Course Title: Cancer Therapy Through Targeting Mammalian DNA Repair Pathways

Overview:

The mammalian cells utilize four major DNA repair pathways to remove different types of DNA damages caused by physical and chemical agents and help restore the genome to its native state.Unfortunately cancer cells use the same repair pathways to survive after chemo- or radiotherapy-induced DNA damage. While bacteria and yeast have served as invaluable tools in revealing the core steps of DNA repair, we are still deciphering differentrepair proteins implicated in the mammalian repair pathways. Mammalian repair pathways not only require more proteins than bacteria but also use unique proteins not present in lower organisms, such as the DNA damage-responsive nuclear enzyme poly(ADP-ribose) polymerase-1 (PARP-1). Recent studies have also revealed unique DNA repair deficiencies in some cancer cells. This course will deal with different DNA repair pathways in normal and cancerous cells,mechanism of actions of PARP-1 in DNA damage responses including DNA repair, and the concept of synthetic lethality in therapy of BRCA mutant cancer cells by simultaneous targeting two different DNA repair pathways. This course will be given by Professor Girish Shah from Laval University in Quebec City, who has an extensive experience withvarious roles of PARP-1 in DNA repair and cell death processes.

Course Objectives:

- Comprehensive understanding of mammalian DNA repair pathways in normal cells
- Contribution of DNA repair pathways in the resistance of cancer cells to therapy
- DNA repair and other roles of PARP-1 and other DNA repair proteins.
- Targeting of PARP-1 in cancer therapy

Course Details: (26 Hoursover 7 days from 23-30 October 2016)

Day 1: Monday 23 Oct 2017 (4.5 hours):

- **Lecture 1:**9:30am –11.00am
  - DNA repair pathways-I: Homologous Recombination Repair (HRR)
- **Lecture 2:** 11:15am – 12:45pm
  - DNA repair pathways-II:Non-Homologous End-Joining (NHEJ)
- **Lecture 3:** 2:00pm – 3:30pm
  - DNA repair pathways-III: BER: Base Excision Repair

Day 2: Tuesday 24 Oct 2017 (4.5 hours):

- **Lecture 4:**9:30am – 11.00am
  - DNA repair pathways-IV: MMR: Mismatch Repair;and otherDNA repair pathways
- **Lecture 5:**11:15am – 12:45pm
  - Contribution of DNA repair pathways in resistance of cancer cells to therapy
- **Lecture 6**: 2:00pm – 3:30pm
  - Biochemical and genetic approaches to study DNA repair pathways

Day 3: Wednesday 25 October 2017 (2 hours exam):

- **Exam 1:** 10:30am-12:30 pm: DNA repair pathways

Day 4: Thursday 26 October 2017 (4.5 hours):

- **Lecture 7**: 9:30am – 11.00am
  - PARP-1 (part I): Biochemistry and Genetics of PARP-1
- **Lecture 8**: 11:15am – 12:45pm
  - PARP-I (part II) DNA repair roles of PARP-1 after DNA damage
- **Lecture 9:** 2:00pm – 3:30pm
  - PARP-I (part III) Fate and functions of PARP-1 in cell death

Day 5: Friday 27 October 2017: (4.5 hours):

- **Lecture 10:**9:30am – 11.00am
  - Methodologies to study PARP-1 in vitro and in vivo in relation to DNA repair

- **Lecture 11:** 11:15am – 12:45pm
    - Targeting PARP in cancer therapy: synthetic lethal approach for BRCA-mutant cancers and potentiation of chemo-/radio-therapy for other cancers
- **Lecture 12:**2:00pm – 3:30pm
    - Targeting of other DNA repair related proteins in cancer therapies

Day 6: Saturday 28 October 2017 (4 hours):

- **Exam 2:** 10:30am-12:30pm :
  PARP-1 in DNA damage responses and cancer therapy
- **Feedback:** 2:00pm-4:00pm
  Discussion in the class and survey documents given to the students to provide feedback on the course.

Day 7: Monday 30 October 2017 (2 hours):

- **Results and Awards Ceremony**: 10:30am – 12:30am
    - Certificates of participation in the courseand awards for top ranked students to be given by the appropriate highest authorities of JMI

Teaching Faculty:

Prof. Girish Shahisa tenured full professorat Laval University in Quebec City, and a "Senior Researcher" at the CHU de Quebec University Hospital Research Centres. A major focus of his studies is to understand the mechanisms by which PAPR-1 participates in DNA repair, cell death and cancer in the cells exposed to genotoxic stress. He has identified novel roles of PARP-1 in DNA repair by nucleotide excision repair (PNAS, 2013), and more recently in non-homologous end-joining repair (Molecular Cell 2016). He has published two reviews in 2013 on therapeutic targeting of PARP in cancer. His team has published 58 peer-reviewed papers (cited 2,614 times) with an h-index of 26, 4 book chapters and 125 abstracts, indicating widespread acceptance of our work by the peers. It is also reflected in being invited to write 1st chapter for Methods in Molecular Biology on PARP (2011) and invitations to speak at prestigious International meetings, such as European Soc. Photobiol (09/2013) or Gordon Research Conf. on DNA repair (03/2014). His research has been supported by numerous competitive grants from Canadian and US funding agencies.

Prof. Shah has received numerous national and international recognition, honours and awards, such as, an honour plaque and citation for "Outstanding Achievement in Carcinoid/Neuroendocrine Tumor Research" in 2006 from the Carcinoid Cancer Foundation Inc. of USA. His has been nominated to the Board of Directors of the Carcinoid NeuroEndocrine Tumor Society of Canada and was appointed as the Chair of its Scientific and Medical Advisory Board in 2014. In 2012, he was appointed by the Italian National Agency ANVUR as a "Foreign member for the committees that grant Professorship in Italian Universities". In 2012, he also received the Visiting Professorship award in the International Short Visit-category from the Swiss National Science Foundation (SNSF) for conducting collaborative work with Professor GP Dotto at the University of Lausanne, Switzerland.

Who Can Attend:

- Student students at all levels and Faculty from reputed academic institutions.

Registration Fees:

Participants from abroad : US $500

Industry/ Research Organizations: 10,000/-

Academic Institutions:

Faculty members: Rs. 5000/-

Master/PhD students: Rs. 1000/-

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility.

Course Coordinator:

Prof. Jawaid Ahmad Khan
Head
Department of Biosciences
JamiaMilliaIslamia (A Central University)
Jamia Nagar, New Delhi – 110025, India
Tel: +91-11-26981717-74302 (O), +91-9818568158 (Mobile)
Email: jkhan1@jmi.ac.in