

**CITIZENSHIP AND AGE**

India, 50 years

## PRESENT TITLE AND AFFILIATION

**Primary Appointment**

##### Dean, Bioscience and Health Research, Ashoka University, Haryana

**Additional Appointments**

## EDUCATION

**Degree-Granting Education**

* *All India Institute of Medical Sciences*, New Delhi, India, MBBS, 1989-1995, Medicine & Surgery
* *Delhi University*, New Delhi, India, PhD, 2004-2007, Physiology

**Postgraduate Training / Diploma**

* Residency, Internal Medicine, Baylor College of Medicine, Houston, USA, Diplomate American Board, Internal Medicine**,** 1996-2000
* Clinical Investigator / Medical Research Track, Baylor College of Medicine, Houston, USA, 1998-2000, Mentor: Burton F. Dickey MD, Molecular & Cellular Biology
* Fellowship, Pulmonary and Critical Care Medicine, Baylor College of Medicine, Houston, USA, Diplomate American Board, Pulmonary Diseases, Critical Care,2000-2003

**CREDENTIALS**

**Board Certification**

* Medical Council of India, Medicine & Surgery, 1995
* American Board of Internal Medicine, Internal Medicine, 2000
* American Board of Internal Medicine, Pulmonary Diseases, 2002, recertified 2014

## American Board of Internal Medicine, Critical Care Medicine, 2003

**Licensure(s)**

Active

* India, all states, MCI-13466
* USA, Texas, M5012

**Inactive**

USA, Indiana

## EXPERIENCE / SERVICE

**Academic/Professional Appointments**

* Instructor in Medicine, Baylor College of Medicine, Houston, USA, 07/2002-6/2003
* Assistant Professor of Medicine (tenure track), Baylor College of Medicine, Houston, USA, 07/2003– 02/2007
* Senior Scientist, CSIR Institute of Genomics & Integrative Biology (CSIR-IGIB), New Delhi, India, 02/2007- 02/2010
* Principal Scientist, CSIR-IGIB, 02/2010-02/2014
* Senior Principal Scientist, CSIR-IGIB, 02/2014-02/2017
* Chief Scientist, CSIR-IGIB, 02/2017-10/2017
* Outstanding Scientist and Director, Institute of Genomics & Integrative Biology, New Delhi, India, 10/2017-3/2022
* Other temporary appointments
  + Chair, National Apex Committee for Stem Cell Research and Therapy, Government of India, 2020
  + Co-chair, Lancet and Financial Times Global Commission, Governing health Futures 2030: Growing up in a digital world, 2019-2021
  + Co-lead, National Bioscience Mission for Human Health, India, 2019
  + Member, Gene Therapy Advisory and Evaluation Committee, Government of India, 2019
  + Member, Committee for Reforms in the Data Management System in Health Sector, Government of India, 2019
  + Member, World Health Organization, Digital Health Technical Advisory Group, 2020-2022
  + Healthcare Theme director, Council of Scientific and Innovative Research, India, 2020-2023
  + Alternate Board Member, Partnership for Maternal, Neonatal and Child Health, World Health Organization, 2020-21
  + Member, Governing Body of the Council of Scientific and Innovative Research, India, and CSIR Society, 2020-22
  + Member, Global Partnership for Artificial Intelligence (Pandemic preparedness subgroup), 2020-21
  + Vertical head, Molecular and Digital Surveillance (COVID-19) for CSIR and Office of Principal Scientific Advisor, GoI

**Other Academic and Administrative Positions**

**Intra Institutional**

Prior to becoming Director

* Member, Management Council, 2017
* Member, Academic Committee, Institute of Genomics & Integrative Biology, 2008 – present
* Member, Business Development Group, 2015 – 2017
* Member, Human Research Ethics Committee, Institute of Genomics & Integrative Biology, 2007 – 2017
* Member, Stem Cell Research Committee, 2017
* Chairman, Biosafety Committee, 2012 – 2017
* Member, Animal Research Ethics Committee, Institute of Genomics & Integrative Biology, 2007 – 2017
* Member, Apex Research & Development Committee, Institute of Genomics & Integrative Biology, 2009-2017
* Member, Technical Committee, 2007 - 2008

**Extra Institutional**

* Advisory
  + Chair, National Apex Committee for Stem Cell Research and Therapy
  + Co-lead, National Bioscience Mission for Human Health, India, 2019-2025
  + Member, Gene Therapy Advisory and Evaluation Committee, Government of India, 2019
  + Member, Committee for Reforms in the Data Management System in Health Sector, Government of India
  + Member, World Health Organization, Digital Health Technical Advisory Group, 2020-2022
  + Member, Apex R&D Board, Department of Biotechnology, 2018-
  + Member, Scientific Advisory Council, Institute of Life Sciences, Bhubaneshwar, 2019
  + Member, Scientific Advisory Council, Institute of Liver & Biliary Sciences, New Delhi, 2019
  + Member, Research Council, CSIR Centre for Cellular and Molecular Biology, Hyderabad, 2017
  + Member, Scientific Advisory Board, Centre for Brain Research, Indian Institute of Science, Bengaluru, 2017
  + Member, Artificial Intelligence Task Force, Commerce Ministry, Govt of India, 2017
  + Chairperson, Research Advisory Council, Max Healthcare, 2013-2017
  + Member, Executive Council, Maharaj Agrasen Medical College, Agroha, India, 2011-2016
  + Member, Academic Advisory Council, Public Health Foundation of India, 2012 – present
  + Member, Scientific Advisory Committee, Centre for DNA Fingerprinting and Diagnostics, 2015 – present
  + Member, Indian Scientific Advisory Committee, Lady Tata Memorial Trust, 2015

– present

* + Member, Scientific Advisory Group, Pediatric Biology Center, Translational Health Science Technology Institute, 2014 - current
  + Member, Research Advisory Council, National Institute of Nutrition, National Center for Lab Animal Sciences (NIN-NCLAS) 2011 – 2014
* Study Sections
  + Member, Exponential Technologies Task Force, Science and Education Research Board, India
  + Member, S&T Advisory Group, Medical Biotechnology Section, 2018
  + Member, Health AI Challenge committee, NITI Ayog, 2018-
  + Co-Chair, Department of Biotechnology Technical Committee, Genomics & Genetics 2019
  + Chair, Department of Biotechnology Taskforce, Human Health & Disease 2018 (member, 2013-2017)
  + Member, High Level Expert Committee, Technology Development Board, 2013-14
  + Member, High Level Expert Committee, NE Region Twinning Program, Department of Biotechnology, 2012 – 2017
  + Member, Program Committee, GLUE grant program, Department of Biotechnology, 2017
  + Member, Expert Committee, Department of Science and Technology Interdisciplinary Cyber Physical Systems – Big Data and Health, 2017
* Others
  + Member, Biosafety Committee, Daiichi Sankyo Pvt Ltd, 2011 - 2017

**Consultancies**

BioMarck Pharmaceuticals, Ltd., Durham, NC, USA, 2006-2007

**HONORS AND AWARDS**

1987 Junior Science Talent Scholarship, Government of Delhi

1988 National Talent Search scholarship, Government of India

1989 Maths Olympiad award, National Association of Mathematics Teachers

1989 First rank in state and national pre-medical tests

2003 Joseph Rodarte Award for Pulmonary Research, Baylor College of Medicine, USA

2010 Lady Tata Memorial Trust Young Researcher Award

2010 Swaranjayanti Fellowship and award (Biological Sciences)\*

2011 Elected member, Guha Research Conference, an honor-society for Indian Researchers

2014 Shanti Swaroop Bhatnagar Award (Medical Sciences)\*

2015 Wellcome Trust DBT Senior Fellowship (Clinical or Public Health Research)

2015 Chair and Kavli Fellow (India), Indo-US Frontiers of Science Symposium, National Academy of Sciences, USA

2015 National Bioscience Award, Department of Biotechnology

2016 Royal Society Commonwealth Science Conference award (established researcher)

2018 Elected Fellow, Indian National Science Academy

2019 Elected Fellow, Indian Academy of Sciences

2020 Sun Pharma Research Award (Medical Science)

## \* The Swarnjayanti Fellowship (2010) and the Bhatnagar award (2014) are the principal national awards for Indian nationals conducting research in India, at an intermediate and advanced stage respectively, with one to two annual awards per scientific discipline.

## RESEARCH

**Grants and Contracts**

1. Low Lung Function in Indians: Physiological Variation or Subclinical Pathology *(*Role: PI) Wellcome Trust DBT India Alliance Senior Fellowship for Clinicians and Public Health Researchers (12/2015 -12/2020, INR 40 million)
2. Developing a Systems View of Health Challenges in India (Role PI and Coordinator) Department of Science and Technology. This project aims to aggregate, validate, analyze and make available multiple health data sources across India (3/2019 - 3/2022, INR 110 million)
3. Technology Tools for COVID-19 response (Role, PI and Coordinator), Fondation Botnar. This project aims to build digital datasets and tools for molecular and digital surveillance of COVID-19 spread. (2020-2021, INR 20 million)
4. CSIR-Intel-IIITH Collaboration for COVID-19 (Role, Coordinator), Intel, India. This project aims to use big data and computational approaches for combating COVID-19 (2020-2021, INR 20 million)
5. SARS-CoV2 molecular surveillance (Role, Coordinator) This is in-house funding of CSIR supported by national and international donors. The purpose is to understand, model and predict COVID19 outbreaks (2020-22)

**Completed**

1. Commercialization grant, with Cognita Labs, Houston, for development of forced oscillation technique based lung function testing device (Role: PI, India), US-India Tech Endowment Fund (2015-19, USD 400,000)
2. Chronic Respiratory disease Innovation and Solution Program (CRISP) (Role: PI and coordinator). This project explores mitochondrial dysfunction in chronic respiratory diseases and nutraceutical based therapies. CSIR (2018-2020, INR 16 million)
3. CSIR Mission on Intelligent Systems (Role: Participant and nodal coordinator for AI in healthcare). This is a mission project exploring AI in healthcare, among other intelligent system applications. CSIR (2018-2020, INR 408 million with IGIB component ~ 20 million)
4. Commercialization grant, with Cognita Labs, Houston, for development of forced oscillation technique based lung function testing device (Role: PI, India), US-India Tech Endowment Fund (2015-18, USD 400,000)
5. Center of Excellence for Translational Research in Asthma and Lung Disease (role: PI and Coordinator). This was established in 2009 and is funded through 2017, supporting multidisciplinary research in lung disease. (MLP5502, 4/2012 - 3/2017, INR 249 million)
6. Effective application of community health efforts through new age, IT based modes, EACH-IT (role: PI) Funding Agency: CSIR. (BSC0303, 7/2014 - 3/2017, INR 70 million)
7. Commercialization grant, with CEERI, Chennai and Sofomo Technologies, for development of Pulse Transit Time base continuous non-invasive blood pressure monitoring device (Role: co-investigator), Funding Agency: DST Indo-US S&T Forum (2015-17, INR 5 million)
8. Principal Investigator “Cellular Hypoxia, Mitochondrial Dysfunction, and Endoplasmic Reticulum Stress In Asthma: – New Therapeutic Targets”, Dept of Science & Technology, 12/2010-11/2015, INR 25,600,000
9. Pulmonary effects of biomass fuel indoor particulate matter from rural India (role: PI, India), NIH FIRCA R03 TW008741, (2012-2014, USD 50,000)
10. Indo-US Joint Centre for Environmental Lung Disease (role: PI, India), with Shyam Biswal, Johns Hopkins Bloomberg School of Public Health, Funding Agency: Indo US S&T Forum, (2010-2012, INR 2,600,000),
11. Mechanisms of increased risk of asthma in obesity and metabolic syndrome (role: PI), Funding Agency: Lady Tata Memorial Trust, Young Researcher Award, 04/2010-03/2015, Rs. 4,000,000 (completed)
12. Co-Investigator, “Development of diagnostics and target-based molecular medicines against allergy, bronchial asthma and chronic obstructive pulmonary disease”, CSIR, NWP0033, 4/2007-3/2012. PI, Balaram Ghosh (current)
13. Co-investigator (Principal Investigator, BF Dickey) “Munc18 Proteins in Airway Mucus Hypersecretion”, NIH, NHLBI RO1HL72984, 4/1/03-3/31/07, $250,000/year (completed)

**Patents Granted and Pending / Product Development**

* Patent no. IN192813, “Device for measurement of lung volume and Raw without panting”. Cited by the joint ATS/ERS taskforce on PFT in children. Patent is currently expired
* Pending “Method for detecting airway disease using pattern analysis of forced oscillation impedance”
* Worked with Cognita Labs, USA, for developing PulmoScan, the first battery operated hand-held oscillometeric device for measuring lung function. The device has received FDA approval in 2020

**PUBLICATIONS**

***Ten best papers are in Appendix I along with summaries***

*Up to date publication list can be seen at*

<http://scholar.google.co.in/citations?hl=en&user=RWR2iU4AAAAJ>

<https://www.scopus.com/authid/detail.uri?authorId=35214460700>

On 10 June 2021 on Scopus; h-index, 43; citations, 20156

**Original Research Manuscripts, \*corresponding**

1. Mahesh S Dhar…… **Anurag Agrawal\*,** Partha Rakshit\*. Genomic characterization and Epidemiology of an emerging SARS-CoV-2 variant in Delhi, India. *Science*. 2021. 374(6570):995-9*.*
2. Mlcochova P, Kemp SA, Dhar MS, Papa G, Meng B, Ferreira IA, … **Anurag Agrawal\*,** Ravindra Gupta\*. SARS-CoV-2 B. 1.617. 2 Delta variant replication and immune evasion. *Nature.* 2021;599(7883):114-9.
3. Aggarwal M, Bansal A, Desiraju BK, Singh S, **Agrawal A\*,** Determinants of adolescent lung function in Indians: race, nutrition and systemic inflammation. *Am J Resp Crit Care Med. 2021; 204(9):1209-11*
4. Gheware A, Dholakia D, Kannan R, **Agrawal A**\*, Parasher\*. B. Adhatoda Vasica attenuates inflammatory and hypoxic responses in preclinical mouse models: potential for repurposing in COVID-19-like conditions. Respiratory Research. 2021, 22(1), 99
5. Naushin S, Sardana V,….,**Agrawal A**, Dash D, Sengupta S. Insights from a Pan India Sero-Epidemiological survey (Phenome-India Cohort) for SARS-CoV2. eLife. 2021 May, 10: e66537
6. Dhar MS, Asokachandran V, Uppili B, Tyagi N, Sharma P, Tiwari S, Srinivasan RV, Marwal R, Kanakan A, Khan AM, Pandey R, Jais M, Gogoi S, Shewale A, Nale T, Kabra S, Faruq M, Singh S, **Agrawal A**, Rakshit P. Reinfection or Reactivation: Genome based two distinct SNP profile of SARS CoV2 positivity in an Indian case. J Med Virol. 2021 Mar 22. doi: 10.1002/jmv.26948.
7. Shastri J, Parikh S, Agrawal S, Chatterjee N, Pathak M, Chaudhary S, Sharma C, Kanakan A, A V, Srinivasa Vasudevan J, Maurya R, Fatihi S, Thukral L, **Agrawal A**, Pinto L, Pandey R, Sunil S. Clinical, Serological, Whole Genome Sequence Analyses to Confirm SARS-CoV-2 Reinfection in Patients From Mumbai, India. Front Med (Lausanne). 2021 Mar 9;8:631769.
8. Rehman R, Jaiswal A, **Agrawal A**, Mabalirajan U. Ku70 modulation alleviates murine allergic asthma features and restores mitochondrial function in lungs. Mitochondrion. 2021 Mar;57:76-87. IF: 3.615
9. Gheware A, Panda L, Khanna K, Bhatraju NK, Jain V, Sagar S, Kumar M, Singh VP, Kannan S, Subramanian V, Mukerji M, **Agrawal A**, Prasher B.Adhatoda Vasica rescues the hypoxia dependent severe asthma symptoms and mitochondrial dysfunction. Am J Physiol Lung Cell Mol Physiol. 2021 Feb 10.
10. Gheware AP, Dholakia D, Kanan S, Panda L, Rani R, Pattnaik BR, Jain V, Parekh Y, Enayathullah M, Bokara KK, Subramanian V, Mukerji M, **Agrawal A**, Prasher B. Adhatoda Vasica attenuates inflammatory and hypoxic responses in preclinical mouse models: potential for repurposing in COVID-19-like conditions.
11. Garg, M., S. Johri, S. Sagar, A. Mundhada, **A. Agrawal**, P. Ray, and K. Chakraborty. 2021. "Cardiolipin-Mediated PPARgamma Phosphorylation Impairs IL-10 Production and Inflammation Resolution during Bacterial Pneumonia." Cell Reports 34 (6).
12. Christopher, D.J., A.M. Oommen, K. George, D. Shankar, **A. Agrawal**, and B. Thangakunam. 2020. "Prevalence of Airflow Obstruction as Measured by Spirometry, in Rural Southern Indian Adults." COPD: Journal of Chronic Obstructive Pulmonary Disease 17 (2).
13. Dawman, L., A. Mukherjee, T. Sethi, **A. Agrawal**, S.K. Kabra, and R. Lodha. 2020. "Role of Impulse Oscillometry in Assessing Asthma Control in Children." Indian Pediatrics 57 (2).
14. Singh P, Chakraborty R, Marwal R, Radhakrishan VS, Bhaskar AK, Vashisht H, et al. A rapid and sensitive method to detect SARS-CoV-2 virus using targeted-mass spectrometry. *Journal of Proteins and Proteomics*. 2020;11(3):159–65.
15. Kumar P, Pandey R, Sharma P, Dhar MS, Vivekanand A, Uppili B, et al. Integrated genomic view of SARS-CoV-2 in India. *Wellcome Open Research*. 2020;5(184):184.
16. Rehman R, Vijayakumar VE, Jaiswal A, Jain V, Mukherjee S, Karuthedath Vellarikkal S, et al. Non-canonical role for Ku70/80 in the prevention of allergic airway inflammation via maintenance of airway epithelial cell organelle homeostasis. *Am J Physiol Lung Cell Mol Physiol*. 2020 Sep 2;
17. Prevalence and attributable health burden of chronic respiratory diseases, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Respir Med*. 2020 Jun;8(6):585–96. (*consortia publication)*
18. Chakraborty S, Dakle P, Sinha A, Vishweswaraiah S, Nagori A, Salimath S, et al. Genetic variations in olfactory receptor gene OR2AG2 in a large multigenerational family with asthma. *Sci Rep.* 2019 Dec 13;9(1):19029.
19. Kulshreshtha A, Singh S, Ahmad M, Khanna K, Ahmad T, Agrawal A, et al. Simvastatin mediates inhibition of exosome synthesis, localization and secretion via multicomponent interventions. *Sci Rep*. 2019 Nov 8;9(1):16373.
20. Vishweswaraiah S, Ramachandra NB, Jayaraj BS, Holla AD, Chakraborty S, Agrawal A, et al. Haplotype analysis of ADAM33 polymorphisms in asthma: A pilot study. *Indian J Med Res*. 2019 Sep;150(3):272–81.
21. Khanna K, Chaudhuri R, Aich J, Pattnaik B, Panda L, Prakash YS, et al. Secretory Inositol Polyphosphate 4-Phosphatase Protects against Airway Inflammation and Remodeling.
22. Am J Respir Cell Mol Biol. 2019 Apr;60(4):399–412. Duggal B, Gokul B, Duggal M, Saunik S, Singh P, **Agrawal A**, Singh K, Wadhera P, Anupindi R, Nallamothu BK. Drug-Eluting Stent Use Among Low-Income Patients in Maharashtra After Statewide Price Reductions. *Circ Cardiovasc Interv*. 2019 Apr;12(4):e007757
23. Khanna K, Chaudhuri R, Aich J, Pattnaik B, Panda L, Prakash YS, Mabalirajan U, Ghosh B, **Agrawal A\***. Secretory Inositol Polyphosphate 4-Phosphatase Protects against Airway Inflammation and Remodeling. *Am J Respir Cell Mol Biol*. 2019 Apr;60(4):399-412.
24. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990-2016. *Lancet Glob Health*. 2018 Dec;6(12):e1363-e1374. Doi: 10.1016/S2214-109X(18)30409-1. Epub 2018 Sep 12. PubMed PMID: 30219316; PubMed Central PMCID: PMC6227385. (Consortium paper, Major role)
25. Paliwal S, Chaudhuri R, **Agrawal A\***, Mohanty S. Human tissue-specific MSCs demonstrate differential mitochondria transfer abilities that may determine their regenerative abilities. *Stem Cell Res Ther*. 2018 Nov 8;9(1):298.
26. Jain V, Raina S, Gheware AP, Singh R, Rehman R, Negi V, Murray Stewart T, Mabalirajan U, Mishra AK, Casero RA Jr, **Agrawal A**, Ghosh B. Reduction in polyamine catabolism leads to spermine-mediated airway epithelial injury and induces asthma features. *Allergy*. 2018 Oct;73(10):2033-2045.
27. Chaudhuri R, Khanna K, Koundinya D, Pattnaik B, Vatsa D, **Agrawal A**, Ghosh B. Novel nuclear translocation of inositol polyphosphate 4-phosphatase is associated with cell cycle, proliferation and survival. *Biochim Biophys Acta Mol Cell Res*. 2018 Jul 30;.
28. Duggal B, Subramanian J, Duggal M, Singh P, Rajivlochan M, Saunik S, Desiraju K, Avhad A, Ram U, Sen S, **Agrawal A**. Survival outcomes post percutaneous coronary intervention: Why the hype about stent type? Lessons from a healthcare system in India. *PloS One*. 2018;13(5):e0196830.
29. Maji A, Misra R, Dhakan DB, Gupta V, Mahato NK, Saxena R, Mittal P, Thukral N, Sharma E, Singh A, Virmani R, Gaur M, Singh H, Hasija Y, Arora G, **Agrawal A**, Chaudhry A, Khurana JP, Sharma VK, Lal R, Singh Y. Gut microbiome contributes to impairment of immunity in pulmonary tuberculosis patients by alteration of butyrate and propionate producers. Environ Microbiol. 2018 Jan;20(1):402-419.
30. Sinha A, Desiraju K, Aggarwal K, Kutum R, Roy S, Lodha R, Kabra SK, Ghosh B, Sethi T\*, **Agrawal A\***. Exhaled breath condensate metabolome clusters for endotype discovery in asthma. J Transl Med. 2017 Dec 22;15(1):262.
31. *India State-Level Disease Burden Initiative Collaborators.* Nations within a nation: variations in epidemiological transition across the states of India, 1990-2016 in the Global Burden of Disease Study. Lancet. 2017 Dec 2;390(10111):2437-2460. (*consortia publication*)
32. Singh VP, Mabalirajan U, Pratap K, Bahal D, Maheswari D, Gheware A, Bajaj A, Panda L, Jaiswal A, Ram A, **Agrawal A**. House dust mite allergen causes certain features of steroid resistant asthma in high fat fed obese mice. Int Immunopharmacol. 2017 Dec 4;55:20-27.
33. Gupta RK, Soree P, Desiraju K, **Agrawal A**, Singh SB. Subclinical pulmonary dysfunction contributes to high altitude pulmonary edema susceptibility in healthy non-mountaineers. Sci Rep. 2017 Nov 2;7(1):14892
34. *GBD 2015 Chronic Respiratory Disease Collaborators.* Global, regional, and national deaths, prevalence, disability-adjusted life years, and years lived with disability for chronic obstructive pulmonary disease and asthma, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet Respir Med. 2017 Sep;5(9):691-706. *(consortia publication)*
35. Tiwari P, Kutum R, Sethi T, Shrivastava A, Girase B, Aggarwal S, Patil R, Agarwal D, Gautam P, **Agrawal A**, Dash D, Ghosh S, Juvekar S, Mukerji M, Prasher B. Recapitulation of Ayurveda constitution types by machine learning of phenotypic traits. PLoS One. 2017 Oct 5;12(10):e0185380
36. Panda L, Gheware A, Rehman R, Yadav MK, Jayaraj BS, Madhunapantula SV, Mahesh PA, Ghosh B, **Agrawal A**, Mabalirajan U. Linoleic acid metabolite leads to steroid resistant asthma features partially through NF-κB. Sci Rep. 2017 Aug 29;7(1):9565
37. Gangwar I, Kumar Sharma N, Panzade G, Awasthi S, **Agrawal A**, Shankar R. Detecting the Molecular System Signatures of Idiopathic Pulmonary Fibrosis through Integrated Genomic Analysis. Sci Rep. 2017 May 8;7(1):1554
38. Dong LF, Kovarova J, Bajzikova M, Bezawork-Geleta A, Svec D, Endaya B, Sachaphibulkij K, Coelho AR, Sebkova N, Ruzickova A, Tan AS, Kluckova K, Judasova K, Zamecnikova K, Rychtarcikova Z, Gopalan V, Sobol M, Yan B, Pattnaik B, Bhatraju N, Truksa J, Stopka P, Hozak P, Lam A, Sedlacek R, Oliveira PJ, Kubista M, **Agrawal A**, Dvorakova-Hortova K, Rohlena J, Berridge MV, Neuzil J. Horizontal transfer of whole mitochondria restores tumorigenic potential in mitochondrial DNA-deficient cancer cells. *Elife*. 2017 Feb 14;6. pii: e22187.
39. Agrawal A, Koundinya DB, Raju JS, **Agrawal A**, Kalyanpur A. Utility of contemporaneous dual read in the setting of emergency teleradiology reporting. *Emerg Radiol.* 2016 Nov 18 (epub ahead of print).
40. Anchal Sharma, Asgar Hussain Ansari, Renu Kumari, Rajesh Pandey, Rakhshinda Rehman, Bharati Mehani, Binuja Varma, Bapu K Desiraju, Ulaganathan Mabalirajan, **Anurag Agrawal**, Arijit Mukhopadhyay. Human brain harbors single nucleotide somatic variations in functionally relevant genes possibly mediated by oxidative stress. *F1000 research* Oct 2016 5:2520
41. Singh S, Bodas M, Bhatraju NK, Pattnaik B, Gheware A, Parameswaran PK, Thompson M, Freeman M, Mabalirajan U, Gosens R, Pabelick C, Linneberg A, Prakash YS, **Agrawal A\***. Hyperinsulinemia adversely affects lung structure and function. *Am J Physiol Lung Cell Mol Physiol*. 2016 May 1;310(9):L837-45.
42. Pattnaik B, Bodas M, Bhatraju NK, Ahmad T, Pant R, Guleria R, Ghosh B, **Agrawal A\***. IL-4 promotes asymmetric dimethylarginine accumulation, oxo-nitrative stress, and hypoxic response-induced mitochondrial loss in airway epithelial cells. *J Allergy Clin Immunol*. 2016 Feb 23. pii: S0091-6749(16)00108-1.
43. Soree P, Gupta RK, Singh K, Desiraju K, **Agrawal A**, Vats P, Bharadwaj A, Baburaj TP, Chaudhary P, Singh VK, Verma S, Bajaj AC, Singh SB. Raised HIF1α during normoxia in high altitude pulmonary edema susceptible non-mountaineers. *Scientific Reports*. 2016 May 23;6:26468.
44. Gupta RK, Himashree G, Singh K, Soree P, Desiraju K, **Agrawal A**, Ghosh D, Dass D, Reddy PK, Panjwani U, et al. Elevated pulmonary artery pressure and brain natriuretic peptide in high altitude pulmonary edema susceptible non-mountaineers. *Scientific Reports*. 2016 Feb
45. Abhimanyu, Bose M, Varma-Basil M, Jain A, Sethi T, Tiwari PK, **Agrawal A**, Banavaliker JN, Bhowmick KT. Establishment of Elevated Serum Levels of IL-10, IL-8 and TNF-β as Potential Peripheral Blood Biomarkers in Tubercular Lymphadenitis: A Prospective Observational Cohort Study. *PLoS One*. 2016 Jan 19;11(1):e0145576.
46. Salvi S, Apte K, Madas S, Barne M, Chhowala S, Aggarwal K, Sethi T, **Agrawal A**, Gogtay J. What ails India? A one-day point prevalence study of symptoms and medical conditions in 204,912 patients visiting primary healthcare practitioners across 880 cities and towns in India. Results of the POSEIDON Study. *Lancet Global Health*. 2015 Dec 3 (12) e776–e784
47. Negi V, Paul D, Das S, Bajpai P, Singh S, Mukhopadhyay A, **Agrawal A**, Ghosh B. Altered expression and editing of miRNA-100 regulates iTreg differentiation. *Nucleic Acids Res*. 2015 Jul 23. pii: gkv752.
48. Singh VP, Aggarwal R, Singh S, Banik A, Ahmad T, Patnaik BR, Nappanveettil G, Singh KP, Aggarwal ML, Ghosh B, **Agrawal A**. Metabolic Syndrome Is Associated with Increased Oxo-Nitrative Stress and Asthma-Like Changes in Lungs. *PLoS One*. 2015 Jun 22;10(6):e0129850.
49. Aggarwal S, Gheware A, **Agrawal A**, Ghosh S, Prasher B, Mukerji M; Indian Genome Variation Consortium. Combined genetic effects of EGLN1 and VWF modulate thrombotic outcome in hypoxia revealed by Ayurgenomics approach. *J Transl Med*. 2015 Jun 6;13:184.
50. Kumar A, Das S, **Agrawal A**, Mukhopadhyay I, Ghosh B. Genetic association of key Th1/Th2 pathway candidate genes, IRF2, IL6, IFNGR2, STAT4 and IL4RA, with atopic asthma in the Indian population. *J Hum Genet.* 2015 Aug;60(8):443-8.
51. Ahmad T, Mukherjee S, Pattnaik B, Kumar M, Singh S, Kumar M, Rehman R, Tiwari BK, Jha KA, Barhanpurkar AP, Wani MR, Roy SS, Mabalirajan U, Ghosh B, **Agrawal A\*.** Miro1 regulates intercellular mitochondrial transport & enhances mesenchymal stem cell rescue efficacy. *EMBO J.* 2014; 33 (9), 994-1010
52. Makhija L, Krishnan V, Rehman R, Chakraborty S, Maity S, Mabalirajan U, Chakraborty K, Ghosh B, **Agrawal A\*.** Chemical Chaperones Mitigate Experimental Asthma by Attenuating Endoplasmic Reticulum Stress. *Am J Respir Cell Mol Biol.* 2013; 50(5): 923-31
53. Das S, Kumar M, Negi V, Pattnaik B, Prakash YS, **Agrawal A,** Ghosh B. MicroRNA-326 Regulates Pro-Fibrotic Functions of Transforming Growth Factor-β in Pulmonary Fibrosis. *Am J Respir Cell Mol Biol.* 2013; 50(5): 882-92
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**Reviews**

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**Book Chapters**

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## EDITORIAL AND REVIEW ACTIVITIES

**Editorial Board/Editor**

Editorial Board: eLife

Editorial Board: *American Journal of Physiology: Lung Molecular and Cellular Physiology (American Physiological Society)*

Editorial Board: *Journal of Translational Medicine*

Guest Editor: *Journal of Allergy, Special Issue on Mechanistic Understanding of the Effect of Obesity on Asthma and Allergy*

Guest Editor: *Immunology and Allergy Clinics of North America, Special Issue on Obesity and Asthma*

**Journal Reviewer**

*American Journal of Respiratory and Critical Care Medicine*

*American Journal of Physiology: Lung Cellular and Molecular Physiology*

*Annals of Family Medicine*

*Antioxidants and Redox Signaling*

*BMC Pulmonary Medicine*

*BMC Research Notes*

*Cellular Communication and Signaling*

*Chest*

*Clinical Experimental Allergy*

*Current Opinion in Genetics and Development*

*European Respiratory Journal*

*Experimental Physiology*

*Expert Opinion in Drug Discovery*

*Indian Journal of Allergy Asthma and Immunology*

*Indian Journal of Medical Research*

*Indian Journal of Human Genetics*

*Journal of Allergy and Clinical Immunology*

*Journal of Applied Physiology*

*Journal of Bioscience*

*Journal of Immunology*

*Journal of Physiology*

*Lung India*

*Pediatrics*

*Pediatric Pulmonology*

*PLoS One*

*PLoS Computational Biology*

*Pulmonary Pharmacology and Therapeutics*

*Respiratory Medicine*

*Respiratory Research*

*Science Translational Medicine*

*Scientific Reports*

**Grant reviewer**

*A-STAR, Singapore*

*Council of Scientific and Industrial Research, India*

*Department of Biotechnology (DBT), India*

*Department of Science and Technology (DST), India*

*French National Research Agency*

*Indian Council of Medical Research*

*Indo-US Science Technology Forum*

*Indo-French Centre for the Promotion of Advanced Research*

*Lady Tata Memorial Trust, India*

*Marsden Fund, Royal Society of New Zealand*

*National Health and Medical Research Council, Australia*

*National Science Center, Poland*

*Tea Board, India*

*Technology Development Board, India*

## TEACHING

**Formal Teaching**

**Courses Taught (Masters/Doctoral level)**

Research Ethics, Academy of Scientific Innovation and research (AcSIR), 2019-2020

Grant-writing, Academy of Scientific Innovation and research (AcSIR), 2018-19

Asthma and Allergy / Immunology, Academy of Scientific Innovation and research (AcSIR), 2011-2017

Host Defense to Inflammatory Disease: An Immunological Overview (AcSIR), 2012-2014

Biostatistics course, IGIB 2008-2011; Ambedkar Center, Delhi University, 2014

Big Data in Health, AcSIR-PHFI Masters in health Informatics, 2014- 19

**Other Educational Programs**

Course conductor for Respiratory Physiology Case Based Teaching, Graduate Medical School, BCM, 2001 – 2002

Course conductor for Respiratory Pathology Case Based Teaching, Graduate Medical School, BCM, 2001 - 2002

##### Supervisory Teaching

**Doctoral work completed**

1. Tanvir Ahmad, IGIB-AcSIR, 2010-2013, PhD
2. Vijay Pal Singh, IGIB-Pune University, 2010-2014, PhD
3. Lokesh Makija, IGIB-Pune University, 2009-2014, PhD
4. Anirban Sinha, IGIB-Pune University, 2008-2014, PhD
5. Suchita Singh-AcSIR, IGIB, 2010-2015, PhD
6. Swapan Gupta, GB Pant Hospital, 2012-2014, DM
7. Shravani Mukherjee, IGIB-AcSIR, 2012-16, PhD
8. Rituparna Chaudhri, IGIB-AcSIR, 2011-16, PhD
9. Rakshinda Rehman, IGIB-AcSIR, 2012-16, PhD
10. Co-Supervisor, Dr. Geetha Devi, AIIMS, Delhi, Supervisor: Dr. Amit Dinda, 2007-2012, BVSc PhD
11. Co-Supervisor, Dr. Tavpritesh Singh, IGIB, Delhi, Supervisor: Dr. Mitali Mukerji, 2008-2014, MBBS PhD
12. Kritika Khanna, IGIB-AcSIR, 2011-17
13. Lipsa Panda, IGIB-AcSIR, 2012-17
14. Vaibhav Jain, IGIB-AcSIR, 2012-18
15. Koundinya Desiraju, IGIB-AcSIR, 2013-2018
16. Samarpana Chakraborty, IGIB-AcSIR, 2014-2019
17. Prashant Bajpai, IGIB-AcSIR, 2014-2020
18. Co-supervisor, Adarsh Misra, IGIB-AcSIR, 2015-2020
19. Mohit Agarwal, IGIB-AcSIR, 2015-2021
20. Co-supervisor, Navya Mishra, PHFI-AcSIR, 2016-2021
21. Co-supervisor, Kriti Upadhyay, AIIMS, 2014-2020
22. Co-supervisor, Nitin Vanjare, Pune University, 2015-2020

**Doctoral degree work ongoing**

1. Aditya Nagori, IGIB-AcSIR, 2015-
2. Aarti Darra, IGIB-AcSIR, 2015-
3. Dr Angira Dasgupta, IGIB-AcSIR, 2017-
4. Vandana Singh, IGIB-AcSIR 2018-
5. Mayank Garg, IGIB-AcSIR 2019-
6. Co-supervisor, Bijay Pattnaik, AIIMS, 2014-

**Other direct supervision**

**Postgraduate Students**

Youlia Petrova , “Role of Munc18 in mucus hypersecretion in mice”, 7/03 – 6/05

**Postdoctoral Fellows**

Tavpritesh Singh, MBBS PhD, 2013-2014

Manish Bodas PhD, 2013-2015

Navin Bhatraju PhD, 2013-current

Evanka Madan PhD, 2015-2017

Divyaanka Iyer PhD, 2016-current (National Post Doctoral Fellowship)

Himanshi Kapoor, PhD, 2017-current (National Post Doctoral Fellowship)

##### Outside of Current Institution

**Organization of National or International Conferences/Symposia**

1. Co-Organizer (with Gagandeep Kang), Future of Healthcare, Session, Indian National Science Academy, Annual Meeting, Dec 2019
2. Organizer, EMBO Big Data in Biomedicine Symposium, Feb 2018, Delhi (Co-organizer: Atul Butte)
3. Founding Co-Organizer, Developing Indian Physician Scientists Workshop, Wellcome Trust DBT India Alliance, 2017-2019
4. Coordinator, Workshop on Impulse Oscillometry, in ICPR Summer symposium on airway inflammation, hyper-reactivity and asthma, Kolkata, May 2016
5. Organizing Co-chair Indo-US Frontiers of Science meeting, National Academy of Sciences, Irvine, USA 2015
6. Scientific committee, World Mitochondria Society, Targeting Mitochondria, 2014 and 2015, Berlin
7. International Human Genome Meeting 2008 Satellite Symposium on “Genomics and Medicine”, India
8. Organizing committee, GenoMeet 2012, India

##### Selected presentations/discussions at National or International Conferences

1. Panelist, UN General Assembly side event, World Health Organization, “Digital Health Network of Networks”, September 2020
2. Panelist, UN General Assembly side event, Devex, “Harnessing the power of data and digital technology for health transformation in the COVID-19 recovery”, September 2020
3. Panelist, Intelligent Health Meeting, “What does COVID-19 mean for data and confidentiality?”, September 2020
4. “Addressing the challenge of the COVID-19 pandemic in Low-and Middle-Income Countries”, UK Academy of Medical Sciences, June 2020
5. “Norm, Normal and Normative: Low Lung Function of Indians”, Indian Toxicology Conference, 2019
6. “Scaling from Innovation to Intervention- Using Big Data in India for Public Health Policy Reform”, Bill and Melinda Gates Foundation, March 2019
7. “The Perfect Storm of Metabolic Diseases and Allergic Inflammation: A role for mitochondrial-targeted interventions”, DN Shivpuri Memorial Oration Feb 2019, ICAAAI meeting.
8. Invited Speaker, IPCR Pulmonary Summer Symposium, “Future Directions of Research in Asthma”, April 2018
9. Invited Speaker, IPCR Pulmonary Summer Symposium, “Biologics: Principles and Practices in Airway Diseases”, April 2018
10. Speaker, EMBO Big Data in Biomedicine Symposium, “Random walks from biomedicine to biggish data and machine learning”, Feb 2018
11. Speaker, Indo-Israel meeting, “From Genetics to Functional Biology: A new role for INPP4A”
12. Invited Speaker, Data Science Applications for Sustainability, TERI University, on "Big Data Applications for Affordable Universal Healthcare in India", July 2107
13. Invited Speaker, 32nd Trans-Atlantic Conference on Lung Disease, Luzerne, Switzerland, Jan 2017, on "Mitochondrial Dysfunction Linking Obesity and Asthma"
14. Keynote Speaker, National Conference on Understanding the mechanism and challenges of Complex Diseases, Jan 2017, on “Endotypes, Phenotypes and Syndromes: Delving Deeper into Asthma”
15. Invited Speaker, NextGen Genomics, Biology, Biotechnology and Informatics conference, Kochi, Oct 2016, “A Big Role for Big Data in Transforming Healthcare”
16. Invited Speaker, National Summit on Innovation & Technology, Ahmedabad, Sept 2016, “Big data for Healthcare and Medicine: Indian and Global Scenario”
17. Invited Speaker, Indo-Taiwan Joint Workshop March 2016, “Big Data in Health”
18. Invited Speaker, ICONIC 2016, Pune, “Detection of small airway disease: A role for impulse oscillometry”
19. Invited Speaker, Workshop on PFT, ICONIC 2016, Pune, “Impulse Oscillometry Principles and Testing”
20. Distinguished Guest Speaker, International Clinical Epidemiology Network (INCLEN) workshp, Faridabad 2015, “Marrying Medicine and Science: My Journey”
21. Invited Speaker, Workshop in Big Data Benchmarking 2015, Delhi, The emerging role of Big Data in Public Health and Medicine
22. Invited Speaker, IIIT Delhi Workshop on Big Data, Nov 2015, The emerging role of Big Data in Public Health and Medicine
23. Invited Speaker, Targeting Mitochondria 2015 Conference, Berlin, Mining the Gut Microbiome for Mitochondrial Therapeutics
24. Invited Speaker, NAPCON 2015, Jaipur, Impulse Oscillometry: Principles and practice
25. Invited Speaker, Targeting Mitochondria 2014 Conference, Berlin, Putting Wheels on Mitochondrial Donation by Stem Cells
26. Invited Speaker, NAPCON 2014, Agra, Stem Cell Therapeutics in Lung Disease
27. Invited Speaker, ICONIC 2014, Pune, Early Detection of COPD: A role for impulse oscillometry
28. Keynote Speaker, National Research Scholar Meet, 2013, ACTREC, Mumbai, Managing a Three-way Marriage: A Story of Maths, Biology, and Medicine
29. Gordon Conference on Lung Development, 2013, Miro1 regulates mitochondrial donation from stem cells to lung epithelial cells
30. Genomeet, India, 2012, Towards a Genomic Understanding of Asthma: Challenges Ahead
31. Indian National Science Congress, 2012, Emerging Interface Between Asthma and Metabolic Syndrome
32. European Respiratory Society Meeting, Barcelona, Spain, 2010, Enhanced Detection of Peripheral Airway Disease by Novel Analysis of Impulse Oscillometry Data.
33. Experimental Biology meeting, Anaheim, California, 2010, Statins attenuate epithelial injury in asthma,
34. Invited speaker and faculty: NAPCON meeting, Kerala, India, Dec 2009, Impulse Oscillometry: Principles and utility
35. Invited speaker and faculty: Indian Society of Gastroentology, Agra, India, 2009, Genomics in Medicine.
36. American Thoracic Society Meeting, USA, 2008, A novel method of partitioning nasal and pulmonary resistance changes during double chamber plethysmography.
37. Invited speaker: Gordon Research Conference, Mucus and Ciliary Disorders 2007, Inhibition of mucus hypersecretion – from mouse to MANS.
38. Invited Speaker: International symposium of cardiac and respiratory physiology in memory of Prof AS Paintal, Novel approaches to inhibition of mucus hypersecretion and measurement of airway function in mice
39. American Thoracic Society Meeting 2006, Inhibition of mucin secretion by a MARCKS related peptide improves airflow obstruction in a murine model of asthma.
40. American Thoracic Society Meeting 2003,The exocytic regulatory protein Munc18-2 controls mast cell secretion and its transcription is regulated by GATA factors.
41. American Thoracic Society Meeting 2002, Transcriptional induction of the exocytic regulatory protein Munc18-2 during airway goblet cell metaplasia.
42. American Thoracic Society Meeting 2001, Airway metaplasia in murine asthma models is accompanied by an upregulation of Munc18-2 by STAT-6, IL-4 receptor dependent pathways.
43. American Thoracic Society Meeting 2000, GATA factors coordinately regulate mast cell secretory phenotype.
44. Keystone Symposia on Asthma 1999, Munc18-2 is a modulator of mast cell exocytosis
45. American Society for Cell Biology Meeting 1995, Elevation of intracellular sodium in asthma
46. Invited Speaker: International symposium on pulmonary function testing, VP Chest Institute, University of Delhi 1995.

**Selected Invited Seminars/Keynotes/Orations**

1. “A three way marriage combining maths, biology and medicine” 3rd Research Day keynote lecture, St Johns Medical College
2. JC Ray Lecture, IICB Foundation day, “Imagining Health Futures”, April 2021
3. Foundation Day Lecture, Regional Center of Biotechnology, “Big Data and AI for Pandemic Preparedness”, March 2021
4. Abdul Majid Siddiqui memorial lecture, Aligarh Muslim University, “The value of interdisciplinary research: a story of maths, biology, and medicine”, Dec 2020
5. Invited Webinar, INSA-INYAS Vigyan Setu, “Analog and Digital Health in the Aftermath of COVID19”, June 2020
6. Invited Lecture, Translational Health Science Technology Institute, Faridabad, “Norm, Normal, Normative: Low Lung Function of Indians”, May 2019
7. Foundation day public lecture, Public Health Foundation of India, “Advancing Public Health Efforts Through New Technologies " March 2019
8. AIIMS Research Day Keynote lecture “The Iterative Journey Between Bench and Bedside: The critical role of physician-researchers”, March 2019
9. Cipla Research Day lecture, March 2019, “Road Ahead for Personalized Medicine in India”
10. 2nd Decennial Lecture, IIT Jodhpur, “Inter, Multi, and Trans: Brothers from Different Mothers”, Feb 2019
11. “The Perfect Storm of Metabolic Diseases and Allergic Inflammation: A role for mitochondrial-targeted interventions”, DN Shivpuri Memorial Oration, Feb 2019
12. Lalji Singh Oration Award, Central Drug Research Institute, “Targeting Mitochondria in Lung Disease: From Microbes to Stem Cells”, November 2018
13. Biswas Lecture, Indian Institute of Science, “Inter, Multi, and Trans: Brothers from Different Mothers”, April 2018
14. Zaidi Oration, Indian Institute of Toxicology Research “Targeting Mitochondria for Preventing and Treating Lung Disease: Being Precisely Imprecise”, November 2018
15. National Centre for Cell Science, April 2018, “Enjoying a Three-way Marriage: A story of Maths, Biology and Medicine”
16. India Habitat Centre, Feb 2018, organized by C-DIS, “Artificial Intelligence and healthcare: Imperatives for India”
17. Miranda House, Delhi University, “Being Human in the age of Artificial Intelligence”, Dec 2017
18. Indian Institute of Science, March 2017, “Enjoying a Three-way Marriage: A story of Maths, Biology and Medicine”
19. National Centre for Biological Sciences, March 2017, “Rejuvenating Cellular Respiration for Optimising Respiratory Health - Targeting Mitochondria”
20. South Asian University, Oct 2016. “Becoming an Organelle Donor: The Healing Touch of Mesenchymal Stem Cells”
21. Indian Cytology and Preventive Oncology Institute, May 2016, “Learning to Enjoy a Three-way Marriage: A story of Maths, Biology and Medicine”
22. Indian Institute of Science Education and Research, Pune, 2015, “Enjoying a Three-way Marriage: A story of Maths, Biology and Medicine”
23. Indian Institute of Science, 2015, Dept of Computer Science and Automation, “The emerging role of Big Data in Health”
24. Tata Institute of Fundamental Research, 2015, “Public Health Needs Three Way Marriages”
25. Annual lecture, University College of Medical Sciences, 2015, “Managing a Three-way Marriage: A story of Maths, Biology and Medicine”
26. Baylor College of Medicine, USA, 2014, The healing touch of mesenchymal stem cells: the role of mitochondrial donation,
27. Distinguished Speaker Series, India Innovation Research Center, Delhi, 2014, Managing a Three-way Marriage: A Story of Maths, Biology, and Medicine
28. Regional Center of Biotechnology, Gurgaon, 2014, Managing a Three-way Marriage: A Story of Maths, Biology, and Medicine
29. Mayo Clinic, USA, 2012, Towards A Genomic Understanding of Asthma: Rethinking Asthma pathogenesis
30. Genentech, USA, 2012, Is Asthma a Metabolic Disease?
31. Delhi University, 2012, Genomics and Medicine
32. Johns Hopkins Bloomberg School of Public Health, USA, 2011, Asthma sans Inflammatory Cells: A Metabolic Theory of Asthma
33. “Genetics of Asthma”, Venkateshwara College, Delhi 2009
34. “Mucous Obstruction and Airway Hyperresponsiveness in Murine Models of Asthma and Rhinitis”Johns Hopkins University, USA 2008
35. “Translational research in asthma: The road ahead” Chest Research Foundation, Pune 2008
36. “Inhibition of mucin hypersecretion in mice by MARCKS related peptides”, MD Anderson Cancer Center, USA, 2007
37. “Pulmonary function testing in mice: The uncertainty principle”, MD Anderson Cancer Center, USA 2005
38. “Mucus related obstruction in asthma: From mouse to MANS” Institute of Genomics & Integrative Biology, India, 2004
39. “Lung mechanics: principles and pitfalls”, MD Anderson Cancer Center, USA, 2003
40. “Secs, Drugs, Rock n’ Roll”, Howard University, USA, 2001

**PROFESSIONAL MEMBERSHIPS/ACTIVITIES**

##### Professional Society Activities, with Offices Held

**National and International**

* Indian National Science Academy, elected 2018
* Indian Academy of Sciences, elected 2019
* Guha Research Conference, Member, elected 2011
* American Physiological Society, Member
* American Thoracic Society, Fellow 2018
  + Planning committee and Awards committee, Respiratory Structure and Function assembly
* American College of Chest Physicians, Selected for Leadership Development 2002, Elected Fellow 2010

OTHER

N/A

DATE OF LATEST C.V. UPDATE: Sept 2021

**Appendix 1: Ten Best Papers**

**Original Research Publications**

1. Ahmad T, Mukherjee S, Pattnaik B, Kumar M, Singh S, Kumar M, Rehman R, Tiwari BK, Jha KA, Barhanpurkar AP, Wani MR, Roy SS, Mabalirajan U, Ghosh B, **Agrawal A\*.** Miro1 regulates intercellular mitochondrial transport & enhances mesenchymal stem cell rescue efficacy. *EMBO J.* 2014; 33 (9), 994-1010

*Mitochondrial dysfunction in epithelial cells triggers local biogenesis and fibroblast proliferation. Thus, mitochondrial dysfunction in airways drives remodeling of lungs. This fits well with the idea that the lung is very sensitive to airway epithelial cell damage (metabolic due to lifestyle, environmental due to pollution) and responds by enantiostatic mechanisms that may compromise lung structure in the long run. The key finding was that mesenchymal stem cells can donate mitochondria via a Miro1 dependent mechanism and rescue the airway epithelium and prevent remodeling.*

1. P Mlcochova, S Kemp, MS Dhar…….Anurag Agrawal, Ravindra Gupta. SARS-CoV-2 B. 1.617. 2 Delta variant replication and immune evasion. *Nature.*2021

*This paper provides amongst the earliest evidence that the Delta variant (B.1.617.2) of SARS-CoV2 is extremely transmissible and can evade immunity elicited by prior infections or vaccination*

1. **Agrawal A\***, Bhattacharya B, Baranwal N, Balazova D, Sardana V, Brahmachari SK. Integrating Health Care Delivery and Data Collection in Rural India Using a Rapidly Deployable eHealth Center. *PloS Medicine* 2013, 10(6): e1001468

*The eHealth center is an integrated solution that harnesses together the infrastructure-creation advantages of cargo containers; high-quality healthcare-access capability of telemedicine; operational transparency of cloud-based electronic workflow; and automated analysis of the data for various levels of decision-support. A key novelty of this solution is direct transfer of data from equipment to cloud, where it is analyzed, assuring data integrity and quality. The analyzed data is presented in the form of a dashboard which provides real time updates on number of patients seen, key diagnoses and their frequency, equipment usage, downtime of equipment, amongst others, bringing operational transparency.*

1. Salvi S, Apte K, Madas S, Barne M, Chhowala S, Aggarwal K, Sethi T, **Agrawal A**, Gogtay J. What ails India? A one-day point prevalence study of symptoms and medical conditions in 204,912 patients visiting primary healthcare practitioners across 880 cities and towns in India. Results of the POSEIDON Study. *Lancet Global Health*. 2015

*This project was a multi-investigator project conceived by Dr Sundeep Salvi and implemented on ground by Cipla (Dr Gogtay). My group analyzed the data of 204,912 patients visits to 7400 general practitioners, in 880 locations spanning all of India, over a single day. Not only were respiratory symptoms the most frequent reasons to visit doctors, but also non-metro cities, had a higher burden of obstructive airway disease (OAD). In secondary analyses, utilizing open governance data, we were able to infer an increase in OAD when LPG penetrance is low. These findings have important implications for multiple government initiatives ranging from national health programs to the “Give It Up” initiative.*

1. India State-Level Disease Burden Initiative CRD Collaborators. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990-2016. *Lancet Glob Health*. 2018 Dec;6(12):e1363-e1374.

*This is the largest study I have been actively part of, coordinated by the Public Health Foundation of India, Global Burden of Disease collaborative, and ICMR. My role was to help collect, organize and interpret the data for Asthma and COPD, along with other main investigators. This showed, using classical epidemiological methods, what we had suspected from our point prevalence study. India has a very high burden of respiratory disease and our age adjusted risk has actually been consistently high over the last few decades. Unlike the West, it is largely attributable to lifestyle and environment rather than smoking.*

1. Singh S, Bodas M, Bhatraju NK, Pattnaik B, Gheware A, Parameswaran PK, Thompson M, Freeman M, Mabalirajan U, Gosens R, Pabelick C, Linneberg A, Prakash YS, **Agrawal A\***. Hyperinsulinemia adversely affects lung structure and function. *Am J Physiol Lung Cell Mol Physiol.* 2016 May 1;310(9):L837-45.

*This is the first report that explored whether poor lung function may be linked to hyperinsulinemia. As discussed above, poor lung function predicts insulin resistance, cardiometabolic disease and premature cardiac death. Here we looked at molecular effects of high levels of insulin on lung and found that insulin activates the type of changes that are seen in lungs of people with restrictive lung function. The tests were done at my lab and at Mayo Clinic and were on both animals and primary human cells from lung transplants. This served as a strong warning against inhaled insulin products and tied together threads about insulin resistance and poor lung function.*

1. Mohit Aggarwal, Anubhuti Bansal, Bapu Koundinya Desiraju, Shailendra Singh, **Anurag Agrawal\*,** Determinants of adolescent lung function in Indians: race, nutrition and systemic inflammation. *Am J Resp Crit Care Med (in revision)*

*This shows for the first time the nature and nurture gradients operational in lung function variation in a large diverse low middle-income country. Indian low lung function is in part due to sub-clinical pathology such as chronic inflammation. This provides critical insights into the challenges and possible solutions of defining normal lung function at global scales. A preprint of this manuscript has been deposited at Medrxiv (https://www.medrxiv.org/content/10.1101/2021.03.01.21252646v1)*

1. Sinha A, Yadav AK, Chakraborty S, Kabra SK, Lodha R, Kumar M, Kulshreshtha A, Sethi T, Pandey R, Malik G, Laddha S, Mukhopadhyay A, Dash D, Ghosh B, **Agrawal A\*.** Exosome-enclosed microRNAs in exhaled breath hold potential for biomarker discovery in patients. *J Allergy Clin Immunol.* 2013 Jul;132(1):219-22 (cover page article)

*miRNAs are well known as potential biomarkers and have been found in many bodyfluids. Here, we discovered the presence of miRNAs, enclosed inside exosomes in exhaled breath, in measurable quantities. Some of them were more than a hundred-fold increased in different disease states. Since exhaled breath samples the entire lung, these hold great promise for diagnosis and understanding of lung diseases. This work was featured on the cover page of the Journal of Allergy and Clinical Immunology, the highest ranked journal in Clinical Immunology/Allergy.*

**Perspectives with policy implications**

1. Agrawal A, Bridging digital health divides, *Science* 2020, 369 (6507), 1050-1052

*India has a very high need for digital health, has created strong digital public goods, but needs to move fast along the axis of digitization, digitalization, and digital transformation in health sector. The current COVID19 pandemic has brought about a catalysis in this sector, but there are many considerations that need to be kept in mind going forward. This article describes some of these key considerations for now and in the post-COVID phase.*

1. Agrawal A. India's COVID crisis flags need to forecast variants. Nature 2021 Jun. 594 (7861), 9

*This is an analysis of how the problem of repeated surges due to mutant variants of concern can be addressed in India and abroad, outlining the key gaps and serving as a call for action*