

Curriculum Vitae

Arup Bhattacharya.

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EDUCATION

1. August 1999 – June 2005.

PhD from Roswell Park Graduate Division of SUNY, Buffalo, in Molecular and Cellular Biophysics program under Department of Cancer Biology with interaction with Dept of Pharmacology & Therapeutics. Awarded full scholarship and fellowship by Roswell Park Cancer Institute. Title of thesis: *NON-INVASIVE IN VIVO ASSESSMENT OF TUMOR HYPOXIA USING FUNCTIONAL MAGNETIC RESONANCE (fMR) IMAGING DURING THERAPY IN HUMAN HEAD AND NECK SQUAMOUS CELL CARCINOMA (HNSCC) XENOGRAFTS: IMPLICATIONS FOR ASSESSING THERAPEUTIC EFFICACY.*

2. October 2002.

Completion of three years study in classical homeopathy with scholarship from the International Academy of Classical Homeopathy, New York. This is a homeopathy course under George Vithoulkas - the winner of 1996 Right Livelihood award (alternate noble prize) for his contribution to the revival of classical homeopathy.

3. December 1997

Masters degree in Psychology (MA) from Annamalai University, India.

4. March 1997

Postgraduate diploma in Guidance and Counseling (PGDGC) from Annamalai University, India

5. Dec 1996

Diploma in Homeopathic Pharmacy (DHP) from British Institute of Homeopathy, UK.

6. August 1994

Completion of Doctorate of Homeopathic Medicine (HMD) from British institute of Homeopathy, UK.

7. May 1994

Completion of Proficiency certificate in Acupuncture from Chinese Academy of Science.

8. March 1992

Diploma in Acupuncture from Open International University of Complementary Medicine, Sri Lanka.

9. October 1992

Diploma in homeopathy (DIHom) from British Institute of Homeopathy, UK.

10. 1985

MS in Biophysics from Cancer Research Institute under University of Bombay

11. 1983

BS in Microbiology from University of Bombay.

OTHER EDUCATION

1. December 1988

Diploma in Management Studies (DMS) from University of Bombay, India.

2. March 1993

Baccalaureate in law (LLB) from University of Bombay.

3. January 1991

Diploma in Export Import Management from Indian Merchants Chambers, Bombay, India.

CAREER IN HEALTH SCIENCES

1. June 2008 – till date.

Associate Research Professor, Department of Natural Sciences, Roswell Park Graduate Division, State University of New York at Buffalo.

2. June 2009 – till date

Affiliate Member in the Department of Cancer Prevention and Control, Roswell Park Cancer Institute, Buffalo, NY. Current research involves investigating anticancer properties of natural products such as broccoli, horse radish, wasabi, mustard and selenium in preclinical cancer models including head & neck, lung, colorectal and bladder cancer.

3. September 19, 2005 – May 2009

Postdoctoral training in Translational Pharmacology and Physiology under tutelage of Dr Youcef M Rustum, Distinguished Professor and Chair, Department

- of Cancer Biology, Roswell Park Cancer Institute, Buffalo, NY. Research involved understanding effect of organoselenium compounds on tumor microenvironment including neoangiogenesis, tumor vessel maturation using various non invasive MR and optical techniques to assess the tumor microenvironment over time and treatment. *In vivo* xenografts of human lung, colorectal and head/neck cancer models are used along with *in vitro* tube formation assays for studying angiogenesis. Postdoctoral Fellow from Jan-May 2009 in Department of Cancer Chemoprevention
4. **September 2, 2004 till August 31 2004**
Research Technologist, Department of Cancer Biology, Roswell Park Cancer Institute, Buffalo, NY, USA.
 5. **April 2002 onwards**
 - a. Homeopathy teacher, tutor, mentor and seminar speaker in North America.
 - b. Homeopathic Tutor for British Institute of Homeopathy, Canada and USA.
 - c. Since October 2004, adjunct faculty with Akamai University for homeopathic education.
 - d. Homeopath practitioner in North America.
 6. **July 1992 till august 1999**
Director, coordinator – Centre for Homeopathic Cure, India. Responsibilities included overseeing activities of homeopathic medical doctors at the Centre, teaching intern homeopathic medical doctors, organizing seminars, homeopathic practice, managing finances coordinating different staff and functions.
 7. **April 1996 till March 1997**
Managing Editor - Health Newsletter, India.
 8. **1995**
Visiting Professor at the Open International University of Complementary Medicine, Sri Lanka teaching homeopathy.

CAREER - OTHERS

1. **July 1989 till August 1999**
Director - Alpha Trade Links, India. Consultants to Himedia Laboratories P Ltd., Ceekay Daikin Ltd. and other corporations on international trade related matters.
2. **June 1996 till March 1999**
Faculty member – Institute of Management and Professional Studies, Mulund, Bombay, India. Taught International marketing to graduate students.
3. **January 1999 till March 1999**

Visiting Faculty - Melange Institute of Management, India. Taught International marketing to graduate students.

4. May 1988 till July 1989

Manager - Exports & Imports. Intec Polymers Ltd., Bombay, India

5. May 1987 till May 1988

Purchase Executive, Intec Polymers Ltd., Bombay, India

6. June 1985 till September 1986

Project Executive, Thomas Baker Pvt. Ltd., Bombay, India.

GRANTS AND AWARDS

1. National Institute of Health 2 year R21 award effective May 1st 2009 (CA133682-01A2) 'Dietary Supplement Selenium and HIF-1 alpha Regulation in Cancer'.
2. American Institute for Cancer Research postdoctoral grant for 2 years effective July 1st. 2006
3. American Association for Cancer Research instituted AACR-AFLAC Scholar-in-Training Award for 2006;
4. International Society for Magnetic Resonance in Medicine Award for annual meeting, 2006;
5. Scholarship from Roswell Park Cancer Institute to attend 7th. International Summer School of Biophysics, Croatia, 2000;
6. Fellowship with scholarship at Roswell Park Cancer Institute & SUNY, Buffalo, NY for PhD studies;

PATENTS

1. #20080019919 - Method for optimizing cancer therapy by monitoring maturation of tumor associated vasculature by selenium.
2. #61/313,004 – Novel method for delivery and use of isothiocyanates and its conjugates against bladder cancer growth and metastasis.
3. #13/609,53 (US), #201180013514.5 (China), #11754150.8 (EP) and #7668/DELNP/2012 – Novel method for delivery and use of isothiocyanates for prophylaxis and/or therapy of bladder cancer.

OTHER AWARDS AND RECOGNITIONS

1. Doctorate of Science (DSc) - Honoris-Causa by Open International University of Complementary Medicine for services in homeopathy;
2. Recipient of College Merit Scholarship twice at Baccalaureate level;
3. Fellow of the International Laser therapy Association;
4. Fellow of the British Institute of Homeopathy;
5. Fellow member of United Writers' Association, India;
6. Fellow of the Homeopathic Foundation, Sri Lanka;
7. Fellow of the Acupuncture Foundation of Sri Lanka;
8. HD (Homeopathic Doctor) by HMCC and NUPATH, Canada;

9. SUNY at Buffalo Graduate Student Association Distinguished Service Recognitions as a Finance Commissioner for 2001-2.

MEMBERSHIPS

1. American Association for Cancer Research (AACR) -1999-2013;
2. International Society For Magnetic Resonance in Medicine (ISMRM) 1999-2013;
3. American Association of Physicists in Medicine (AAPM) 1999-2013;
4. Homeopathic Medical Council of Canada (HMCC);
5. National United Professional Association of Trained Homeopaths (NUPATH), Canada;
6. Associate member of the Institute of Company Secretary of India;
7. International German Homoeopathic Society;
8. Commonwealth Institute of Acupuncture & Natural Medicine;
9. Member of the Acupuncture Foundation of SriLanka;
10. Ex-member of Bombay Management Association;
11. Ex-associate member of the International Federation of Practitioners of Natural Therapeutics, UK.

HOMEOPATHY ARTICLES

1. A case of chromosomal translocation causing repeated abortion. Hpathy Ezine, Dec 2014.
2. Homeopathy used as an adjuvant therapy in a metastatic non-small cell lung cancer case. Homeopathy Case Reports, 11.19.2014.
3. Book Chapter: 'Towards a better understanding of health and disease' in 'A compendium of Essays on Alternative Therapy'. ISBN 978-953-307-863-2. Intech-Open Access Publishers, Rijeka, Croatia. 2012.
4. A model of health and disease in homeopathy. The American Homeopath 14, 138-142, 2008.
5. The enigma of coffee restriction in homeopathic treatment. Asian Homeopathic Journal, 6(4), 33-36, 1996.
6. Dietary effect on criminal behaviour. Health Newsletter, 15, 4, 1996.
7. A new model of health and diseases. Health Newsletter, 1996.
8. Alleviating Anxiety neuroses nutritionally. Health Newsletter, 1996.
9. Garlic – the health Panacea. Health Newsletter, 1996.
10. Understanding minerals. Health Newsletter. 1996 & 1997.

BOOK EDITOR

1. 'A compendium of Essays on Alternative Therapy'. ISBN 978-953-307-863-2. Intech-Open Access Publishers, Rijeka, Croatia. 2012.

OTHER SCIENTIFIC PUBLICATIONS

11. **Bhattacharya A**, Klaene J J, Li Y, Paonessa J, Stablewski A B, Vouros P, Zhang Y. The inverse relationship between bladder and liver in 4-aminobiphenyl-induced DNA damage. *Oncotarget*, 6(2), 836-845, 2014
12. **Bhattacharya A**, Li Y, Shi Y, Zhang Y. Enhanced inhibition of urinary cancer growth and muscle invasion by allyl isothiocyanate and celecoxib in combination. *Carcinogenesis*, 34(11), 2593-2599, 2013.
13. Veeranki O L, **Bhattacharya A**, Marshall J R, Zhang Y. Organ-Specific Exposure and Response to Sulforaphane, a Key Chemopreventive Ingredient in Broccoli: Implications for Cancer Prevention. *British Journal of Nutrition*, 109, 25-32, 2012.
14. **Bhattacharya A**, Li Y, Geng F, Munday R, Fahey J W, Zhang Y. The principal urinary metabolite of allyl isothiocyanate, N-acetyl-S-(N-allylthiocarbamoyl)cysteine, inhibits the growth and muscle invasion of bladder cancer. *Carcinogenesis*, 33(2), 394-398, 2012.
15. Azrak R.G, Cao S, Durrani F A, Tóth K, **Bhattacharya A**, Rustum Y M. Augmented therapeutic efficacy of irinotecan is associated with enhanced drug accumulation. *Cancer Letters*, 311(2), 219-229, 2011, doi:10.1016/j.canlet.2011.07.023.
<http://www.sciencedirect.com/science/article/pii/S0304383511004484>
16. **Bhattacharya A**. Methylselenocysteine - a Promising Antiangiogenic Agent for Overcoming Drug Delivery Barriers in Solid Malignancies for Therapeutic Synergy with Anticancer Drugs. *Expert Opinion on Drug Delivery*, 8(6), 749-763, 2011.
17. **Bhattacharya A**, Turowski S G, San Martin I D, Rajput A, Rustum Y M, Hoffman R M, Seshadri M. Magnetic resonance and fluorescence-protein imaging of anti-angiogenic and anti-tumor efficacy of selenium in an orthotopic model of human colon cancer. *Anticancer Research*, 31, 387-394, 2011.
18. **Bhattacharya A**, Turowski S G, San Martin I D, Rajput A, Rustum Y M, Hoffman R M, Seshadri M. Combined magnetic resonance and fluorescence-protein imaging to simultaneously assess the antitumor and anti-angiogenesis efficacy of selenium. *Proc. Am. Assoc. Cancer Res. (Abstract#4284)*, 2011.

19. **Bhattacharya A**, Li Y, Wade K L, Paonessa J D, Fahey J W, Zhang Y. Allyl isothiocyanate-rich mustard seed powder inhibits bladder cancer growth and muscle invasion. *Carcinogenesis*, 31(12), 2105-2110, 2010; doi: 10.1093/carcin/bgq202.
<http://carcin.oxfordjournals.org/content/31/12/2105.full.pdf+html>
20. Chintala s, Tóth K, Yin M-B, **Bhattacharya A**, Smith S B, Ola M S, Cao S, Durrani F A, Zinia T R, Dean R, Slocum H K, Rustum Y M. Downregulation of cystine transporter X_c by irinotecan in human head and neck cancer FaDu xenografts. *Chemotherapy*. *Chemotherapy*, 56(3), 223-233, 2010.
21. Rustum Y M, Tóth K, Seshadri M, Sen A, Durrani FA, Stott E, Morrison C D, Cao S, **Bhattacharya A**. Architectural heterogeneity in tumors caused by differentiation alters intratumoral drug distribution and affects therapeutic synergy of antiangiogenic organoselenium compound. *Journal on Oncology*, Article ID 396286. doi:10.1155/2010/396286.
<http://downloads.hindawi.com/journals/jo/2010/396286.pdf>
22. **Bhattacharya A**, Tang L, Li Y, Geng F, Paonessa J, Chen S C, Wong M, Zhang Y. Inhibition of bladder cancer by allyl isothiocyanate. *Carcinogenesis*, 31(2), 281-286, 2010; doi: 10.1093/carcin/bgp303.
<http://carcin.oxfordjournals.org/cgi/reprint/31/2/281.pdf>
23. **Bhattacharya A**, Tang L, Li Y, Geng F, Paonessa J, Chen S C, Wong M, Zhang Y. Bladder cancer inhibition by allyl isothiocyanate. *Proc. Am. Assoc. Cancer Res.*, *Frontiers in Cancer prevention Research*, 2009.
24. **Bhattacharya A**, Tóth K, Sen A, Seshadri M, Cao S, Durrani FA, Faber E, Repasky E, Rustum Y M. Inhibition of colon cancer growth by methylselenocysteine - induced angiogenic chemomodulation is influenced by histological characteristics of the tumor. *Clinical Colorectal Cancer* 8(3), 155-162, 2009. <http://cigjournals.metapress.com/content/f31h5xv7268440k9/fulltext.pdf>
25. **Bhattacharya A**, Tóth K, Durrani FA, Cao S, Slocum HK, Chintala S, Rustum Y M. Hypoxia Specific Drug Tirapazamine Does Not Abrogate Hypoxic Tumor Cells in Combination Therapy with Irinotecan and Methylselenocysteine in Well-Differentiated Human Head and Neck Squamous Cell Carcinoma A253 Xenografts. *Neoplasia* 10 (8), 857-865, 2008.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2481573/pdf/neo1008_0857.pdf
26. **Bhattacharya A**, Seshadri M, Oven S D, Tóth K, Vaughan M, Rustum Y.M. Tumor vascular maturation and improved drug delivery by organoselenium compound methylselenocysteine. *Clinical Cancer Research* 14(12), 3926-3932, 2008. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2504718/pdf/nihms-59711.pdf>

27. Cao S, Durrani FA, **Bhattacharya A**, Yu Y, Rustum YM. Enhanced irinotecan toxicity in UDPGT deficient rats: Role of UDPGT1A in irinotecan detoxification. Proc. Am. Assoc. Cancer Res., 2008.
28. **Bhattacharya A**, Tóth K, Cao S, Azrak R. G, Durrani F A, Rustum Y M. 5-Methylselenocysteine (MSC) causes tumor vessel maturation leading to synergistic antitumor effect in human xenografts. Proc. Am. Institute for Cancer Res., 2007.
29. Seshadri M, **Bhattacharya A**, Tóth K, Rustum Y M. Contrast-enhanced MRI of the vascular response of human tumor xenografts to the chemopreventive agent selenium in vivo: Implications for combination therapy. Proc. Am. Assoc. Cancer Res., 2007.
30. **Bhattacharya A**, Tóth K, Cao S, Azrak R. G, Durrani F A, Rustum Y M. Se-(Methyl)selenocysteine causes tumor vessel maturation leading to synergistic antitumor effect in human xenografts. The Journal of Nutrition, 137(1S), 278S, 2007.
31. Seshadri M, Mazurchuk R, Spornyak J A, **Bhattacharya A**, Rustum Y M, Bellnier D A. Activity of the vascular disrupting agent 5,6-dimethylxanthenone-4-acetic acid (DMXAA) against human head and neck carcinoma xenografts. Neoplasia, 8(7), 534-542, 2006.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1601938/pdf/neo0807/0534.pdf>
32. **Bhattacharya A**, Mazurchuk R, Spornyak J. A, Tóth K, Magnano, C.R, Cao S, Azrak R. G, Durrani F A, Rustum Y M. Tumor vessel maturation by 5-Methylselenocysteine (MSC) results in synergistic antitumor effect in human head and neck squamous cell carcinoma (HNSCC) xenografts. Proc. Am. Assoc. Cancer Res., 2006.
33. **Bhattacharya A**, Mazurchuk R, Spornyak J. A, Cao S, Durrani F A, Rustum Y M. Serial spin echo based BOLD fMR imaging can predict chemotherapy response in head and neck squamous cell carcinoma (HNSCC) xenografts. Proc. International Society of Magnetic Resonance in Medicine, 2006.
34. Seshadri M, Mazurchuk R, Spornyak J. A, **Bhattacharya A**, Rustum Y M, Bellnier, D.A. Tumor response of human head and neck squamous cell carcinoma (HNSCC) xenografts to the vascular targeting agent 5,6-dimethylxanthenone-4-acetic acid (DMXAA). Proc. Am. Assoc. Cancer Res., 2006
35. Cao S, **Bhattacharya A**, Durrani F A, Fakhri M. Irinotecan, oxaliplatin and raltitrexed for the treatment of advanced colorectal cancer (Review Article).

- Expert opinion on pharmacotherapy, 7, 687-703, 2006.
<http://informahealthcare.com/doi/abs/10.1517/14656566.7.6.687>
36. Yin M-B, Li Z-R, Tóth K, Cao S, Durrani F A, Hapke G, **Bhattacharya A**, Azrak R G, Frank C, Rustum Y M. Potentiation of irinotecan sensitivity by Se-methylselenocysteine in an *in vivo* tumor model is associated with downregulation of cyclooxygenase-2, inducible nitric oxide synthase and hypoxia-inducible factor 1 α expression, resulting in reduced angiogenesis. *Oncogene*, 25, 2509-2519, 2006.
<http://www.nature.com/onc/journal/v25/n17/pdf/1209073a.pdf>
37. **Bhattacharya A**, Tóth K, Mazurchuk R, Sperryak J A, Slocum H K, Pendyala L, Azrak R, Cao S, Durrani F A, Rustum Y M,: Lack of microvessels in well differentiated regions of head and neck squamous cell carcinoma (HNSCC) A253 is associated with fMR imaging detectable hypoxia, limited drug delivery and resistance to irinotecan therapy. *Clinical Cancer Res*, 10, 8005 – 8017, 2004.
<http://clincancerres.aacrjournals.org/content/10/23/8005.full.pdf+html>
38. **Bhattacharya A**, Tóth K, Azrak R, Pendyala L, Sperryak J, Cao S, Durrani F A, Mazurchuk R, Slocum H K, Rustum Y M. Resistance to irinotecan is associated with lack of microvessels, hypoxia and limited drug delivery in the well differentiated parts of human head and neck squamous cell carcinoma (HNSCC) A253. *Proc. Am. Assoc. Cancer Res*. 45, 2004.
39. Cao S, Durrani F A, Moser M T, **Bhattacharya A**, Foster B A, Rustum Y M. Se-(Methyl)Selenocysteine (MSC) potentiates the antitumor activity of Taxotere against Prostate Cancer in Tramp model. *Proc. Am. Assoc. Cancer Res*, 45, 2004.
40. **Bhattacharya A**, Azrak R, Toth K, Cao S, Durrani F, Pendyala L, Mazurchuk R, Rustum Y M - Tumor hypoxia and differentiation status are markers associated with response to irinotecan (FU therapy) of xenografts bearing squamous cell carcinoma of the head and neck (SCCHN) tumors. *Proc. Am. Assoc. Cancer Res*. 44, 2003.

MENTORING

M.S – Thesis Committee and advisor for Steven Oven (*'Tumor vascular maturation by Se-(Methyl)-Selenocysteine in human head and neck squamous cell carcinoma (HNSCC) xenografts'*, March 2007).

Summer Students – Mentor for Summer Students Science Program for high school and college students at Roswell Park Cancer Institute, Buffalo, NY.

Homeopathy – Mentor for students and practitioners at various levels of education and training.

SYMPOSIA – ORGANIZER/INVITED SPEAKER/REVIEWER

- 1/4-
1/5/2005 Buffalo, NY
Invited speaker at Selenium Workshop
Title: *"Angiogenic activity of selenium: Comparative studies with standard agent"*
- 2/14-
2/16/2006 Seattle, Washington
Oral presentation – Oral Scientific Session at 14th. ISMRM Scientific meeting.
Title: *"Assessment of spin echo BOLD fMR imaging as a prognostic tool for determining chemotherapeutic efficacy "*
- 12/30/2007 Toronto, ON
Invited Speaker – Homeopathic Medical Council of Canada
Title: *"Cancer and Autoimmune Diseases – A Homeopathic Perspective "*
- 11/09/2008 Toronto, ON
Invited Keynote Speaker – The National United Professional Association of Trained Homeopaths (NUPATH) Annual Conference
Title: *"Homeopathic Detoxification – Freeing the Complex Biological System for Creative Fulfillment."*
- 11/30/2009 Buffalo, NY
Invited Speaker – Gilda's Club WNY. Ask the expert lecture
Title: *"Cancer and Homeopathy "*
- 10/29/2011 Daemen College, Amherst, NY
Organizer & Part Speaker – co-sponsored by Daemen College and Himalayan Institute, Buffalo.
Title: *"Is Homeopathy Effective Against Cancer? The Use of Banerji Protocol in Treatment of Cancer"* Drs Prasanta & Pratip Banerji and Arup Bhattacharya.
- 10/12-
10/14/2012 Toronto, Canada.
Invited Speaker - Canadian Homeopathic Conference.
Title: *"The Magic of Nosodes – Microdoses Mega Results"*

10/25/2012 Buffalo, NY
Invited Speaker - Fisher-Price
Title: "Introduction to Homeopathy"

1. ISMRM – ESMRM 2007 joint annual meeting scientific abstract reviewer;
2. Reviewer for scientific journal such as Molecular Cancer Therapeutics, Clinical Cancer Research, Cancer Research, Bioorganic & Medicinal Chemistry Letters, Expert Opinion on Emerging Drugs, and, Cancer Epidemiology, Biomarkers & Prevention.
3. Canadian Institute of Health Research – External reviewer since 2008.
4. Featured in 'Scientist in spotlight', Fall 2009, American Institute for Cancer Research, AICR ScienceNow, Volume 30, Fall 2009.
http://www.aicr.org/site/News2?page=NewsArticle&id=17287&news_iv_ctrl=0&abr=res
5. Invited by New York Academy of Sciences to participate in roundtable discussion on critical R&D global challenges for their PepsiCo Company Day on December 10, 2009.