

## PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	Academy of Pharmacy
Supervisors	<p><i>Please list all the names in the supervisory team. It should be consistent with the information on your approved PGRS proposal.</i></p> <p>Principal supervisor: Professor/Dr. Jie Zhang (XJTLU)  Co-supervisor: Professor/Dr. Gang Ruan (XJTLU)  Co-supervisor: Professor/Dr. Mark Pritchard (UoL)</p>
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	The mechanism of the therapeutic potential of stem cell-derived Dendrobium Officinale sprouts (DOS) for gastric mucosa wound healing
Contact	<p>Please email <a href="mailto:jie.zhang03@xjtlu.edu.cn">jie.zhang03@xjtlu.edu.cn</a> (XJTLU principal supervisor's email address) with a subject line of the PhD project title.</p> <p>The principal supervisor's profile is linked here:  <a href="http://www.xjtlu.edu.cn/en/persons/JieZhang03">http://www.xjtlu.edu.cn/en/persons/JieZhang03</a></p>

### **Requirements:**

The candidate should have a first class or upper second class honours degree, or a master's degree (or equivalent qualification), in biology, pharmacology, molecular biology, bioinformatics, or biochemistry.

Evidence of good spoken and written English is essential. The candidate should have an IELTS score of **6.5 or above**, if the first language is not English. This position is open to all qualified candidates irrespective of nationality.

### **Degree:**

The student will be awarded a PhD degree from the University of Liverpool (UK) upon successful completion of the program.

### **Funding:**

The PhD studentship is available for three years subject to satisfactory progress by the student. The award covers tuition fees for three years (currently equivalent to RMB 99,000 per annum). It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. The scholarship holder is expected to carry out the major part of his or her research at XJTLU in Suzhou, China. However, he or she is eligible for a research study visit to the University of Liverpool up to six months, if this is required by the project.

### **Project Description:**

*Dendrobium Officinale* (DO) is a traditional Chinese medicine for repairing gastrointestinal mucosa injuries. Plant stem cell-derived DO sprouts (SDO) exhibits more significant mucosa wound-healing effects than DO. Substantial exosome-like vesicles (EVs) were found in SDO and showed promise in reducing ethanol-induced gastric mucosa injury in pre-experimental studies conducted *in vitro* and *in vivo*. However, the mechanism remains unknown. To address this, we will study from three parts.

Aim 1: *In vitro* functional analysis of EVs.

We will prepare EVs from SDO and identify the function of EVs *in vitro*. EVs will be isolated from DOS water extract through ultra-centrifugation. Ethanol or bile acid-induced human gastric mucosa GES-1 cell model will be used for the investigation. The cells will be treated with or without EVs in advance and then treated with ethanol or bile acid to evaluate the potential protection of EVs. We will identify critical proteins influenced by EVs related to cell proliferation, oxidation, inflammation, and apoptosis to verify the functional effect of EVs.

Aim 2: *In vivo* functional analysis of EVs.

Using alcohol or bile acid gavage injury model in mice, we will treat the mice with different concentrations (ten times of those in cells) of EVs and induce polar gastric ulcers through high-concentration alcohol or bile acid gavage. The stomachs of each concentration group will then be dissected and examined. Morphology observation such as HE staining, pathology examination such as IHC or ISH about the related proteins will be studied. Proteins related to cell proliferation, migration, oxidation, inflammation, and apoptosis will be determined using WB or qPCR to evaluate EVs' function and repair role in gastric mucosal injury.

Aim 3: Molecular mechanism study of the function of EVs

We will identify the significantly changed proteins or genes of the abovementioned functions through proteomic and transcriptomic analysis methods and pinpoint the most influential signaling pathways related to cell proliferation, migration, oxidation, inflammation, and apoptosis to explain the molecular mechanism of EVs in gastric mucosa injury, including AMPK pathway and NF- $\kappa$ B pathway. Alcohol or bile acid injured mucosal cell line GES-1 will be compared with normal mucosal cells to observe the changes in protein and RNA levels with or without the addition of EVs. Then we will use antagonists or synergist to validate the result. Meanwhile, we will conduct transcriptome sequencing of EVs miRNA, and match the highly expressed miRNA with proteins of signaling pathways selected from omics analysis to screen out miRNA with high expression levels and significant correlation with the pathways above. Next, we will synthesize these miRNAs and validate their function in the cell model to confirm the main pathways and proteins involved. *In vivo* validation in the injury models will also be studied.

For more information about doctoral scholarship and PhD programme at Xi'an Jiaotong-Liverpool University (XJTLU), please visit

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<https://www.xjtlu.edu.cn/en/admissions/global/entry-requirements/>

<https://www.xjtlu.edu.cn/en/admissions/global/fees-and-scholarship>

**How to Apply:**

Interested applicants are advised to email jie.zhang03@xjtlu.edu.cn (XJTLU principal supervisor's email address) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Two formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS or equivalent)
- Full academic transcripts in both Chinese and English (for international students, only the English version is required)
- Verified certificates of education qualifications in both Chinese and English (for international students, only the English version is required)
- PDF copy of Master Degree dissertation (or an equivalent writing sample) and examiners reports available