

## SNIF International Fellowship in Neurointervention and Stroke

SNIF Network Hospitals in Kerala, India with rotations abroad in Centres in Europe and/or Japan

### **Program Overview**

Neurointervention is fast becoming an important subspecialty of neurosciences. There are many unexplored dimensions of these techniques, which may become useful in the management of stroke in the coming future. The next generations of neurologists will be playing an important and more useful role in the management of stroke and neurovascular diseases.

In the recent past, endovascular approach for the management of stroke and various complex neurovascular lesions has advanced significantly. Today this approach is preferred for the treatment of carotid, vertebral and basilar stenosis, brain aneurysms, cerebral and spinal arteriovenous malformations (AVM), dural cerebral and spinal arteriovenous fistulas (Dural AVF), vascular trauma, etc. Endovascular embolization of vascular tumors of the cranial base and other head and neck regions play an important role in the safe and radical surgical resection of these otherwise difficult to access locations.

Intra-arterial thrombolysis and mechanical clot retrieval in acute stroke management has offered a new dimension for the treatment of ischemic stroke. Advancements in the techniques of neuro imaging have contributed significantly to the understanding of ischemia of the brain and in case selection within window period. Stent assisted angioplasty of Carotids is seen as an alternative to its surgical counterpart, carotid endarterectomy, in the secondary prevention of stroke in high degree carotid stenosis. Vertebral, basilar, and middle cerebral arterial stenotic disease is now safely amenable to revascularization by stent angioplasty.

Intracranial haemorrhage due to aneurysm, AVM, and dural AVF has always been a matter of great surgical concern. Surgical results of the treatment of these lesions located in difficult areas of the circle of Willis and eloquent area of the brain has been discouraging. Endovascular approach in such situation is very rewarding. Today endovascular treatment of ruptured aneurysm by coiling and other techniques is the preferred method over surgical clipping. Results of the randomized, double blind, multi-center ISAT trial published recently has shown superiority of endovascular coiling over surgical clipping.

Endovascular embolization of AVM and dural AVFs is one of the best ways to eliminate these malformations from the circulation immediately to prevent them from re-bleed. Glue (NBCA) or Onyx embolization offers a permanent obliteration of AVM in majority of the cases.

Preoperative tumor embolization of vascular tumors like meningioma, juvenile angiofibroma, glomus tumors, haemangiomas etc. has been of great help to neurosurgeons. It causes tumor necrosis, and thus changes the consistency of the tumor from hard or firm to soft or less firm. It also reduces blood loss during surgery and offers better operative vision due to less blood in the operative field.

**Duration:** 24 months

**Program Goals:** To produce skilled Neurointerventionalists and Stroke Specialists capable of diagnosing and managing a wide range of clinical problems related to stroke and neurovascular diseases, using both medical and endovascular approaches.

## TRAINING BREAKDOWN

**Program structure:** The first year of the training will be divided into 4 modules each lasting three (3) months;

Module A: Basics and Fundamentals of Stroke and Angioanatomy

Module B: Advanced Angioanatomy and Introduction to Neurovascular Diseases

Module C: Ischemic Stroke Clinical Presentation, Pathogenesis and Stroke Intervention (Medical, Mechanical Thrombectomy, Intra-arterial Thrombolysis, Carotid Stenting)

Module D: Hemorrhagic Stroke Clinical Presentation, Pathogenesis (Aneurysm, AV Malformation, AV Fistula) and Hemorrhagic Stroke Intervention (Medical, Surgical and Endovascular Approach)

In the second year of training, participants will engage in continuous attendance of the Academic Program, Simulation Training, involvement in Interventional Procedures, and publication of Research Papers.

**FIRST YEAR:** Total Duration: 12 months

### **Module A: Basics and Fundamentals of Stroke and Angioanatomy**

#### Academics:

- Case Discussions: Every other day
- Morbidity and Mortality Case Conference: Once every 2 months
- Faculty Lecture Meeting: Twice a month
- Program on Basics and Fundamentals of Stroke and Angio-anatomy: 2x/week

#### Topics to be discussed:

- Introduction on Neurointervention and Stroke
- Radiation Safety
- Overview of Embryology of Aortic Arch Vessels and Intracranial Vessels
- Internal Carotid Artery, Anterior Cerebral Artery, Posterior Cerebral Artery, Middle Cerebral Artery, Vertebro-basilar Artery, Anterior Choroidal Artery, Ophthalmic Artery, External Carotid Artery, Spinal Vascular Anatomy, Superficial and Deep Venous Cerebral and Spinal Supply
- Pharmacology in Neurointervention: Contrast materials

#### Research:

- Formulation of a Research Problem and Research Proposal
- Journal Club every 2-4 weeks

#### Laboratory Training:

- Mentice Simulation Training on the Basics of Cerebral Angiography
- Live workshop with the Professor about the Basic Techniques of Cerebral Angiography
- Workshop on Arterial Access: Femoral and Radial Approach

#### Case Participation:

- Assist during Cerebral Angiogram
- Observe during Neurointerventional Procedures, Participate during Pre-Op discussion of the Case and Post-op Discussion of the case
- Participate during Neurointerventional Procedures by assisting in providing Neurointerventional Materials

### Clinical Work:

- Daily Rounds on Stroke Ward Unit, Neuro-ICU, and Acute Stroke Unit
- Pre-op Assessments and Evaluation of Patients for Neurointervention
- Completion of Diagnostic Examinations (Blood tests, Neuroimaging, Carotid duplex scan and Transcranial Doppler Examination)
- Interventional Neurology and Stroke Outpatient Clinic: 5 times/week
- Daily Attendance at Emergency Department for Stroke and Neurointerventional Cases (Assessment if eligible for thrombolysis or thrombectomy)
- Pre-op Preparation for Mechanical Thrombectomy and Neurointerventional Procedures

### **Module B: Advanced Angioanatomy and Introduction to Neurovascular Diseases**

#### Academics:

- Case Discussions: Every other day
- Morbidity and Mortality Case Conference: Once every 2 months
- Faculty Lecture Meeting: Twice a month
- Program on Advanced Angioanatomy and Introduction to Neurovascular Diseases

#### Topics to be discussed:

- Collateral Circulation
- Skull Base Dangerous Anastomosis
- Aneurysm and Subarachnoid Hemorrhage, Incidental Aneurysm and Risk of bleeding  
Dural Fistula - Clinical Presentation and Pathogenesis, Different Classification of Dural Fistula, Dural AVF (trans-arterial vs. trans-venous embolization)
- Cerebral AVMS (natural history, pathogenesis, therapeutic options)
- Spinal AVM (classification, natural history, etiopathogenesis)

#### Research:

- Approval of Research Proposal and Preparation of Related Literatures
- Collection of Data
- Journal Club every 2-4 weeks

#### Laboratory Training:

- Mentice Simulation Training on Cerebral Angiography on Difficult Anatomy
- Mentice Simulation Training on Mechanical Thrombectomy, Carotid Stenting and Simple Aneurysms
- Live workshop with the Professor about the Approach to technically difficult Cerebral Angiography

#### Case Participation:

- Primary or Secondary Operator during Cerebral Angiogram
- Assist during Neurointerventional Procedures, Participate during Pre-Op discussion of the Case and Post-op Discussion of the case

### Clinical Work:

- Daily Rounds on Stroke Ward Unit, Neuro-ICU, and Acute Stroke Unit
- Pre-op Assessments and Evaluation of Patients for Neurointervention
- Completion of Diagnostic Examinations (Blood tests, Neuroimaging, Carotid duplex scan and Transcranial Doppler Examination)
- Interventional Neurology and Stroke Outpatient Clinic: 5 times/week
- Daily Attendance at Emergency Department for Stroke and Neurointerventional Cases

(Assessment if eligible for thrombolysis or thrombectomy)

- Pre-op Preparation for Mechanical Thrombectomy and Neurointerventional Procedures

### **Module C : Ischemic Stroke Clinical Presentation, Pathogenesis and Stroke Intervention (Medical, Mechanical Thrombectomy, Intra-arterial Thrombolysis, Carotid Stenting)**

#### Academics:

- Case Discussions: Every other day
- Morbidity and Mortality Case Conference: Once every 2 months
- Faculty Lecture Meeting: Twice a month
- Program on Ischemic Stroke Clinical Presentation, Pathogenesis and Stroke Intervention (Medical, Mechanical Thrombectomy, Intra-arterial Thrombolysis, Carotid Stenting)

#### Topics to be discussed:

- Overview on Stroke (Ischemic and Hemorrhagic, Pathophysiology, Clinical Presentation)
- Acute Stroke: Cerebral Blood Flow, Autoregulation and Ischemic Concept
- Neuroradiology on Stroke: CT Protocol for Acute Stroke: ASPECTS Score, CT Perfusion MR Protocol for Acute Stroke: Concept of DWI/FLAIR mismatch and MR Perfusion
- Mechanism of Coagulation Cascade Pharmacology: Antiplatelets/ Anticoagulation/ Thrombolytic in Neuro-intervention
- Mechanical Thrombectomy, Carotid Stenting and Intracranial Stenting Techniques

#### Research:

- Collection of Data
- Journal Club every 2-4 weeks
- Monthly update with the Mentor about the progress of Research

#### Laboratory Training:

- Mentice Simulation Training on Mechanical Thrombectomy, Carotid Stenting and Simple Aneurysms
- Live workshop with the Professor about Mechanical Thrombectomy, Carotid Stenting and Stenting of Intracranial Stenoses

#### Case Participation:

- Primary Operator during Cerebral Angiogram
- Assist during Neurointerventional Procedures, Participate during Pre-Op discussion of the Case and Post-op Discussion of the case
- Primary or Secondary Operator during Mechanical Thrombectomy and/or Carotid Stenting

#### Clinical Work:

- Daily Rounds on Stroke Ward Unit, Neuro-ICU, and Acute Stroke Unit
- Pre-op Assessments and Evaluation of Patients for Neurointervention
- Completion of Diagnostic Examinations (Blood tests, Neuroimaging, Carotid duplex scan and Transcranial Doppler Examination)
- Interventional Neurology and Stroke Outpatient Clinic: 5 times/week
- Daily Attendance at Emergency Department for Stroke and Neurointerventional Cases (Assessment if eligible for thrombolysis or thrombectomy)
- Pre-op Preparation for Mechanical Thrombectomy and Neurointerventional Procedures

### **Module D : Hemorrhagic Stroke Clinical Presentation, Pathogenesis (Aneurysm, AV**

## **Malformation, AV Fistula) and Hemorrhagic Stroke Intervention (Medical, Surgical and Endovascular Approach), Other Indications for Neurointervention**

- Case Discussions: Every other day
- Morbidity and Mortality Case Conference: Once every 2 months
- Faculty Lecture Meeting: Twice a month
- Program Hemorrhagic Stroke Clinical Presentation, Pathogenesis (Aneurysm, AV Malformation, AV Fistula) and Hemorrhagic Stroke Intervention (Medical, Surgical and Endovascular Approach), Other Indications for Neurointervention

### **Topics to be discussed:**

- Subarachnoid Hemorrhagic from Ruptured Aneurysm, Medical, Surgical and Endovascular Therapeutic Implication
- Incidental Aneurysm: Therapeutic Implication
- Dural AVF (trans-arterial vs. trans-venous embolization)
- Angio-architecture of Brain AVM and Therapeutic Intervention
- Spinal AVM and therapeutic options, Spinal AVM Endovascular Embolization
- Carotico-Cavernous Fistula
- Tumor Embolization of Meningioma, and other Head and Neck Tumors
- Embolization of Chronic Subdural Hematoma

### **Research:**

- Collection of Data, Draft of the Final Paper, Submission to Journals for Publication
- Journal Club every 2-4 weeks

### **Laboratory Training:**

- Mentice Simulation Training on Mechanical Thrombectomy, Carotid Stenting and Simple, complex Aneurysms
- Live workshop with the Professor about Preparation of Materials for Aneurysm Coiling, Choice of Coil Size and Embolization

### **Case Participation:**

- Primary Operator during Cerebral Angiogram
- Assist during Neurointerventional Procedures, Participate during Pre-Op discussion of the Case and Post-op Discussion of the case
- Primary or Secondary Operator during Mechanical Thrombectomy and/or Carotid Stenting, Coiling of Aneurysm
- Assist during embolization of AVM or AVF

### **Clinical Work:**

- Pre-op Assessments and Evaluation of Patients for Neurointervention
- Completion of Diagnostic Examinations (Blood tests, Neuroimaging, Carotid duplex scan and Transcranial Doppler Examination)
- Interventional Neurology and Stroke Outpatient Clinic: 5 times/week
- Senior call at Emergency Department for Stroke and Neurointerventional Cases (Assessment if eligible for thrombolysis or thrombectomy)
- Pre-op Preparation and Post-op Management for all Neurointerventional Procedures

## **SECOND YEAR:**

- Engage in continuous attendance of the Academic Program
- Continuous Simulation Training
- Involvement in Interventional Procedures,
- Publication of Research Papers.
- Outside Elective Rotation (3-6 months)
- University Hospital Zurich, Department of Interventional Neuroradiology
- Kameda Medical Center, Chiba, Japan, Department of Endovascular Neurosurgery

### **COMPETENCIES TO BE ACHIEVED**

- Manage approximately 300 cases of stroke per year
- Administer IV Thrombolysis for 50 eligible patients per year
- Interpret neuroradiological examinations (CT, MRI, Angiograms, Carotid Duplex Scan and TCD) accurately
- Perform 50-100 Diagnostic Angiograms
- Participate and perform in 50-100 Therapeutic Neurointervention Procedures
- Completion of 2 (Two) Research Papers

Prepared by:

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 Chairman, Stroke and Neurointervention Foundation (SNIF)  
 Director, International Fellowship in Neurointervention and Stroke

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### **Faculty:**

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MD, DM (NEUROLOGY), FINR(Switzerland), FRCP (Edin), FRCP (Glasg), FRCP (London)  
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