

國立清華大學 108 學年第 下 學期課程大綱

科號 Course No.	LSMC515800	組別 Group		學分 Credit	2	人數限制 Size limit	
修課年級 For grade	<ul style="list-style-type: none"> ■ 大學部 年級以上 (undergraduate) ■ 碩士班一年級以上(含博士班) graduate ■ 碩士班二年級以上(含博士班) 						
上課時間 Time	F7F8	教室 Room	521A LSBI				
科目中文名稱 Course title in Chinese	細胞內鞭毛運輸以及其相關纖毛疾病之探討一						
科目英文名稱 Course title in English	Special topics on intraflagellar transport and its relation to cilia-based diseases (Part 1)						
任課教師 Teacher	王歐力						
擋修科目 Prerequisite			擋修分數 credit				

※下列各欄由任課教師提供※

<p>一、課程說明 Course Description</p>	<p>The intraflagellar transport (IFT) machinery is an evolutionarily conserved system shuffling proteins and signaling molecules into and out of the cilium. Cilia are composed of a basal body located beneath the cell surface, and the out-projecting axoneme is surrounded by an external membrane continuous to the plasma membrane of the cell. Based on different axoneme architecture, cilia are motile when containing a central pair of MTs surrounded by nine doublet MTs (9+2), and non-motile when containing only outer nine doublet MTs (9+0). Non-motile cilia, also called primary cilia, participate in a number of chemo-, thermo-, and mechanosensory tasks, and act as the antenna of the cell. In <i>C. elegans</i>, none of cilia are motile, whereas 60 out of 302 neurons possess cilia at the ends of their dendritic processes. The primary chemosensory organ of <i>C. elegans</i> is built from a subset of 12 amphid neurons. Ciliogenesis is tightly linked to the precise assembly and maintenance of ciliary building blocks by IFT. Two kinesins (heterotrimeric kinesin-2) and (homodimeric kinesin-2 OSM-3) cooperatively power the anterograde travel of the “IFT train”, whereas at the turnaround zone (at the tip of cilia) these motors become deactivated and IFT dynein moves the (reassembled) train retrogradely back to the base of the cilium. Notably, in <i>C. elegans</i>, cilia cannot grow when IFT kinesins such as OSM-3 are mutated (Nachury, 2018; Prevo et</p>
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	<p>al., 2017). The rationale behind studying IFT is that numerous human ciliary disorders (collectively termed ciliopathies) are linked to defects in the IFT machinery, often leading to abnormal cilia growth. Particularly comprised are Bardet-Biedl syndrome (BBS), Joubert syndrome (JS), polycystic kidney disease (PKD), primary ciliary dyskinesia (PCD), Meckel-Gruber syndrome (MKS), nephronophthisis (NPHP), and various forms of retinal degeneration (Brown and Witman, 2014; Satir, 2017). It is worth mentioning that PKD is a wide-spread disease in Taiwan (Yu et al., 2016). In this seminar, we discuss current state-of-the-art research on the molecular basis of IFT and its relation to human diseases.</p>
<p>二、指定用書 Text Books</p>	<p>(1) “The Neurobiology of <i>C. elegans</i>” by Eric Aamodt; (2) “<i>C. elegans Atlas</i>” by Hall and Altun; (3) “<i>C. elegans: A Practical Approach</i>” by Ian Hope; (4) “<i>C. elegans II</i>” by Riddle et al.</p>
<p>三、參考書籍 References</p>	<ol style="list-style-type: none"> 1. Brown, J.M., and G.B. Witman. 2014. Cilia and Diseases. <i>Bioscience</i>. 64:1126-1137. 2. Nachury, M.V. 2018. The molecular machines that traffic signaling receptors into and out of cilia. <i>Curr Opin Cell Biol</i>. 51:124-131. 3. Prevo, B., J.M. Scholey, and E.J.G. Peterman. 2017. Intraflagellar transport: mechanisms of motor action, cooperation, and cargo delivery. <i>FEBS J</i>. 284:2905-2931. 4. Satir, P. 2017. CILIA: before and after. <i>Cilia</i>. 6:1. 5. Yu, T.M., Y.W. Chuang, M.C. Yu, C.H. Chen, C.K. Yang, S.T. Huang, C.L. Lin, K.H. Shu, and C.H. Kao. 2016. Risk of cancer in patients with polycystic kidney disease: a propensity-score matched analysis of a nationwide, population-based cohort study. <i>The Lancet. Oncology</i>. 17:1419-1425.
<p>四、教學方式 Teaching Method</p>	<p>Introductory lecture by teacher and assigned student’s presentations on current topics on intraflagellar transport and its relation to cilia-based diseases.</p>
<p>五、教學進度 Syllabus</p>	<p>2 hourly seminar (whole semester) to discuss current state-of-the-art research on the molecular basis of intraflagellar transport and its relation to human diseases.</p>
<p>六、成績考核 Evaluation</p>	<p>Class performance: 35%. Assigned presentation: 45%. Attendance: 20%.</p>
<p>七、位址 http://</p>	<p>http://life.nthu.edu.tw/~laboiw/Handouts/Neurobiology_Handout.pdf</p>