VISION

To develop and implement novel, safe, and effective treatments to advance neurosurgical care.

MISSION

The Division of Neurosurgery in the UCL Queen Square Institute of Neurology, through its close partnership with the National Hospital for Neurology and Neurosurgery, is committed to advancing neurosurgical care for the current and next generations of patients through world class research, excellent training and education, and top quality clinical care.
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Division Head’s Report

In the practice of medicine, particularly at an Academic Health Sciences Centre, it is essential to combine excellence in-patient care with continuous academic enquiry: it is as crucial that we develop newer and safer treatments for our future patients as it is that we treat our patients of today with the best available therapies. To this end, we focus on three overlapping academic pillars in the Division of Neurosurgery at the UCL Queen Square Institute of Neurology: research into the mechanisms of diseases and treatments, developing new tools for treating our patients, and clinical research evaluating the impact of our treatments. Each of these areas have been expanding in recent years.

The foundation for each of these academic endeavours is, of course, our patients. In 2018, we opened 2 new operating theatres, bringing our total to 6 plus our intraoperative MR unit. Our operative activity is thus continuing to increase: a snapshot of our activity in the Victor Horsley Department of Neurosurgery at Queen Square is presented in the pages that follow.

From an academic perspective, many of our sub-specialty areas are well represented in various international forums. Our academic training programme is expanding, with several of our trainees currently pursuing PhDs. Overall, we continue to enhance our meaningful academic productivity.

We gained two new professors in 2018, as David Choi and Ludvic Zrinzo were each promoted. We also had a retirement in 2018, with Professor Marwan Hariz returning to his not-so-native Umeå, Sweden, where he will continue to participate in the functional neurosurgery programme. We are indebted to Prof Hariz for his 16 year leadership of the Functional Neurosurgery Unit, expanding the unit to be the largest in the UK, and establishing a solid international leadership position in safety and excellence in DBS surgery and clinical research. We wish Marwan the best in this next stage of his life.

I look forward to further enhancement of our academic mission in 2019.
Clinical Activity

In this year’s annual report, we highlight our very active cranial neuro-oncology services: in 2018, a total of 742 oncological operations were done in 2018. In the coming years, we aim to expand our academic productivity. To this end, we play an active part in the BRC neuro-oncology sub-theme, where we aim to combine multiple data to further understand gliomas. Our pituitary group has been developing new tools for pituitary surgery, and will be expanding this work in 2019. Here is a snapshot of our clinical activity:

*Chart 1: High-Grade Tumours - total 291*

- GBM IV, 133
- Metastasis, 89
- Other High Grade Tumour, 13
- Oligodendroglioma III, 11
- Chordoma, 6
- Medulloblastoma IV, 6
- Chondrosarcoma, 3
- Other Tumour, 69
- Lymphoma, 15
- Astrocytoma III, 15

*Chart 2: Low-Grade Tumours – total 451*

- Meningioma I and II, 162
- Pituitary Adenoma, 152
- Oligodendroglioma II, 18
- Ependymoma, 8
- Other Tumour, 137
- Haemangioblastoma I, 8
- Schwannoma I, 51
- Astrocytoma II, 22
- Other Low-Grade Glioma, 30
- Other Low-Grade Glioma, 15
Grants

New Grants Awarded

PRINCIPLE INVESTIGATORS


CO-INVESTIGATORS

**Harith Akram**: NIHR University College London Hospitals Biomedical Research Centre (Grant number BRC-536): Advanced Neuroimaging to Study the Central Pain Pathways in Trigeminal Neuralgia (Tic Douloureux) Pre and Post-Microvascular Decompression (ANTIC). £17,798. 2018 – 2019.


On-going Grants

PRINCIPLE INVESTIGATORS


COLLABORATORS

**Rob Brownstone and Andrew McEvoy**: Wellcome EPSRC Centre for Surgical and Interventional Sciences, co-investigators (PI: S. Ourselin), £13,130,284. 2017-2022.
Awards


**Hani Marcus**: Queen Square Clinical Governance Committee Annual Audit Competition. “Informed Consent in Patients Undergoing Transsphenoidal Surgery.” First Prize.

**Hani Marcus**: Royal College of Surgeons of England - Margaret Witt Scholarship Fund for Clinical Excellence. £1000.

Craven, C. supervised by **Watkins LD and Toma AK**: 10th International Society for Hydrocephalus and Cerebrospinal Fluid Disorders, Bologna, October. “Brain Tissue Oxygen Monitoring and CSF diversion.” Young Investigator Award.

Publications

Peer-reviewed Papers

CEREBROVASCULAR


CSF


FUNCTIONAL


**NEURO-ONCOLOGY**


PITUITARY


SPINAL


GENERAL


Book Chapters


Books


Other

Hani Marcus: Currently acting as Editor the first book on Neurosurgical Robotics by Springer, with a publication date planned in Feb 2020.
Presentations

International

3rd DBS AND 9TH NEURO-ENGINEERING WORKSHOP, LINKOPING UNIVERSITY, SWEDEN, FEBRUARY:
Tractography and DBS.
*Presenter: Harith Akram.*

ASSOCIATION OF SURGEONS IN TRAINING CONFERENCE, EDINBURGH, UK, APRIL:
Multidisciplinary Management of Paediatric Traumatic Brain Injury (TBI): A Regional Retrospective Cohort Study.
*Presenters: Paine H, Marcus HJ, and Wilson M.*

AMERICAN ASSOCIATION OF NEUROLOGICAL SURGEONS (AANS), NEW ORLEANS, USA, APRIL:
Neurosurgery for Obsessive-Compulsive Disorder.
*Presenter: Ludvic Zrinzo.*

34TH CONGRESS OF PORTUGUESE NEUROSURGICAL SOCIETY, COIMBRA, PORTUGAL, MAY:
Towards Connectomic Functional Neurosurgery.
*Presenter: Harith Akram (keynote speaker).*

40TH INTERNATIONAL SYMPOSIUM OF THE GRSNC, MONTREAL, CANADA, MAY:
From Conductor to C(H)Ord: Orchestrating Recovery of Motor Function.
*Presenter: Rob Brownstone.*

MECHANISMS OF DEXTEROUS BEHAVIOR, JANELIA, USA, MAY:
Spinal Microcircuits for Regulating Paw Function.
*Presenter: Rob Brownstone.*

CELL BIOLOGY SYMPOSIUM, UMEÅ, SWEDEN, MAY:
Can C-Bouton-Motoneuron Synapses Get Any More Exciting?
*Presenter: Rob Brownstone.*

ESPN CONFERENCE, BONN, GERMANY, MAY:
Robot-Assisted Stereotactic Brainstem Biopsy in Children: Prospective Cohort Study.
*Presenters: Marcus HJ, Dawes W, Tisdall M, and Aquilina A.*

COMPUTER ASSISTED ROBOTIC SURGERY CONFERENCE, BERLIN, GERMANY, JUNE:
Preclinical Assessment of A Novel Intraoperative Ultrasound Probe for Transsphenoidal Surgery.
*Presenters: Mihcin S, Marcus HJ, Delaunay R, Maneas E, Xia W, Ourselin S, Desjardins A, Dorward N, and Vercauteren T.*
AMERICAN ASSOCIATION OF STEREOTACTIC AND FUNCTIONAL NEUROSURGERY (ASSFN), DENVER, USA, JUNE:
"Image-Verified" surgery that allows "Asleep" DBS is the new standard.
Presenter: Ludvic Zrinzo.

AMERICAN ASSOCIATION OF STEREOTACTIC AND FUNCTIONAL NEUROSURGERY (ASSFN), DENVER, USA, JUNE:
Primer on advanced neuroimaging analyses.
Presenter: Harith Akram.

INTERNATIONAL CONFERENCE OF THE ROYAL COLLEGE OF PSYCHIATRISTS, BIRMINGHAM, UK, JUNE:
Contemporary neurosurgery for psychiatric disorders: A neurosurgical perspective.
Presenter: Ludvic Zrinzo.

EUROPEAN SOCIETY FOR STEREOTACTIC AND FUNCTIONAL NEUROSURGERY, EDINBURGH, UK, SEPTEMBER:
Structural connectivity: Overview.
Presenter: Harith Akram.
Parkinsonian signs in patients with cervical dystonia treated with pallidal deep brain stimulation: A controlled and observer-blinded study.
Presenter: Harith Akram.
Brain networks implicated in ventral capsule and anteromedial subthalamic nucleus stimulation for refractory obsessive-compulsive disorder.
Presenter: Harith Akram.

BREAKING BARRIERS IN HEALTHCARE; UNIVERSITY OF MALTA MULTIDISCIPLINARY CONFERENCE, MALTA, SEPTEMBER:
Breaking healthcare barriers: Hope versus hype in the Age of "Fake News".
Presenter: Ludvic Zrinzo.

10TH MEETING OF THE INTERNATIONAL SOCIETY FOR HYDROCEPHALUS AND CEREBROSPINAL FLUID DISORDERS, BOLOGNA, ITALY, OCTOBER:
Radiographic markers of disturbances in CSF dynamics: Correlating imaging with 24-Hour ICP monitoring.
Long-term outcomes for venous sinus stenting for IIH.
CSF diversion strategies for persistent cranial pseudomeningoceles.
CSF drainage increases brain oxygen tension after subarachnoid haemorrhage.
Shunting slit ventricles: A comparison of the parieto-occipital vs frontal approach.
Neuro-sarcoidosis presenting with normal pressure hydrocephalus.
The effect of CSF flow blockage on the surgical management and outcomes of Chiari malformation.
Formulating Infection Control Guidelines for Lumbar Drain Insertion Following Subarachnoid Haemorrhage.


SOCIETY FOR NEUROSCIENCE, CALIFORNIA, USA, NOVEMBER:
Therapeutic Effect of L-DOPA and Deep Brain Stimulation for Advanced Parkinson’s disease is Associated with Unique Network Hubs.

**Presenter:** Harith Akram.

MOTOR NEURONE DISEASE ASSOCIATION 29TH INTERNATIONAL SYMPOSIUM, GLASGOW, UK, DECEMBER:
(Plenary Lecture) Beyond Molecules: Could Circuit Pathophysiology Contribute to Progression Of ALS.

**Presenter:** Rob Brownstone.

THE NEURAL BASES OF ACTION – FROM CELLULAR MICROCIRCUITS TO LARGE-SCALE NETWORKS AND MODELLING, ERICE, ITALY, DECEMBER:
The Role of Spinal Cord in the Control of Movement.

**Presenter:** Rob Brownstone.

Regional

BRITISH SKULL BASE SOCIETY MEETING, LIVERPOOL, UK, JANUARY:
Robotics in Endoscopic Skull Base Surgery.

**Presenter:** Hani Marcus.

BRITISH NEUROVASCULAR GROUP MEETING, LONDON, UK, MARCH:
Predicting Vasospasm with Headache Scores.

**Presenters:** Craven CL *, Kafai A *, Stephen T, Davis S, Rollinson V, Watkins LD, Toma AK.

SOCIETY OF BRITISH NEUROLOGICAL SURGEONS SPRING MEETING, TORQUAY, UK, APRIL:
Ventricular Catheter Placement in IVH: What is the Evidence Behind the Dogma of Laterality?

**Presenters:** Asif H, Craven CL, Thompson S, D’Antona L, Watkins LD, Toma AK.

Automated Volume and Pressure Controlled CSF Drainage for IVH: A Single Centre Experience.

**Presenters:** Asif H, Craven CL, Thompson S, D’Antona L, Watkins LD, Toma AK.

SVP in IIH: Towards Non-Invasive Monitoring.

**Presenters:** D’Antona L, Thompson S, Craven CL, Thorne LT, Watkins LD.

CSF Flow Studies in Chiari Malformation.

**Presenters:** Mediratta S, D’Antona L, Craven CL, Thompson S, Watkins LD, Toma AK.

Facial Recognition in NPH is Impaired.

**Presenters:** Sennik S, Craven CL, Thompson S, D’Antona L, Watkins LD, Toma AK.
BRAIN REPAIR AND REHABILITATION, UCL QUEEN SQUARE INSTITUTE OF NEUROLOGY, LONDON, UK, MAY:

Early Experience of Parenchymal Brain Oxygen Monitoring.
**Presenters:** Craven CL, Reddy U, Watkins LD and Toma AK.

ABN/SBNS JOINT ANNUAL MEETING, LONDON, UK, SEPTEMBER:

Advances in Deep Brain Stimulation (invited talk).
**Presenter:** Harith Akram.

Update on Neurosurgical Techniques used in Functional Neurosurgery (Plenary session).
**Presenter:** Harith Akram.

Experience of Tunnelled Vs. Bolt E 모든 on the Intensive Care Unit.
**Presenters:** Asif H, Craven CL, Reddy U, Watkins LD, Toma AK.

Trials and tribulations in spine surgery
**Presenter:** Adrian Casey.

The Role of Surgery in the Management of Spinal Hypermobility.
**Presenter:** Adrian Casey.

Brain Parenchymal Oxygen Monitoring in Delayed Cerebral Ischaemia.
**Presenters:** Craven CL, Reddy U, Asif H, Watkins LD, Toma AK.

Treatment Implications of Parkinson’s Disease in Normal Pressure Hydrocephalus.
**Presenters:** Funnell JP, Craven CL, D’Antona L, Thorne L, Toma AK, Watkins LD.

Use of Adjustable Anti-Gravity Devices in NPH Patients with Delayed Post-Shunt Deterioration.
**Presenters:** Funnell JP, Craven CL, D’Antona L, Thorne L, Toma AK, Watkins LD.

Neurosarcoidosis Presenting with Normal Pressure Hydrocephalus: Case Series.
**Presenters:** Kafai A*, Craven CL*, Thorne L, Watkins LD, Toma AK.

The Art and Craft of Neurosurgery (Sir Victor Horsley Lecture).
**Presenter:** Neil Kitchen.

Improved Prediction of Surgical Resectability in Patients with Glioblastoma Multiforme using an Artificial Neural Network.
**Presenters:** Marcus AP, Marcus HJ, Camp SJ, Nandi D, Kitchen N, and Thorne L.

**Presenters:** Marcus HJ, Vakharia VN, Sparks R, Rodionov R, Kitchen N, McEvoy AW, Miserocchi A, Thorne L, Ourselein S, and Duncan JS.

**Presenters:** Marcus HJ, Sayal P, Kitchen N, Surajit B, and Thorne L.

**Presenters:** Marcus HJ, Jain A, Grieve J, and Dorward NL.

Sphenopalatine Ganglion Stimulation for Chronic Cluster Headache.
**Current and Novel Surgical Treatment of Epilepsy (Lifelong learning session).**
**Presenters:** Andrew McEvoy and Anna Miserocchi.

Cranio-Cervical Instability in Ehlers-Danlos Syndrome Employing Upright, Dynamic MR Imaging; A Comparative Study.
**Presenter:** Georgios Prezerakos.

Prevalence of Normal Pressure Hydrocephalus in Falls Clinic Patients.
Vestibular Dysfunction in Acute Traumatic Brain Injury.

Presenter: Ludvic Zrinzo.

Poster Presentations

BRITISH NEUROVASCULAR GROUP MEETING, LONDON, UK, MARCH:
Subarachnoid Haemorrhage in Over 70s: A Single Centre Experience.

SOCIETY OF BRITISH NEUROLOGICAL SURGEONS SPRING MEETING, TORQUAY, UK, APRIL:
Awake ICP Monitoring: The Patient Experience.
Recognition of Clinical Features in DCI: Time for a Checklist.

QUEEN SQUARE SYMPOSIUM, LONDON, UK, MAY:
Towards Connectomic Functional Neurosurgery.
Presenter: Harith Akram.
Organisation of Courses and Symposia

20TH CLINICOPATHALOGICAL CONFERENCE IN PITUITARY DISEASE, LONDON, UK, FEBRUARY:
Audience approximately 120. Mainly UK based endocrinologists and pituitary surgeons.
Organising committee and Faculty: Neil Dorward, Joan Grieve and Hani Marcus.

HAMLYN SYMPOSIUM ON MEDICAL ROBOTICS, LONDON, UK, JUNE:
The Symposium attracted over 500 delegates last year and now in its 12th year, it has become a leading international conference on medical robotics, current clinical practice and emerging technologies in robotic surgery.
Organising committee: Hani Marcus.

ASECULAP COURSE: COMPLEX HYDROCEPHALUS MANAGEMENT. THE JOURNEY – NEW BORN TO THE ELDERLY, LONDON, UK, SEPTEMBER:
Approximately 30 attendees from various units within the UK, consisting of specialist nurses and physicians with interest in managing complex hydrocephalus.
Organiser: Thompson ST.
Faculty: Claudia Craven, Lewis Thorne, Ahmed Toma, Laurence Watkins and GOSH consultants.

XXIII CONGRESS OF THE ESSFN (EUROPEAN SOCIETY FOR STEREOTACTIC AND FUNCTIONAL NEUROSURGERY, EDINBURGH, UK, SEPTEMBER:
One of the main topics for the meeting was neurosurgical approaches to the treatment of psychiatric disorder and for the first time, this meeting was jointly organised with a psychiatrist (Keith Matthews). Held over 4 days, this meeting was attended by over 850 delegates from Europe. North and South America, Africa, Asia and Australia, making it the largest such congress to date.
Organisers: Marwan Hariz and Ludvic Zrinzo.

WHITE FIBRE DISSECTION AND 3D ANATOMY OF HUMAN BRAIN, LONDON, UK, SEPTEMBER:
A course aimed to understand in great depth eloquent areas of cerebral cortex, the important pathways, the complex anatomy of the deeper structures and the ventricles in a three dimensional way. Aimed at Consultants and Neurosurgical trainees. We had national and international faculty and participants from all over the country. It was free for all candidates and we had a very positive feedback. Approved by SBNS: 10 CPD points.
Organiser: Huma Sethi.

CAUDA EQUINA TIPS AND TRICKS, LONDON, UK, SEPTEMBER:
The course aimed to understand in great depth the anatomy of cauda equina, surgical principles to deal with this emergency, various techniques to repair CSF leak and litigations involved. Aims at higher and early years Neurosurgical trainees. Great opportunity to pair higher surgical trainees with early years so that the former could teach the later and get a certificate on practical teaching. We had a very positive feedback. It was free for all trainees. Approved by SBNS: 6 CPD points.
Organiser: Huma Sethi.
ADVANCED COMMUNICATION SKILLS IN NEURO ONCOLOGY: CONSENT, DUTY OF CANDOUR, BREAKING THE BAD NEWS, MEDICOLEGAL ASPECTS, LONDON, UK, OCTOBER:
Held at the General Medical Council. A course aimed to equip doctors for difficult conversations with patients. Real life scenarios were explored to further develop critical leadership qualities and skills for positive impact. Key learning was best practice approaches that work when breaking bad news. Aimed at Neurosurgical trainees. It was well attended with very positive feedback. It was free for all participants. Approved by SBNS: 5 CPD points.

Organiser: Huma Sethi.

MRI-GUIDED AND MRI-VERIFIED DBS COURSE ON BEHALF OF THE ECMT (EUROPEAN CONTINUING MEDICAL TRAINING), LONDON, UK, OCTOBER:
Attended by neurosurgeons, neurologists and neuro-radiologists, this course includes didactic lectures and attendance to multidisciplinary clinics as well as deep brain stimulation surgeries in the interventional iMRI Suite. Approved by the Royal College of Surgeons: 12 CPD points.

Course Director: Ludvic Zrinzo.
Faculty Participation in Courses

FIFTH ANNUAL DEEP BRAIN STIMULATION NURSE ASSOCIATION (DBSNA) CONFERENCE, LONDON, UK, MARCH:
Faculty member: Ludvic Zrinzo.

INTERNATIONAL DBS ACADEMY - A ROUNDTABLE DISCUSSION WITH INTERNATIONAL DBS EXPERTS ABOUT ADVANCEMENTS IN DBS THERAPY, PARIS, FRANCE, JUNE:
Faculty member: Harith Akram.

2ND SPEECH AND SWALLOWING IN PARKINSON’S DISEASE SCHOOL, ON BEHALF OF THE MOVEMENT DISORDER SOCIETY, LONDON, UK, JULY:
Faculty member: Ludvic Zrinzo.

INTERNATIONAL DBS ACADEMY - A ROUNDTABLE DISCUSSION WITH INTERNATIONAL DBS EXPERTS ABOUT ADVANCEMENTS IN DBS THERAPY, LONDON, UK, SEPTEMBER:
Faculty members: Harith Akram and Ludvic Zrinzo.

ADVANCED DEEP BRAIN STIMULATION FOR MOVEMENT DISORDERS COURSE ON BEHALF OF THE INTERNATIONAL PARKINSON & MOVEMENT DISORDER SOCIETY, LONDON, UK, NOVEMBER:
Faculty member: Ludvic Zrinzo.
Public Engagement Activities & Scientific Advisory Boards

Public Engagement

**Hani Marcus**: Science of Surgery Event at the Wellcome / EPSRC Centre for Interventional and Surgical Sciences.

**Ahmed Toma**: Idiopathic Intracranial Hypertension (IIH) Priority Setting Partnership.

Scientific Advisory Boards

**Rob Brownstone**: Brain Research UK, Chair in Neurosurgery.

**Joan Grieve**: Member of Independent Data Monitoring and Ethics Committee – for Dex-CSDH and Rescue - ASDH trials.

**Hani Marcus**: Member of Advisory Group on Robotic Surgery. Royal College of Surgeons of England.

**Ahmed Toma**: UK CSF advisory group.

**Ludvic Zrinzo**: Member of the educational subcommittee of the ESSFN.

**Ludvic Zrinzo**: Member of the ESSFN subcommittee on pedunculopontine nucleus DBS surgery.

**Ludvic Zrinzo**: Member of the subcommittee on psychiatric surgery of the World Society.

Other

**Rob Brownstone**: Trustee of Stoke Mandeville Spinal Research.

**Rob Brownstone**: External review panel, Department of Neuroscience, University of Copenhagen.

**Joan Grieve**: Elected council member of Society of British Neurosurgeons.

**Joan Grieve**: Trustee of the National Brain Appeal.

**Ahmed Toma**: Member of the International Society for Hydrocephalus and Cerebrospinal Fluid Disorders.
Other Professional Activities

**Huma Sethi:** Regional Director Royal College of Surgeons (North-East London).

**Huma Sethi:** Royal College of Surgeons Assessor.

**Huma Sethi:** Royal College of Surgeons Faculty.

**Huma Sethi:** Panel member for National Neurosurgery Selection Committee.

**Huma Sethi:** Question writer for Neurosurgery FRCS exam.
2018 Victor Horsley Lecture

Visualization of Cerebrospinal Fluid Movement with Spin Labelling at MR Imaging in Normal and Pathophysiologic Conditions

Dr. Shinya Yamada

Chief of Neurosurgery, Toshiba Rinkan Hospital, Japan.

About Dr. Shinya Yamada

Dr. Yamada is chief neurosurgeon at the Toshiba Rinkan Hospital in Japan. His main research topics are hydrocephalus and cerebrospinal fluid (CSF) movement. Dr. Yamada worked in the brain physiology laboratory at Brown University with Prof. Helen Csern, whose discovery of interstitial fluid physiology is now known as a part of the glymphatic system. In 2004, Dr. Yamada discovered that CSF fluid motion could be visualised using MRI arterial spin labeling techniques, in which CSF itself can be used as internal tracer. This technique allows for the non-invasive study of CSF movement in various regions without contrast administration. He now applies this MRI sequence to study CSF dynamics in people with normal brains and CSF-related disorders, and has found that CSF dynamics are far different from what was thought. The technique has also proven to be clinically useful to observe CSF flow before and after treatment of patients with hydrocephalus.

About Sir Victor Horsley

Horsley (1857-1916) was the first neurosurgeon appointed to the National Hospital Queen Square, and was known worldwide as the ‘Father of Neurosurgery’. He was also a brilliant experimentalist, elected as FRS at the age of 29 years for his work on cerebral localization and comparative anatomy. He pioneered neurosurgery for epilepsy, tumours, abscesses, head injuries, spinal and pituitary diseases, and trigeminal neuralgia. He devised a stereotactic frame and a variety of new surgical techniques and technologies. His work was not limited to neurosurgery: he made significant contributions to the understanding of rabies, thyroid disease, vaccines, antisepsis, anaesthesia, and military medicine. He was an iconoclast and social reformer, active in the Temperance Movement, a supporter of female suffrage, health care of the working class, vivisection, and medical reform. He stood for Parliament and served as president of the British Medical Association and was on the General Medical Council. He won the Gold Medal of the Royal Society, and was knighted in 1902. He worked to reform the medical services of the British Army and died on active duty, the only casualty of the First World War amongst the National Hospital senior staff. The meeting celebrated the enduring legacy of one of the greatest National Hospital doctors.
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