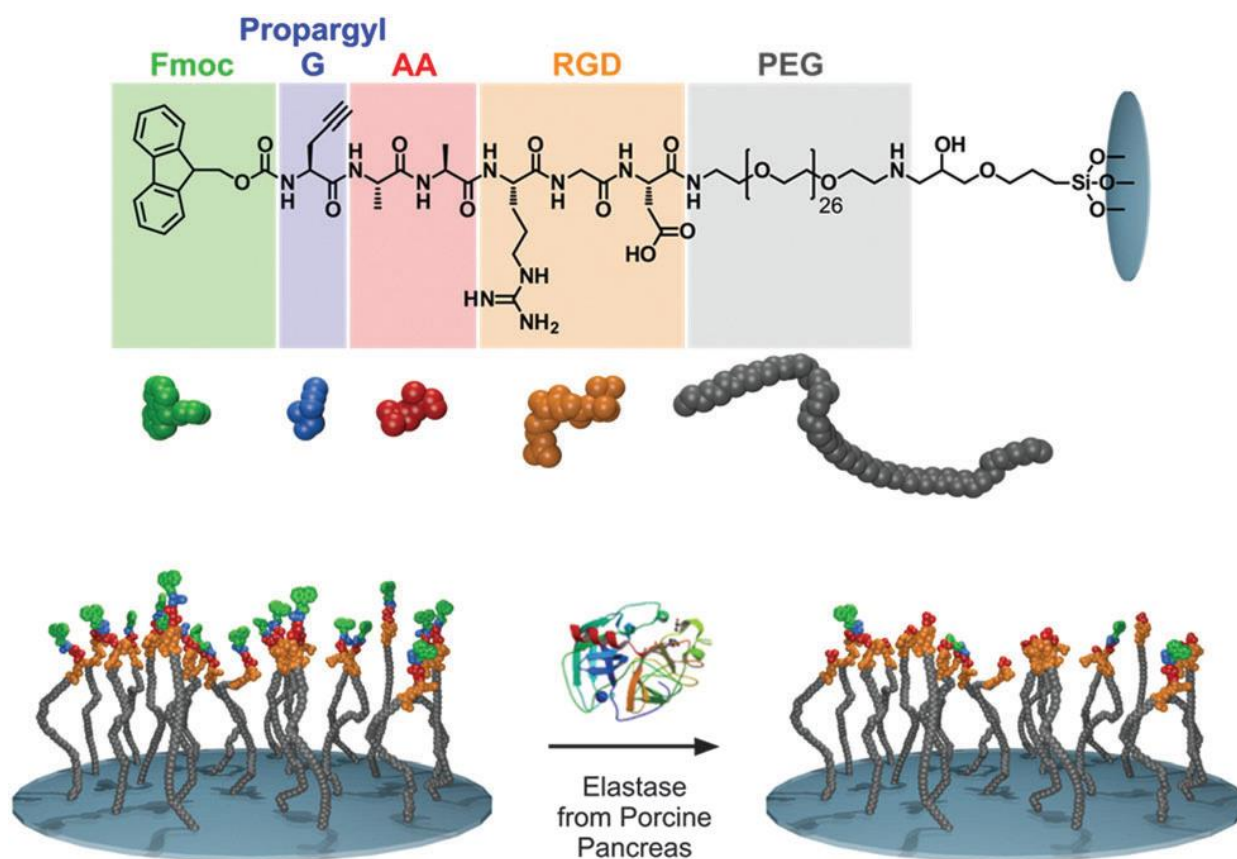




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# The School of Pharmacy Journal



**February 2016-April 2016**

## Foreword

Welcome to our latest edition of the School of Pharmacy Journal, a quarterly collection of publications and press releases from February 2016 to April 2016.

It gives us both great pleasure to present this Journal for the period in which the School of Pharmacy has increased its world standing to be ranked 6<sup>th</sup> in the QS World Rankings for Pharmacy and Pharmacology. This status reflects the combination of teaching quality, research excellence and international reputation of the School. The breadth and depth of the publications collected here, in journals such as Advanced Materials, Blood, Medical and Veterinary Entomology, and Journal of Neurosurgery, highlights the Schools wide ranging impact in science and discovery.

This period also saw recognition of the School as a supportive and enjoyable workplace with the award of our Athena Swan Bronze Award. The Athena SWAN Charter was initially established to encourage and recognise commitment to advancing the careers of women in employment in higher education and research, and now recognises work undertaken to address gender equality more broadly, and not just barriers to progression that affect women.



Professor Phil Williams  
[Phil.Williams@nottingham.ac.uk](mailto:Phil.Williams@nottingham.ac.uk)  
Director of Research  
(Nottingham)



Professor Nashiru Billa  
[Nashiru.Billa@nottingham.edu.my](mailto:Nashiru.Billa@nottingham.edu.my)  
Associate Dean (Research)  
(Malaysia)

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- [The King's Fund Conference, February 2016](#)
- [What does community pharmacy environment in the UK look like and how as a pharmacist can you drive innovation and change?](#)

- **Collated Research Papers:**

**Combinatorial Biomolecular Nanopatterning for High-Throughput Screening of Stem-Cell Behavior**

Yacoub Y. I. Amin , Kasper Runager , Fabio Simoes , Adam Celiz , Vincenzo Taresco , Roberto Rossi , Jan J. Enghild , Lisbeth A. Abildtrup , David C. E. Kraft , Duncan S. Sutherland , Morgan R. Alexander , Morten Foss and Ryosuke Ogaki

Advanced Materials (2016) 28, 1472-1476

DOI: 10.1002/adma.201504995

**Health Care Education Must Be More of a Team Sport**

Tina Brock, Jill Boone and Claire Anderson

American Journal of Pharmaceutical Education (2016) 80 (1) Article 1

DOI: 10.5688/ajpe8011

**Imaging of Crystalline and Amorphous Surface Regions Using Time-of-Flight Secondary-Ion Mass Spectrometry (ToF-SIMS): Application to Pharmaceutical Materials**

Andreea Iuras, David J. Scurr, Catherine Boissier, Mark L. Nicholas, Clive J. Roberts and Morgan R. Alexander

Analytical Chemistry (2016) 88, 3481-3487

DOI: 10.1021/acs.analchem.5b02621

**Age-Related Changes to Human Stratum Corneum Lipids Detected Using Time-of-Flight Secondary Ion Mass Spectrometry Following in Vivo Sampling**

Nichola J. Starr, Daniel J. Johnson, Judata Wibawa, Ian Marlow, Mike Bell, David A. Barrett and David J. Scurr

Analytical Chemistry (2016) 88, 4400-4408

DOI: 10.1021/acs.analchem.5b04872

**Non-destructive characterisation of mesenchymal stem cell differentiation using LC-MS-based metabolite footprinting**

Amal Surrati, Rob Linforth, Ian D. Fisk, Virginie Sottile and Dong-Hyun Kim  
Analyst (2016)

DOI: 10.1039/c6an00170j

**[A novel DFP tripeptide motif interacts with the coagulation factor XI apple 2 domain](#)**

Szu S. Wong, Søren Østergaard, Gareth Hall, Chan Li, Philip M. Williams, Henning Stennicke and Jonas Emsley

Blood (2016) Available online

DOI: 10.1182/blood-2015-10-676122

**[Cyclin A1 and P450 Aromatase Promote Metastatic Homing and Growth of Stem-like Prostate Cancer Cells in the Bone Marrow](#)**

Regina Miftakhova, Andreas Hedblom, Julius Semenas, Brian Robinson, Athanasios Simoulis, Johan Malm, Albert Rizvanov, David M. Heery, Nigel P. Mongan, Norman J. Maitland, Cinzia Allegrucci, and Jenny L. Persson

Cancer Research (2016) 76, 3453-2464

DOI: 10.1158/0008-5472.CAN-15-2340

**[Surface-directed modulation of supramolecular gel properties](#)**

Maria Galini Faidra Angelero, Akmal Sabri, Rhiannon Creasey, Polyxeni Angelero, Maria Marlow and Mischa Zelzer

ChemCommun (2016) 52, 4298-4300

DOI: 10.1039/c6cc00292g

**[Analysis of enzyme-responsive peptide surfaces by Raman spectroscopy](#)**

Jugal Kishore Sahoo, Narayana M. S. Sirimuthu, Anne Canning, Mischa Zelzer, Duncan Graham and Rein V. Ulijn

ChemCommun (2016) 52, 4698-4701

DOI: 10.1039/c5cc09189f

**[Potent dual inhibitors of Plasmodium falciparum M1 and M17 aminopeptidases through optimization of S1 pocket interactions](#)**

Nyssa Drinkwater, Natalie B. Vinh, Shailesh N. Mistry, Rebecca S. Bamert, Chiara Ruggeri, John P. Holleran, Sasdekumar Loganathan, Alessandro Paiardini, Susan A. Charman, Andrew K. Powell, Vicky M. Avery, Sheena McGowan and Peter J. Scammells

European Journal of Medicinal Chemistry (2016) 110, 43-64

DOI: 10.1016/j.ejmech.2016.01.015

**[Penetration and intracellular uptake of poly\(glycerol-adipate\) nanoparticles into three-dimensional brain tumour cell culture models](#)**

Weina Meng, Martin C Garnett, David A Walker and Terence L Parker

Experimental Biology and Medicine (2016) 241, 466-477

DOI: 10.1177/1535370215610441

**[Who uses pharmacy for flu vaccinations? Population profiling through a UK pharmacy chain](#)**

Claire Anderson and Tracey Thornley

International Journal of Clinical Pharmacy (2016) 38, 218-222

DOI: 10.1007/s11096-016-0255-z

Paper of the Week:

**[Pqsbc, A Condensing Enzyme In The Biosynthesis Of The Pseudomonas Aeruginosa Quinolone Signal: CRYSTAL STRUCTURE, INHIBITION, AND REACTION MECHANISM](#)**

Steffen Lorenz Drees, Chan Li, Fajar Prasetya, Muhammad Saleem, Ingrid Dreveny, Paul Williams, Ulrich Hennecke, Jonas Emsley<sup>1</sup> and Susanne Fetzner

The Journal of Biological Chemistry (2016) 291, 6610-6624

DOI: 10.1074/jbc.M115.708453

**[Synergistic cytotoxic effects of combined  \$\delta\$ -tocotrienol and jerantinine B on human brain and colon cancers](#)**

Ibrahim Babangida Abubakar, Kuan-Hon Lim, Toh-Seok Kam, Hwei-San Loh

Journal of Ethnopharmacology (2016) 184, 107-118

DOI: 10.1016/j.ep.2016.03.004

**[Does release of antimicrobial agents from impregnated external ventricular drainage catheters affect the diagnosis of ventriculitis?](#)**

Roger Bayston, Waheed Ashraf and Catherine Ortori

Journal of Neurosurgery (2016) 124, 375-381

DOI: 10.3171/2014.12.JNS141900

**[The impacts of larval density and protease inhibition on feeding in medicinal larvae of the greenbottle fly \*Lucilia sericata\*](#)**

M. R. Wilson, Y. Nigam, W. Jung, J. Knight and D. I. Pritchard

Medical and Veterinary Entomology (2016) 30, 1-7

DOI: 10.1111/mve.12138

**[Making the Practically Impossible "Merely Difficult"—Cryogenic FIB Lift-Out for "Damage Free" Soft Matter Imaging](#)**

Christopher D.J. Parmenter, Michael W. Fay, Cheryl Hartfield and Hoda M. Eltaher  
Microscopy Research and Technique (2016) 79, 298-303  
DOI: 10.1002/jemt.22630

**[Indomethacin-Kollidon VA64 Extrudates: A Mechanistic Study of pHDependent Controlled Release](#)**

Francesco Tres, Kevin Treacher, Jonathan Booth, Leslie P. Hughes, Stephen A. C. Wren, Jonathan W. Aylott and Jonathan C. Burley  
Molecular Pharmaceutics (2016) 13, 1166-1175  
DOI: 10.1021/acs.molpharmaceut.5b00979

**[Arborisidine and Arbornamine, Two Monoterpenoid Indole Alkaloids with New Polycyclic Carbon–Nitrogen Skeletons Derived from a Common Pericine Precursor](#)**

Suet-Pick Wong, Kam-Weng Chong, Kuan-Hon Lim, Siew-Huah Lim, Yun-Yee Low and Toh-Seok Kam  
Organic Letters (2016) 18, 1618-1621  
DOI: 10.1021/acs.orglett.6b00478

**[Structural Derivatization of Clusianone and In Vitro Cytotoxicity Evaluation Targeting Respiratory Carcinoma Cells](#)**

Sree Vaneesa Nagalingam, Kok Wai-Ling, Khoo Teng-Jin  
Planta Medica Letters (2016) 1, e1  
DOI: 10.1055/s-0035-1568332

**[Post-transcriptional Control of Tumor Cell Autonomous Metastatic Potential by CCR4-NOT Deadenylase CNOT7](#)**

Farhoud Faraji, Ying Hu, Howard H. Yang, Maxwell P. Lee, G. Sebastian Winkler, Markus Hafner and Kent W. Hunter  
PLOS Genetics (2016) e1005820  
DOI: 10.1371/journal.pgen.1005820

**[Odontogenic Differentiation of Human Dental Pulp Stem Cells on Hydrogel Scaffolds Derived from Decellularized Bone Extracellular Matrix and Collagen Type I](#)**

Francesco Paduano, Massimo Marrelli, Lisa J. White, Kevin M. Shakesheff and Marco Tatullo

PLOS One (2016) e0148225

DOI: [10.1371/journal.pone.0148225](https://doi.org/10.1371/journal.pone.0148225)

**[Variation in structure and properties of poly\(glycerol adipate\) via control of chain branching during enzymatic synthesis](#)**

V. Taresco, R.G. Creasey, J. Kennon, G. Mantovani, C. Alexander, J.C. Burley and M.C. Garnett

Polymer (2016) 89, 41-49

DOI: [10.1016/j.polymer.2016.02.036](https://doi.org/10.1016/j.polymer.2016.02.036)

**[Synthesis of <sup>19</sup>F nucleic acid-polymer conjugates as real-time MRI probes of biorecognition](#)**

Giovanna Sicilia, Adrienne L. Davis, Sebastian G. Spain, Johannes P. Magnusson, Nathan R. B. Boase, Kristofer J. Thurecht and Cameron Alexander

Polymer Chemistry (2016) 7, 2180-2191

DOI: [10.1039/c5py01883h](https://doi.org/10.1039/c5py01883h)

**[The effect of protein concentration on the viscosity of a recombinant albumin solution formulation](#)**

Andrea D. Gonçalves, Cameron Alexander, Clive J. Roberts, Sebastian G. Spain, Shahid Uddin and Stephanie Allen

RSC Advances (2016) 6, 15143-15154

DOI: [10.1039/c5ra21068b](https://doi.org/10.1039/c5ra21068b)

**[Monitoring model drug microencapsulation in PLGA scaffolds using X-ray powder diffraction](#)**

Adeyinka Aina, Manish Gupta, Yamina Boukari, Andrew Morris, Nashiru Billa and Stephen Doughty

Saudi Pharmaceutical Journal (2016) 24, 227-231

DOI: [10.1016/j.jsps.2015.03.015](https://doi.org/10.1016/j.jsps.2015.03.015)

**[Docking and molecular dynamics simulations of the ternary complex nisin<sub>2</sub>:lipid II](#)**

Sam Mulholland, Eleanor R. Turpin, Boyan B. Bonev and Jonathan D. Hirst

Scientific Reports (2016) 6, 21185

DOI: [10.1038/srep21185](https://doi.org/10.1038/srep21185)

**[A Detailed Assessment of Varying Ejection Rate on Delivery Efficiency of Mesenchymal Stem Cells Using Narrow-Bore Needles](#)**



Mahetab H. Amer, Felicity R.A.J. Rose, Lisa J. White, Kevin M. Shakesheff  
Stem Cells Transl Med (2016) 5, 366–378.  
DOI: 10.5966/sctm.2015-0208

**Film thickness measurement and contamination layer correction for quantitative XPS**

J. Walton, M. R. Alexander, N. Fairley, P. Roach and A. G. Shard  
Surface and Interface Analysis (2016) 48, 164-172  
DOI: 10.1002/sia.5934

**The role of acid-base imbalance in statin-induced myotoxicity**

Dhiaa A. Taha, Cornelia H. De Moor, David A. Barrett, Jong Bong Lee, Raj D. Gandhi, Chee Wei Hoo and Pavel Gershkovich  
Translational Research  
DOI: 10.1016/j.trsl.2016.03.015

• **Reviews**

**Engineering serendipity: High-throughput discovery of materials that resist bacterial attachment**

E.P. Magennis, A.L. Hook, M.C. Davies, C. Alexander, P. Williams and M.R. Alexander  
Acta Biomaterialia (2016) 34, 84-92  
DOI: 10.1016/j.actbio.2015.11.008

**Biomarkers of the involvement of mast cells, basophils and eosinophils in asthma and allergic diseases**

Dean D. Metcalfe, Ruby Pawankar, Steven J. Ackerman, Cem Akin, Frederic Clayton, Franco H. Falcone, Gerald J. Gleich, Anne-Marie Irani, Mats W. Johansson, Amy D. Klion, Kristin M. Leiferman, Francesca Levi-Schaffer, Gunnar Nilsson, Yoshimichi Okayama, Calman Prussin, John T. Schroeder, Lawrence B. Schwartz, Hans-Uwe Simon, Andrew F. Walls and Massimo Triggiani  
World Allergy Organization Journal (2016)9, 7  
DOI 10.1186/s40413-016-0094-3

## Staff Research News

- Professor Cameron Alexander has been invited to be a keynote speaker at the National Science Foundation China (NSFC) – Royal Society of Chemistry International Symposium at Zhejiang University, Hangzhou, China in September 2016.

- Miss Sarah Brydges (pictured bottom right) was awarded a Postgraduate Teaching Assistant Award 2016. These awards recognise and celebrate examples of innovative teaching and/or support of learning.



- Professor Rachel Elliott has been invited to be a member of the National Institute of Health and Care Excellence (NICE) additional adhoc Cancer Drugs Fund (CDF) Committee. The current CDF has a remit around considering patient-level requests for highly expensive drugs not approved for use by the NHS due to insufficient effectiveness for the cost required. The CDF is currently overspent and needs to review which drugs will be funded in the future. The aim of these meetings over 2016 will be to allow the reconsideration of drug-indication pairs currently on the CDF as part of the transition from the old to the new operating model for the CDF.
- Dr Glen Kirkham has been promoted to R&T Level 5 Senior Research Fellow.
- Professor Andrew Morris has been invited to join the Consultative Council of Pharmacy Practitioners for the Faculty of Pharmacy, Quest International University, Perak, Malaysia.
- Dr Anna Piccinini:
  - Was invited to deliver a seminar “The extracellular matrix fine-tunes the innate immune response to infection” at the Institute for Science and Technology in Medicine, Guy Hilton Research Centre, Keele University on 3<sup>rd</sup> February 2016.
  - Participated in the blog for [International Women’s Day 2016](#)
- Dr Omar Qutachi has been promoted to R&T Level 5 Senior Research Fellow.

- Professor Clive Roberts:
  - Was invited to speak at the 3D Printing Symposium, Belgian Particle, Colloid & Interface Society, Leuven
  - Was interviewed for part of an article in [Life Science Leader Magazine](#).
  
- Dr Giovanna Sicilia has been awarded the Macro Group UK Jon Weaver prize for work carried out during her PhD thesis. This is the leading prize for PhD students in polymer science in the UK, and was awarded just after the publication of her latest paper ["Synthesis of <sup>19</sup>F nucleic acid-polymer conjugates as real-time MRI probes of biorecognition" Giovanna Sicilia et al. Polym. Chem., 2016,7, 2180-2191 DOI: 10.1039/C5PY01883H](#) which was chosen for an Inside Front Cover feature. This paper describes the use of polymer-DNA conjugates for sensing nucleic acids by magnetic resonance imaging methods, and was a collaboration with the Dr Kris Thurecht's world-leading team at the Centre for Advanced Imaging at the University of Queensland.
  
- Professor Phil Williams has been appointed a Fellow of the Royal Society of Chemistry.

## **Grants/Studentships Awarded**

- Professor Cameron Alexander has received a Royal Society Wolfson Research Merit Award "Encoding cellular instructions in materials – biology-directed synthesis £50k .
- Professor Morgan Alexander has been awarded:
  - MetVBadBugs EMPIR consortium UoN: Kim Hardie, Paul Williams and MR Alexander, in collaboration with large European metrology institute network led by Gilmore at NPL June 2016 3 years Euro 389k
  - Formulation for 3D printing: Creating a plug and play platform for a disruptive UK industry, Wildman et al. £3.8m EPSRC (EP/N024818/1 2016-2020)
  - A Strategic Partnership with the Australian Cooperative Research Centre for Cell Therapy Manufacturing (CRC-CTM) to Commercialise Stem Cell Culture Polymers EPSRC Impact Acceleration Account £67k with Andrew Hook. Matching resource provided by UniSA (01/11/15 – 28/02/16).
- Heinrich-Hertz-Scholarship awarded to Steffen Drees to work with Professor Jonas Emsley on structural biology of quorum sensing proteins.
- Professor Rachel Elliott has been awarded:
  - NIHR Programme development grants competition 14 + multimorbidities themed call. PI: Prof Mike Slade, University of Nottingham. Recovery Colleges Characterisation and Testing (RECOLLECT). Awarded March 2016. £99932, 12 months.
  - NIHR Programme Grants for Applied Research: PIs: Tony Avery & Rachel Elliott, University of Nottingham. Avoiding patient harm through the application of prescribing safety indicators in English general practices (acronym: PRoTeCT): RP-PG-1214-10005. Duration: 54 months. Bid: £2423153. Awarded March 2016.
- Dr Franco Falcone has been awarded £62,049 from the Rosetrees Trust for PHD support for Belal Shohayeb.
- Dr Sara Pijuan-Galitó has been awarded Wellcome Trust Sir Henry Wellcome Early Career Fellowship: Achieving controlled human pluripotent stem cell derivation and expansion using Inter-alpha-Inhibitor with a novel polymer substrate £250k 4 years, working with Professors Morgan Alexander and Chris Denning
- Dr Frankie Rawson has been awarded a Nottingham Research Fellowship "Cellular electricity: diagnostics and treatments for the future" £200k

- Dr Lisa White, EU Outgoing Marie Curie Fellow, has been awarded an Ann McLaren Fellowship "Advanced functional aerogels from extracellular matrix" £200k.

## Student News

- Hosam Abu Awwad won second best poster at the UKICRS Conference, Cardiff, April 2016 (personal award of £50)
- Mahi Amer (pictured right) has been awarded an Andrew Hendry postgraduate prize, at the Tri-Campus Postgraduate Prize Ceremony, in recognition of the quality of her research during her PhD
- Jack Bridge has successfully defended his PhD
- Gizem Osman won best oral presentation prize at the EPSRC Regenerative Medicine CDT Cross Cadre Conference, Loughborough, March 2016
- TJ Singh presented his poster "Blood, Bugs and Medical Devices: In Search of Next-Generations Biomaterials" at the [SET for Britain Biological and Biomedical Sciences exhibition session](#) held at the House of Commons on 7<sup>th</sup> March 2016. TJ was shortlisted from hundreds of applicants to appear in Parliament.



## General News

- The School of Pharmacy is delighted to be ranked 6<sup>th</sup> in the world in the [2016 QS World Rankings for Pharmacy and Pharmacology](#). Professor Clive Roberts, Head of School, said:

*This is wonderful news. The ranking reflects a holistic picture of the School including an assessment of our research outputs, teaching quality and our international reputation and is therefore something to which all staff contribute. I am grateful to all staff for their excellent work in achieving this status.*

- **Alumni pre-registration training event and reunion 2016**

On Saturday 16 April, we welcomed over 65 graduates to a pre-registration training and development session in the School of Pharmacy. In the morning, our trainees reviewed changes to the GPhC registration assessment framework, completed a practice question workshop, and benefitted from 'top tips' for exam preparation. After lunch, sessions on 'foundation practice and early careers', 'support and resources', and 'consultation skills for pharmacists', were followed by 'free time' to catch up with friends. In the evening, we enjoyed an excellent buffet supper and 'ad hoc' entertainment...a good time was had by all. Special thanks to Amy Kelly and Michelle Dickson for arranging this, to Keith Spriggs, Gautam Paul and Tom Gray for tutoring, and to colleagues who were able to join us for an evening celebration.

Good luck to all our alumni in their forthcoming registration assessment.

- The School's commitment to gender equality has been recognised with a [Bronze Athena Swan Award](#). Head of School, Professor Clive Roberts, said:

*I am really pleased that Athena SWAN have recognised the progress the School is making in creating a workplace and learning environment where all are treated equally and where we all support and celebrate diversity.*

- Staff and students recently took part in '[Science in the Park 2016](#)', an event organised by the British Science organisation and held at Wollaton Park on 19<sup>th</sup> March. Over 7,000 people attended the event and the team offered hands-on activities on drug delivery and cream making and produced over 100 tablets during the day.

## Highlighted Papers

- [\*\*\*A novel DFP tripeptide motif interacts with the coagulation factor XI apple 2 domain\*\*\*](#)

Szu S. Wong, Søren Østergaard, Gareth Hall, Chan Li, Philip M. Williams, Henning Stennicke and Jonas Emsley

Blood (2016) Available online

DOI: [10.1182/blood-2015-10-676122](https://doi.org/10.1182/blood-2015-10-676122)

This research at The University of Nottingham could help to prevent the harmful blood clots associated with heart disease and stroke. It provides new insights into the coagulation of blood, in a study which could pave the way for new treatments aimed at preventing thrombosis – clots in the blood that obstruct the flow of blood through the circulatory system. These conditions arise from defects in the process of blood coagulation in the heart or brain. The plasma protein Factor XI (FXI) is a key culprit in this process - it can trigger the development of harmful blood clots, known as thrombi. Now, for the first time, in a study funded by the British Heart Foundation, University of Nottingham Emsley group have revealed the molecular structure of FXI bound to a DFP tripeptide.

FXI is unique among coagulation factors since it consists of two identical subunits that are joined together in a structure termed a dimer. Researchers knew that the FXI dimer circulates in an inactive form and must bind to certain surfaces to become active. But the significance of its unique molecular characteristics had been a mystery. This could provide a scaffold for novel anti-thrombotic medicines.

The team was led by Prof Jonas Emsley at The University of Nottingham Centre for Biomolecular Sciences, in collaboration with Prof Phil Williams (LBSA) and researchers from NovoNordisk (Denmark)

### **Abstract from paper**

Factor XI (FXI) is the zymogen of factor XIa (FXIa) which cleaves factor IX in the intrinsic pathway of coagulation. FXI is known to exist as a dimer and form interactions with multiple proteins via its four apple domains in the "saucer section" of the enzyme however to date, no complex crystal structure has been described. To investigate protein interactions of FXI a large random peptide library consisting of 106-107 peptides was screened for FXI binding and this identified a series of FXI binding motifs containing the signature Asp-Phe-Pro (DFP) tripeptide. Motifs containing this core tripeptide were found in diverse proteins including the known ligand high molecular weight kininogen (HK) as well as extracellular matrix proteins laminin and collagen V. To define the



binding site on FXI we determined the crystal structure of FXI in complex with the HK derived peptide NPISDFPDT. This revealed the location of the DFP peptide bound to the FXI apple 2 domain and central to the interaction the DFP phenylalanine side chain inserts into a major hydrophobic pocket in the apple 2 domain and the isoleucine occupies a flanking minor pocket. Two further structures of FXI in complex with the laminin derived peptide EFPDFP and a DFP peptide from the random screen demonstrated binding in the same pocket although in a slightly different conformation, thus revealing some flexibility in the molecular interactions of the FXI apple 2 domain.

### **[The role of acid-base imbalance in statin-induced myotoxicity](#)**

Dhiaa A. Taha, Cornelia H. De Moor, David A. Barrett, Jong Bong Lee, Raj D. Gandhi, Chee Wei Hoo and Pavel Gershkovich

Translational Research

DOI: 10.1016/j.trsl.2016.03.015

This work provides novel insight about effects of disease states on the development of statin-associated muscle toxicity. In this work the effects of conditions such as alkalosis and acidosis on statin-associated muscle toxicity are explored. Statins are commonly prescribed for elderly patients who are at risk of developing acid-base imbalance as a result of multiple comorbidities such as diabetes mellitus, cardiovascular, and renal diseases. Disturbances in acid-base balance, such as acidosis and alkalosis, have potential to affect the ratio between the lactone and acid forms of statins and alter the pharmacologic and toxicologic outcomes of statin therapy.

This work has important translational significance because it provides a novel translational insight into the role of disturbances in acid-base balance in development of statin-induced muscle toxicity. The effect of acidosis on statin-induced muscle toxicity is particularly important in case of lipophilic statins, such as simvastatin. Enhanced cytotoxicity of statins was observed under acidic conditions as a result of increased cellular uptake of the more lipophilic lactone form or unionized hydroxy acid form. On the other hand, alkaline conditions were found to have a protective effect against statin-induced myotoxicity because of inability of statin to achieve adequate intracellular concentrations as a result of conversion to the more hydrophilic ionized hydroxy acid form.

- **[Non-destructive characterisation of mesenchymal stem cell differentiation using LC-MS-based metabolite footprinting](#)**

Amal Surrati, Rob Linforth, Ian D. Fisk, Virginie Sottile and Dong-Hyun Kim

Analyst (2016)

DOI: 10.1039/c6an00170j

This paper has been published as an invited contribution to 'Emerging Investigators Theme' in Analyst where leading analytical scientists at an early stage of their career showed the excellent work in all areas of analytical science.