

Y G M F J f
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O e d e L b
 T h d h e R b l d b d c
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 E b k e L d c l h h d L b
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Teaching Modules
 N g g k k f

Research Areas F d d l b d l f d d l b d l b d k c h e b h k h d k f d b d

Kang Zhang, MD, PhD is the Professor of the Faculty of Medicine, Macau University of Science and Technology (MUST). Dr. Zhang obtained his M.D. with Magna Cum Laude honors from Harvard Medical School and MIT joint MD program and his PhD in genetics from Harvard University. He did his postdoctoral training also at Harvard. He completed his residency in ophthalmology at Johns Hopkins University and his retina surgery fellowship at University of Utah. He was a faculty member at Johns Hopkins University, Cleveland Clinic Foundation, University of Utah, and University of California San Diego.

Among his honors include AAAS fellow, fellow of American Institute for Medical and Biological Engineering, memberships in Association of American Physicians and American Society of Clinical Investigation; Outstanding Achievement Award of Chinese Ophthalmological Society, Burroughs Wellcome Clinical Scientist Award in Translational Research; Lew R. Wasserman Merit Award and Senior Investigator Award from Research to Prevent Blindness; Charles Schepens Award for Excellence in Retina Research; and Johns Hopkins Medical Institutions Clinician S Ophthalmologists.

Dr. Zhang has published over 200 peer-reviewed manuscripts in top peer-reviewed journals covering a wide range of topics in genetics, epigenetics, stem cells, nano-engineering and 3D printing, clinical trials, and artificial intelligence. He has more than 26,000 citations and an h-index of 80. His discovery that HTRA1 is a major susceptibility gene for age-related macular

Education and Training

EDKKNV T h d h eT g Rbg k eL dclbh d R k K j d h TS
Uh d d h kChd d c R fd
QDRHCDMS I g G j h T h d h V H d D d H h d kh d
L C N g g k kf
HMSDQM O d a d h R K j d G h k C d d N L dclbh d
L C G c T h d h L dclb k Rbg k L HS G d kg R b r d b d c
Sdbg kf l a l r f d L L dclbh d
Og C G c T h d h l a l r f d L F d d l b
R Rbg T h d h Rbg gh h b g d l h

Academic History

O d d O ed c E b k eL dclbh d L b T h d h e R b r d b d c
Sdbg kf L b
R ee Og l bh U d d ee h R C l r f G d kg R dl
E k k ed hg d d T h d h e k e h R C l r f
h O ed bh d O ed hg d d
T h d h e T g C d l d e N g g k kf Uh k R b r d b d
h R ee k d k c k h b E c h k d D d H h d
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Professional Experiences

A. Full Time Positions

Chdb hl dhk c Sh d D f h d d h f d d H h d e
D f h d d h f h L dclbh d T h d h e k e h R C l r f K I k
E chf Chdb H h de F d l l b L dclbh d T h d h e
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bh d O ed hg d d T h d h e T g C d l d e
N g g k kf c Uh k R b r d b d I g L D d d d R k K j d
h TS
d chf R ee Og l bh U d d c l h h h L dclb k d d
R k K j d h TS
h O ed T h d h e T g C d l d e N g g k kf
c Uh k R b r d b d I g L D d d d R k K j d h TS
h ee k d k c k h b E c h K d d Q d d b g H h d
k d k c NG
H b I g G j h T h d h Rbg k eL dclbh d V H d D d
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B. Editorial Experience

d d b Dch h ghde Rlf kS c b h c S f d dc Sgd
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d d bh dDch d L kdb k L dcLbh d
d d Dch h ka c I k e h k f lb k gdl h
d d kh f Dch I k e kh lb kH d lf h
d d bh dc Dch h ghde gh d dI k eQd h kChd d
ghdeL dcLb kDch N g g k k f Md c V kc Qd gh
Dchh bh b k h g g k k f h h h

C. Reviewer Experience

Referee for American Journal of Human Genetics
Referee for American Journal of Medical Genetics
Referee for American Journal of Pathology
Referee for Archives of Ophthalmology
Referee for Biochemical Journal
Referee for BMC Genomics
Referee for Cell
Referee for Molecular Cell
Referee for Cell Stem Cell
Referee for Developmental Dynamics
Referee for Experimental Eye Research
Referee for Expert Opinion in Ophthalmology
Referee for Genome Biology
Referee for Human Genetics
Referee for Human Molecular Genetics
Referee for Human Gene Therapy
Referee for International Journal of Biologic Science
Referee for Investigative Ophthalmology and Visual Science
Referee for Journal of Biological Chemistry
Referee for Journal of Cataract and Refractive Surgery
Referee for Journal of Clinical Investigation
Referee for Journal of Lipid Research
Referee for Journal of Medical Genetics
Referee for Journal of Neurology
Referee for Lancet
Referee for Molecular Therapy
Referee for Molecular Vision
Referee for Nature
Referee for Nature Genetics
Referee for Nature Medicine
Referee for Nature Materials
Referee for Nature Biomedical Engineering
Referee for Nature Communications

Referee for Neuroscience
Referee for New England Journal of Medicine
Referee for Ophthalmic Genetics
Referee for Ophthalmology
Referee for PNAS
Referee for PNAS Plus
Referee for PLoS Biology
Referee for PLoS Medicine
Referee for PLoS Genetics
Referee for PLoS One
Referee for Progress in Retina and Eye Research
Referee for Retina
Referee for Science
Referee for Science Translational Medicine
Qdæ d d e S d c h F d d h
Referee for Trend in Molecular Medicine

Research Awards

Administrative Experience

A. Grant Review Committee/Study Section

- d d Qd hl d Md X j R dl dlkO f l
- d d Qd hl d L dc hb kQd d bg blkTJ
- d d Qd hl d V dlk b l d S Qd d bg O f l TJ
- d d Qd hl d Md X j R dl dlkO f l
- d d Qd hl d Od R dl dlkO f l
- d d Qd hl d gh d d b c dl eR bhd bd R df hb R dl dlkO f l
- 2009-present Reviewer, Natural Science foundation of China
- 2008-present Reviewer, ChangJiang Scholars Program, Ministry of Education, China
- 2009-present Reviewer Reviewer, National Basic Research Program, China
- 2007-present Ad Hoc Reviewer, Biology and Disease of the Posterior Eye Study Section (VISC), NIH
- 2006-present Ad Hoc Reviewer, Anterior Eye Disease Study Section (VISA), NIH
- 2007-present , National Eye Institute, NIH
- 2009-present Ad Hoc Reviewer, diabetic complications section, Juvenile Diabetes research Foundation
- 2006-Present Ad Hoc Reviewer, research grants and fellowships, Wellcome Trust, UK
- 2006-Present Ad Hoc Reviewer, research grants and fellowships, Medical Research Council, UK
- 2004-present Ad Hoc Reviewer, Neurobiology C Study Section, Medical Research Service, Department of Veterans Affairs Administration
- 2002-present Ad Hoc Reviewer, research grants, Foundation Fighting Blindness, USA
- 2009-2010 ARRA grant panels
- 2007 Special emphasis panel, Gene environment Initiative, Nat Human Genome Research Institute, NIH
- 2007 CIDR Access Review Panel, National Human Genome Research Institute, NIH
- 2007 Ad Hoc Reviewer, research grants, Macular Disease Society, UK
- 2003 Ad Hoc Reviewer, research grants, Foundation Fighting Blindness, Canada
- 2001 Ad Hoc Reviwer, postdoctoral training grant, Research into Aging, UK
- 2000 Ad Hoc Reviewer, Medical Research Service, Department of Veterans Affairs Administration

B. Professional Community Activities

f h d M d e d d b d Sh d D f h d d h f c
Q d f d d h d L d c l b h d F f g gh
f h d M d e d d b d M b d Q d f l l h f c
g d b d F d l d K l k
f h d M d e d d b d D l f d d l b e b d c
f h f d l h f gh
f h d H d h k f d e N b k d l k c R d l d l k
h k f
f h d M d e d d b d F d l l b c R d l d l k d c
S g d h d R g h f g d E d e O d h d c L d c l b h d
F f g gh
f h d M d e d d b d F d l l b S d b g k f h d c
h l d h k e T c d c h f C h d d R C h f
f h d H d h k L d e Q d h
f h d M d h b R l h l
f h d M d g h R l h l
d L d l a d G c L d c l b k R b g k C d c h b l k
E c h f O d h d l d l b g h d d b h h e Q d d b g
h U h c N g g k k f
d L d c l b k c h c F d d d b g
d L d c l b k c h c S g l a f d l b
d R b d l h b c h c K l e d a E c h
d R b d l h b c h c b b d k
d b f h d H d h k L d e Q d h
d O f l l l h d d k L d d h f e g h d d
N g g k k f l b k R b d
N f h d g d R d b c V k V h d g h d d N g g k k f h
Q d h R l l h
f h d M d T R C H h d e F d l l b L d c l b h d
R l h l
N f h d F d d l b e C h a d l b Q d h g V j g R
C h f
Q d h R a d b h k C L c d N k L d d h f
N f h d R g f g h H d h k N g g k k f R l h l
N f h d F d d l b e C h a d l b Q d h g V j g R k j
K j d h T S
N f h d F d d l b e C h a d l b Q d h g V j g R k j K j d
h T S
N f h h f l l h d d l d l a d H d h k E l e
U h d d h k C h d d c R f d gh
R d b h g h H k L c d k e f d Q d k d c l b k
C d f d d h O d Q U N L d d h f Q d h k C d f d d h
c f d d S g d E K

N f h d Rg f g hH d h kN g g k k f R l h l
N f h d R a h c M d

Qd h NJ O b cdl hbKdb d L b k C g
F d kdb d h d fh dd hf Rdl h
Rdh F c Q c Fd h hbL khO ed h kKdb d
Rd hl

F d kdb d L kdb k h eG l Chd d HL
F d kdb d Fd d hb e fdQdk dc Chd d
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F d Kdb d O SG

H b Hgd hdc Nb k Ch cd Edlk L dclb k
Fd d hb d

H b LRb db hb kl h hdL dg c h
Fd d hb HNL

Rl kcf chb h kd cd Fd d hb h L dclhb d
dbhb hb kb db hb kl Rbg k eL dclhb d T RC
d Chdb Fd d hb h L dclhb d dbhb hb kb d
b hb kl Rbg k eL dclhb d T RC

db dh dlk k cL kdb k L dclhb d hl dclb k
Rbhl bdOgC O f l T RC

d Og l b fd l hb Rbg k eOg l b cOg l bd hb k
Rbhl bd T RC

d Qd h d Kdb dRd hl Rghd D d d d T RC

d Chdb ahl gk R Chdf bh h d Qd h k
Ek d bdh fhf l ed d bd

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d Uh hh f O ed E c T h d h gh

d Uh hh f O ed Rbg b cdl eL dclb kRbhl bd gh
E hl h Md bhl bdOgC O f l h Md bhl bd
T h d h eT g R k K j d h TS b ha hf kdb d
Uh hh f O ed J hf J g kdc D dR dbh k G h kQh gc
R ch ah

E b k Qd d bgS hbKdb dRd hl OgC O f l h
L kdb k hkf T h d h eT g R k K j d h TS
b ha hf kdb d

O d Uh hh f O ed Odj hf T h d h D d d d Odj hf
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O d Uh hh f O ed Rbg b cdl eL dclb kRbhl bd c
Rbg O h bh kG h k gh

O d Uhhh f O ed Yg f Rg N g g k hb d d R Xd d
 T h d h gh
 Chdb Ek d bdh fhf l ed d bd I g L D d
 d d T h d h eT g R k K j d h TS la hf
 kdb d
 F c Q c I g L D d d d T h d h eT g R k
 K j d h TS la hf kdb d
 N g g k kf Qd h d Kdb d Kdb d Rd h d gd
 Qd h I g L D d d d T h d h eT g R k K j d
 h TS la hf kdb d
 F c Q c P h e d h d kd D d H h d kd dk c
 kh hb
 Sd bghf h h GL R L HS GRS Fd d hb c L dc h h d
 cd L HS cd f c d c f c d cd
 G c L dc hb kR cd

Representative Publications

NQFHM KOT KH SHNMR

Peer-Reviewed Publications

1. **Zhang K**, Chaillet JR, Perkins LA, Halazonetis TD, Perrimon N. (1990) Drosophila homolog of the mammalian jun oncogene is expressed during embryonic development and activates transcription in mammalian cells. *Proc Natl Acad Sci U S A*, 87(16), 6281-5.
2. **Zhang K**, Smouse D, Perrimon N. (1991) The crooked neck gene of Drosophila contains a motif found in a family of yeast cell cycle genes. *Genes Dev*, 5(6), 1080-91.
3. Rutledge BJ*, Zhang K*, Bier E, Jan YN, Perrimon N. (1992) The Drosophila spitz gene encodes a putative EGF-like growth factor involved in dorsal-ventral axis formation and neurogenesis. *Genes Dev*, 6(8), 1503-17. *co-first authors.
4. **Zhang K**, Kniazeva M, Han M, Li W, Yu Z, Yang Z, Li Y, Metzker ML, Allikmets R, Zack DJ, Kakuk LE, Lagali PS, Wong PW, MacDonald IM, Sieving PA, Figueroa DJ, Austin CP, Gould RJ, Ayyagari R, Petrukhin K. (2001) A 5-bp deletion in ELOVL4 is associated with two related forms of autosomal dominant macular dystrophy. *Nature Genet*, 27(1), 89-93.
5. Yang Z, Peachey NS, Moshfeghi DM, Thirumalaichary S, Chorich L, Shugart YY, Fan K, **Zhang K**. (2002) Mutations in the RPGR gene cause X-linked cone dystrophy. *Hum Mol Genet*, 11(5), 605-11.
6. Toomes C, Bottomley HM, Jackson RM, Towns KV, Scott S, Mackey DA, Craig JE, Jiang L, Yang Z, Trembath R, Woodruff G, Gregory-Evans CY, Gregory-Evans K, Parker MJ, Black GC, Downey LM, **Zhang K**, Inglehearn CF. (2004) Mutations in LRP5 or FZD4 underlie the common familial

exudative vitreoretinopathy locus on chromosome 11q. *Am J Hum Genet*, 74(4), 721-30.

7. Xu Q, Wang Y, Dabdoub A, Smallwood PM, Williams J, Woods C, Kelley MW, Jiang L, Tasman W, **Zhang K**, Nathans J. (2004) Vascular development in the retina and inner ear: control by Norrin and Frizzled-4, a high-affinity ligand-receptor pair. *Cell*, 116(6), 883-95.
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10. Brown DM, Kaiser PK, Michels M, Goubrane MD, Heier JS, Kim RY, Sy JP, Schneider S for the ANCHOR Study Group. (2006) Ranibizumab versus Vertiporfin for Neovascular Age-Related Macular Degeneration. *New Eng J of Med*, 355(14): 1432-1444.
11. Rosenfeld PJ, Brown DM, Heier JS, Boyer DS, Kaiser PK, Chung CY, Kim RY for the MARINA Study Group. (2006) Ranibizumab for Neovascular Age-Related Macular Degeneration, *New Eng J of Med*, 355(14): 1419-1431.
12. Yang Z, Camp NJ, Sun H, Tong Z, Gibbs D, Cameron DJ, Chen H, Zhao Y, Pearson E, Li X, Chien J, Dewan5(r 5)ier1 o 5HKTm0 g/F3ttw2 598b(R)-2(e)4r6tpa

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16. Yang Z, Chen Y, Lillo C, Chien J, Yu Z, Michaelides M, Klein M, Howes KA, Li Y, Kaminoh Y, Chen H, Zhao C, Chen Y, Al-Sheikh YT, Karan G, Corbeil D, Escher P, Kamaya S, Li C, Johnson S, Frederick JM, Zhao Y, Wang C, Cameron DJ, Huttner WB, Schorderet DF, Munier FL, Moore AT, Birch DG, Baehr W, Hunt DM, Williams DS, **Zhang K.** (2008). Mutant prominin 1 found in patients with macular degeneration disrupts photoreceptor disk morphogenesis in mice. *Journal Clinical Investigation* 118:2908-2916.
 17. Yang Z, Stratton C, Francis PJ, Kleinman ME, Tan PL, Gibbs D, Tong Z, Chen H, Constantine R, Yang X, Chen Y, Zeng J, Davey L, Ma X, Hau VS, Wang C, Harmon J, Buehler J, Pearson E, Patel S, Kaminoh Y, Watkins S, Luo L, Zabriskie NA, Bernstein PS, Cho W, Schwager A, Hinton DR, Klein ML, Hamon SC, Simmons E, Yu B, Campochiaro B, Sunness JS, Campochiaro P, Jorde L, Parmigiani G, Zack DJ, Katsanis N, Ambati J, **Zhang K.** (2008). Toll-like receptor 3 and geographic atrophy in age-related macular degeneration. *New England Journal of Med.* 14:1456-63. Epub 2008 Aug 27.
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 21. **Zhang, K***, Hopkins, JJ, Heier, JS, Birch, DG, Halperin, LS, Albin, TA, Brown, DM, Jaffe, GJ, Tao, W, and Williams, GA. (2011). Ciliary neurotrophic factor delivered by encapsulated cell intraocular implants for treatment of geographic atrophy in age-related macular degeneration. *PNAS* 108(15):6241-5. *corresponding author.
 22. Korn BS, Zhang K. . Carotid-cavernous sinus fistula. *N Engl J Med.* 2011 Feb 24;364(8):
 23. Kim J, Efe JA, Zhu S, Talantova M, Yuan X, Wang S, Lipton SA, **Zhang K,** Ding S. (2011). Direct reprogramming of mouse fibroblasts to neural progenitors. *Proc Natl Acad Sci U S A.* 108:7838-43.
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25. Sun F, Park KK, Belin S, Wang D, Lu T, Chen G, **Zhang K**, Yeung C, Feng G, Yankner BA, He Z. (2011). Sustained axon regeneration induced by co-deletion of PTEN and SOCS3. *Nature* 480:372-375.
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 27. Fang RH, Chen KN, Aryal S, Hu CM, **Zhang K**, Zhang L. (2012). Large-scale synthesis of lipid-polymer hybrid nanoparticles using a multi-inlet vortex reactor. *Langmuir*. 39:13824-9.
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 29. Hannum G, Guinney J, Zhao L, Zhang L, Hughes G, Sadda S, Klotzle B, Bibikova M, Fan JB, Gao Y, Deconde R, Chen M, Rajapakse I, Friend S, Ideker T, **Zhang K**. (2013). Genome-wide Methylation Profiles Reveal Quantitative Views of Human Aging Rates. *Mol Cell*, 49:359-67.
 30. Xue, Y-C., Ouyang, K., Huang, J., Zhou, Y., Ouyang, H., Li, H., Wang, G., Wu, Q., Wei, C., Bi, Y., Jiang, L., Cai, Z., Sun, H., **Zhang, K.**, Zhang, Y., Chen, J., and Fu, X-D. (2012) Direct conversion of fibroblasts to neurons by reprogramming PTB-regulated microRNA circuits. *Cell* 152:82-96.
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 33. X. Qu, W. Zhu, S. Huang, J. Y. Li, S. Chien, K. Zhang, S.C. Chen, (2013). Relative impact of uniaxial alignment vs. form-induced stress on differentiation of human adipose derived stem cells. *Biomaterials*, 11:9812-9818.
- X EWK I L IR Kh F J H X L dh l f F X EW K I L IR

e l M GNQ L QHM c GNQHNM RDUDM TOR c
 N g g k kf
 R jhJ S dj X Gd cd d hd Q V I Yg I JH DI G j
 E X l l L j S KhY J h L Ghgr S KhL h DF R
 gd RF dak R kf k QC P I Ih f S E WI e hL D da Q
 d ff d VS Ki I M d C d k b c DF H d O l h kL
 L jhE Kh FG L fh d hO Yg f J k DL Zhang K c
 dk dI H H h fd l ddchhf h QHROQ l dch dc
 g l kf hcd d cd fddch df h M d
 G WK G J b j L V dhV V f V V f I Ekff J G I Yg f
 G XhRI e hL Kh C g f fgd KhF Cg C RghV Ygd f K
 G Q Yg I Yg KE WYg f D Yg f Yg IJ J h L W QG Zhang
 K. CM l dg k h l jd e chf h c f h e
 b l l b bd O bM k b c RbhTR O bM k b c RbhTR

W QG V dhV J b j L V f V K G Ekff J XhR RghV P P Kh
 J Ygd f K Yg f G fgd Yg P G I Yg f Q W X hG KhF
 G Q Yg f Y Kh C E WYg I C X X L Xhf Yg f V V f I
 Yg f D Yg f KhN F Q d G Yg IJ G WZhang K.
 hb k hf l CM l dg k h l jd e chf h c f h
 egd bdkk b bh l M L dhk
 Yg I L hf E WC X G f C Q f c I Yg f Q V f V G Q
 Yg f C Yg f D Yg f G WWh f V Zhang, K. Fd d c
 l h hcd d cd gd h QHROQ l dch dc bdkk
 d f l l h f h c g dbd dkQd d bg
 J d l C F ka l L hV U kd H R Kh f G d RK
 L b j d X f F V WX E C f I O cg LJ OdhI Sh f L Yg I
 Kh Gd d RC f I Yh HRgh Yg f Q Ygd f K G Q RghV E W
 C X G U V d Yg f D Yg f K KhN V f WRh fd L R W
 W I S ed gh Kd h L Wh G Zhang K. Hd le hf L dclb k
 Chf d c S d akd Chd d a H fd dc Cdd Kd hf dk

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2. **Zhang, K** and Ding S. (2011). Stem cells and eye development. *N Eng J Med*. 365:370-3.
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