

A Survey on Medical Artificial Intelligence Talent Cultivation

Dear respondent:

Zhongshan Ophthalmic Center (ZOC) is the national leader in eye care, ophthalmic research, education, and blindness prevention. It has been entitled the State Key Laboratory of Ophthalmology by the Ministry of Science and Technology, without any equivalent in China.

Established in May 2018, it is the first clinical department of artificial intelligence in China. We are engaged in research and application on medical big data and artificial intelligence technology. We built up the world's top level ophthalmic clinical database (Science 2015), set up the first cloud platform of intelligent diagnosis and treatment of cataract in the world (Nat. Biomed. Eng. 2017, cover story), created of the world's first intelligent ophthalmic clinic in Guangzhou, and conducted the first ever multi-center randomized controlled clinical research (EClinical Medicine 2019, cover story). The department undertakes National Key R&D Program of China (No.2018YFC0116500), the Science and Technology Planning Projects of Guangdong Province (No. 2018B010109008). It was awarded the first clinical application qualification of AI-assisted diagnosis technology in Guangdong Province.

Thank you again for participating in the survey. We will appreciate your contribution to education reform and talents cultivation on medical artificial intelligence.

I have read the policy above, understand and agree to participate in this survey.

- Yes
- No (Please skip to the end of the questionnaire and submit the answer sheet)

My professional/occupation belongs to

- Medical and healthcare related fields (medical students, clinicians, nursing, technical, pharmaceutical, medical and healthcare education, administrative work, researchers, etc.)
- Non-medical field

[\(jump to\) medical health version](#)

Part 1, Demographics [multiple choice questions] *

1. The countries you currently work/study

- China Other countries in Asia US Canada Africa Europe
 Australia Other: _____

2. Your gender is

- Male Female

3. Your age is

- 18 years old or younger 18~25 26~30 31~40 41~50 51~60 60 or above

4. Your current academic qualifications are

- Primary school and below Junior high school High school Specialized college Undergraduate/ bachelor's degree
 Master's degree Doctor's degree

5. Your current job position is

- Student Doctor Nurse Clinical laboratory doctors Pharmacists Teaching staff Administrative staff
Researchers in medical fields / postdoctoral Technician

6. Your current job title is

- Primary (not awarded) General Physicians Consultants Chief/Senior physician

7. The main unit of your work is

- Tertiary hospital Secondary hospital Primary hospital/Community health service Private hospital/clinic
University/Academic institution Government health and disease control unit Other: _____

8. Your major is

- Medical students without subspecialty
 Respiratory medicine Digestive medicine Cardiology Department of Nephrology Department of Hematology
 Endocrinology Department of Rheumatology Department of Neurology
 Hepatobiliary surgery Gastrointestinal surgery Breast surgery Cardiothoracic surgery Urology Bone surgery
 Neurosurgery Pediatrics Obstetrics and gynecology Emergency department Stomatology Infectious diseases
 Dermatology Ophthalmology Otolaryngology Psychiatry Critical care medicine Oncology Imaging
 Laboratory Pathology Other: _____

Part 2, The formal questionnaire

1. Medical artificial intelligence understanding [Matrix Multiple Choice Question]*	Disagree	Neutral	Agree
1) I have heard of the concept of medical artificial intelligence.			
2) I can list at least one practical application scenario of medical artificial intelligence.			
3) I can list three medical specialties where medical artificial intelligence is developing rapidly.			
4) I can list at least one common algorithm for medical artificial intelligence.			
5) I have received a course/training/lecture on medical artificial intelligence.			
6) I have been involved in research on medical artificial intelligence.			
7) I understand medical artificial intelligence through different channels including [multiple choice questions] * <ul style="list-style-type: none"> <input type="checkbox"/> Participating in medical artificial intelligence research <input type="checkbox"/> Academic conferences, special lectures <input type="checkbox"/> Medical artificial intelligence related courses <input type="checkbox"/> Information from network and social platform <input type="checkbox"/> The artificial intelligence service system in the hospital <input type="checkbox"/> Books, magazines, newspapers and periodicals <input type="checkbox"/> TV programmes and films <input type="checkbox"/> No understanding of Medical Artificial Intelligence <input type="checkbox"/> Other: _____ 			

2. The willingness to participate in medical artificial intelligence teaching activities [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral Neutral	Somewhat Agree	Strongly Agree
8) I am interested in medical artificial intelligence.					
9) I am willing to acquire general knowledge in medical artificial intelligence.					
10) I am willing to participate in academic lectures and conferences on medical artificial intelligence.					
11) I am willing to take courses in medical artificial intelligence.					
12) I am willing to participate in medical artificial intelligence related clinical trainee, internship study.					
13) I am willing to participate in the research of medical artificial intelligence.					
14) I am willing to participate in medical artificial intelligence classroom teaching/clinical teaching as a teacher.					
15) I am willing to undertake or assist in the education reform and related work on medical artificial intelligence tutoring system.					
16) I believe that my current knowledge can support the study of medical artificial intelligence courses.					
17) I believe the obstacles in the implementation of medical artificial intelligence education include [multiple choice questions] * <ul style="list-style-type: none"> <input type="checkbox"/> Students are not interested <input type="checkbox"/> Students' basic knowledge of the relevant disciplines is weak and it is difficult to learn well <input type="checkbox"/> Students are burdened with heavy workload and have no time to take care of them <input type="checkbox"/> Lack of teachers in the field of medical artificial intelligence <input type="checkbox"/> Lack of policy guidance and financial support <input type="checkbox"/> Medical artificial intelligence is not mature at this stage, and its development prospects are uncertain <input type="checkbox"/> Medical artificial intelligence has potential medical, legal, ethical risks <input type="checkbox"/> The prospects of medical artificial intelligence talent employment are not positive <input type="checkbox"/> Others: _____ 					

3. Medical artificial intelligence teaching content [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
18) Medical college should offer medical artificial intelligence courses.					
19) Medical college affiliated hospitals should set up artificial intelligence clinical practice teaching.					
20) Universities should encourage research projects on medical artificial intelligence.					
21) Supervisors in medicine and science professions can cooperate to cultivate PhD Students.					
22) Medical artificial intelligence should be set as an independent subject in universities in the future.					
23) VR (virtual reality) technology shows the anatomic features of disease and is beneficial to medical teaching.					
24) 5G+ Internet can assist remote connections between students and teachers, which is beneficial to medical teaching.					
25) I think the medical artificial intelligence course type should be set as [multiple choice questions] * <input type="radio"/> Major required course <input type="radio"/> Major elective course <input type="radio"/> General required course <input type="radio"/> General elective course					
26) I think Medical college should set medical artificial intelligence courses/training in the following stages. [multiple choice questions] * <input type="checkbox"/> Undergraduate stage (before medical major courses begin) <input type="checkbox"/> Undergraduate stage (after medical major courses begin) <input type="checkbox"/> Master's degree courses <input type="checkbox"/> Doctoral degree courses <input type="checkbox"/> On-the-job part-time education					
27) I think medical artificial intelligence courses should include the following teaching content [multiple choice questions] * <input type="checkbox"/> Developmental history of medical artificial intelligence <input type="checkbox"/> Artificial intelligence application scenarios in the medical field <input type="checkbox"/> Basic algorithm in machine learning, deep learning models <input type="checkbox"/> Mathematical and statistical basis <input type="checkbox"/> Big data management and data labelling <input type="checkbox"/> Latest research progression in medical artificial intelligence <input type="checkbox"/> Humanities, law, ethics related medical artificial intelligence <input type="checkbox"/> Surgical robot <input type="checkbox"/> Others: _____					

4. The role of medical artificial intelligence teaching [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
28) Medical artificial intelligence related content has been covered in other courses, there is no need to start a separate course.					
29) Medical artificial intelligence teaching is conducive to the cultivation of talents in this field.					
30) Medical artificial intelligence teaching can improve students' scientific literacy and help to work in the field of health care.					
31) Medical artificial intelligence teaching is conducive to promoting the development of medical artificial intelligence diagnosis system.					
32) Medical artificial intelligence teaching helps artificial intelligence technology to be applied in medical field.					
33) Medical artificial intelligence teaching helps to improve the level of medical diagnosis, treatment and service capabilities.					
34) Medical artificial intelligence teaching helps to broaden research ideas.					
35) Medical artificial intelligence education can effectively promote health care reform.					

5. Medical artificial intelligence teaching and career [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
36) I am willing to work full-time in the field of medical artificial intelligence.					
37) I am willing to engage in some work related to medical artificial intelligence.					
38) I think that by learning medical artificial intelligence can secure my job from being replace by them.					
39) In the future, artificial intelligence can only play a supporting role and cannot replace human medical workers.					
40) Artificial intelligence will replace human beings as the dominant force in the medical field in the future.					
<p>[The options of following three questions are common]</p> <p>a. Clinical service guiding, care workers b. Nursing staff c. Clinical laboratory doctors d. Medical technicians e. Pharmacist f. Medical related administrative staff g. Surgeon h. Medical imaging doctor i. Pathologist j. Dermatologist k. Ophthalmologist l. Physician m. Obstetrician and Gynecologist n. Pediatrician o. Researchers in medical related fields p. Other: _____</p> <p>41) I think that with the development of medical artificial intelligence, the profession may be completely replaced [multiple choice questions] * _____</p> <p>42) The top three majors you want to pursue (regardless of whether they can be influenced by artificial intelligence) are [multiple choice questions] * 1.____ 2.____ 3.____</p> <p>43) The top three majors you will choose (considering possible influence by artificial intelligence) are [multiple choice questions] * 1.____ 2.____ 3.____</p>					
Open question [optional] *					
44) Do you have additional comments on medical artificial intelligence teaching activities? We will appreciate if you can write down your suggestions and contact information.					

(jump to) non-health-careversion

Part 1, Demographics [multiple choice questions] *

1. The country where you are working/studying in

- China Other Asian countries US Canada Africa Europe Australia Other: _____

2. Your gender is

- Male Female

3. Your age is

- 18 years old or younger 18~25 26~30 31~40 41~50 51~60 60 or above

4. Your current academic qualification is

- Primary school and below Junior high school High school Specialized college Undergraduate/ Bachelor's degree
 Master's degree Doctor's degree

5. Your current job position is in

- Students Government officials Academic institutions University/College Other teaching units Force Medical or
Healthcare unit Non-medical public institutions Private enterprises State-owned enterprises Three-funded enterprises
 Other companies Other: _____

6. You currently study/ work on

- Agriculture / Fisheries / Forestry/Mining and mineral, oil and gas extraction
 Manufacturing (Food/ Clothing/Electric Power Equipment/Paper Products/ Furniture / Home appliances/ Heavy
Industry/Car)
 Pharmaceutical/Bioengineering/Medical Devices/Devices
 Electricity, gas and water supply/ Transportation and storage/ Logistics
 Construction industry /Real estate development
 Wholesale / Retail /Trade / Import and Export
 Art /Entertainment /Sports
 Media /Advertising
 IT /Software and hardware services /Internet operations
 Bank /Finance/Insurance
 Law/Accounting/Audit
 Administrative management /Management /National defense
 Education / Training / Institution/ Research and Development
 Other: _____

7. Your current professional title is

- Student Lecturer Associate professor Professor No professional title

Part 2, The formal questionnaire

1. Medical artificial intelligence understanding [Matrix Multiple Choice Question] *	Disagree	Neutral	Agree
1) I have heard of the concept of medical artificial intelligence.			
2) My academic/work is related to medical artificial intelligence.			
3) I can list at least one practical application scenario of medical artificial intelligence.			
4) I can list three medical specialties with rapid development in medical artificial intelligence.			
5) I can list at least one common algorithm for medical artificial intelligence.			
6) I have received a course/training/lecture on medical artificial intelligence.			
7) I have been involved in research on medical artificial intelligence.			
<p>8) I understand medical artificial intelligence through [multiple choice questions] *</p> <ul style="list-style-type: none"> <input type="checkbox"/> Participating in medical artificial intelligence research <input type="checkbox"/> Academic conferences, special lectures <input type="checkbox"/> Medical artificial intelligence related courses <input type="checkbox"/> Information from network and social platform <input type="checkbox"/> The artificial intelligence service in the hospital <input type="checkbox"/> Books, magazines, newspapers <input type="checkbox"/> TV programmes and films <input type="checkbox"/> No understanding at all <input type="checkbox"/> Other: _____ 			

2. The willingness to participate in medical artificial intelligence teaching activities [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
9) I am interested in medical artificial intelligence.					
10) I am willing to acquire general knowledge in medical artificial intelligence.					
11) I am willing to participate in academic lectures and conferences on medical artificial intelligence.					
12) I am willing to take courses in medical artificial intelligence.					
13) I am willing to participate in the research of medical artificial intelligence.					
14) I am willing to participate in medical artificial intelligence classroom teaching as a teacher.					
15) I am willing to undertake or assist in the teaching reform and related work of medical artificial intelligence.					
16) I believe that my current knowledge can support the study of medical artificial intelligence courses.					
17) I believe that there are the obstacles in the implementation of medical artificial intelligence teaching activities include [multiple choice questions] * <ul style="list-style-type: none"> <input type="checkbox"/> Students are not interested <input type="checkbox"/> Students believe that they are not related to their academic fields <input type="checkbox"/> Students' basic knowledge of the relevant disciplines is weak and it is difficult to learn well <input type="checkbox"/> Students are burdened with heavy workload and have no time to take care of them <input type="checkbox"/> Lack of teachers in the field of medical artificial intelligence <input type="checkbox"/> Lack of policy guidance and financial support <input type="checkbox"/> Medical artificial intelligence is not mature at this stage, and its development prospects are uncertain <input type="checkbox"/> Medical artificial intelligence has potential medical, legal, ethical risks <input type="checkbox"/> The prospects of medical artificial intelligence talent employment are not positive <input type="checkbox"/> Others: _____ 					

3. Medical artificial intelligence teaching form content [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
18) Medical college should offer medical artificial intelligence courses.					
19) Non-medical related majors in universities should offer medical artificial intelligence courses.					
20) Universities should encourage research projects on medical artificial intelligence.					
21) Supervisors in medicine and science professions can cooperate to cultivate PhD Students.					
22) Medical artificial intelligence should be set as an independent subject in universities in the future.					
23) VR (virtual reality) technology shows the anatomic features of disease and is beneficial to medical teaching.					
24) 5G+ Internet can assist remote connections between students and teachers, which is beneficial to medical teaching.					
25) I think the medical artificial intelligence course type should be set as [multiple choice questions] * <input type="checkbox"/> Major required courses <input type="checkbox"/> Major elective courses <input type="checkbox"/> General required courses <input type="checkbox"/> General elective courses					
26) I think Medical college should set medical artificial intelligence courses/training in the following stages [multiple choice questions] * <input type="checkbox"/> Undergraduate stage <input type="checkbox"/> Master's degree courses <input type="checkbox"/> Doctoral degree courses <input type="checkbox"/> On-the-job part-time education					
27) I think medical artificial intelligence courses should include the following teaching content [multiple choice questions] * <input type="checkbox"/> Developmental history of medical artificial intelligence <input type="checkbox"/> Artificial intelligence application scenarios in the medical field <input type="checkbox"/> Basic algorithm in machine learning, deep learning models <input type="checkbox"/> Mathematical and statistical basis <input type="checkbox"/> Big data management and data labelling <input type="checkbox"/> Latest research progression in medical artificial intelligence <input type="checkbox"/> Humanities, law, ethics related medical artificial intelligence <input type="checkbox"/> Surgical robot <input type="checkbox"/> Others: _____					

4. The role of medical artificial intelligence teaching [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
28) Medical artificial intelligence related content has been covered in other courses, so there is no need to start a separate course.					
29) Medical artificial intelligence teaching is conducive to the cultivation of talents in this field.					
30) Medical artificial intelligence teaching can improve students' scientific literacy and help to work in the field of health care.					
31) Medical artificial intelligence teaching is conducive to promoting the development of medical artificial intelligence diagnosis system.					
32) Medical artificial intelligence teaching helps artificial intelligence technology to be applied in medical field.					
33) Medical artificial intelligence teaching helps to improve the level of medical diagnosis, treatment and service capabilities.					
34) Medical artificial intelligence teaching helps to broaden research ideas.					
35) Medical artificial intelligence education can effectively promote health care reform.					

5. Medical artificial intelligence teaching and career planning [Matrix Multiple Choice Question] *	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
36) I am willing to work full-time in the field of medical artificial intelligence.					
37) I am willing to engage in some work related to medical artificial intelligence.					
38) I believe that artificial intelligence can only play a supporting role in the future, and can not replace human medical workers.					
39) I believe that artificial intelligence will replace human beings as the dominant force in the medical field in the future.					
<p>40) I think that with the development of medical artificial intelligence, the profession may be completely replaced [multiple choice questions] *</p> <p>a. Clinical service guiding, care workers b. Nursing staff c. Clinical laboratory doctors d. medical technicians e. Pharmacist f. Medical related administrative staff g. Surgeon h. Medical imaging doctor i. Pathologist j. Dermatologist k. Ophthalmologist l. Physician m. Obstetrician and Gynaecologist n. Paediatrician ; o. Researchers in medical related fields p. Other: _____</p>					

Open question [optional] *	
41) Do you have additional comments or ideas about medical artificial intelligence teaching activities? We will appreciate if you can write down your suggestions and contact information.	