

## Curricular Vitae of Dr. U.S.RAY

**Name:** Dr. Uday Sankar Ray

Email: [udaysankray@yahoo.com](mailto:udaysankray@yahoo.com)

MOB: 9635213921

**Address:** Block-B, Flat-B, 2<sup>nd</sup> floor, Choudhury towers, 18/3, Kumud Ghosal Road,

PO-Ariadaha, Ariadaha, Kolkata 700057

**Date of birth:** 29<sup>th</sup> September of 1949

### Academic Qualifications:

**BSc (Hons in Physiology) 1970**, University of Calcutta,

**Msc (Physiology)** with specialization in work physiology & Ergonomics,  
University of Calcutta,

**Ph D (Physiology) 1982**, University of Calcutta

**DSc. (Yoga, Honoris causa) 2013** Swami Vivekananda Yoga Anusandhan  
Samsthan - A deemed University, Bangalore. (Based on the contributions on  
basic Physiological research on yoga & its applications )

### Training in Yoga and relevant practices :

- Initial training (1961) and practiced *yogasanas* at the age of 11 under a trainer who was disciple of Late Nilmoni Das and Late Shri Bishnu Charan Ghosh, Calcutta (there was no formal yoga course in those days)
- One week yoga course 'Art of Living' under Sri Sri Ravi Shankar at DIPAS Delhi (90's)
- One Week course 'Brahma Kumari Raja Yoga Meditation, Delhi
- Attended Yoga classes at 'Prashanti during Int Conferences at S-VYASA, Prashanti, Bangalore (late 80's)
- Attended Meditation classes along with religious discourses at Ramakrishna mission centre, Delhi (1994 onwards)
- Attended Yoga classes at Morarji Desai National Institute of Yoga ,Delhi, particularly during conferences.(Year 2000 onwards)
- Attained the First Degree in the REIKI method of Natural healing, Kolkata (under traditional Reiki master Dr. Jainaseni Mitra , Kolkata (2011)

### Positions held before retirement from active Government Service on September 30,2009

- Scientist 'F' & Additional Director, Head of the Department, Environmental Physiology Division Defense Institute of Physiology and allied sciences, DRDO, Ministry of Defence, Delhi,
- Program Director,  
Centre for Advanced Research and Training in Yoga,  
A Joint venture of Morarji Desai National Institute of Yoga, Ministry of Health & Family Welfare & DIPAS, DRDO, Delhi
- Scientist 'E' (2004- 2009) Divisional Head, Environmental Physiology, DIPAS, DRDO.
- Scientist 'D' (1999-2004), Scientist 'C' (1994 -1999), Scientist 'B' (1990- 1994),  
Group head, Exercise / Work Physiology and Yoga, DIPAS, DRDO
- Junior Scientific officer, 1984-1989 DIPAS,DRDO ; Senior Scientific assistant 1974- 1978
- Physiology research cell , R& D Orgn, Min of Defense Darjeeling.; Senior Scientific assistant 1979-1983, DIPAS,DRDO.
- Research associate 1973, University of Calcutta

### Recent activities

- **Professor**, Department of Sports Science and Yoga, Ramakrishna Mission Vivekananda Educational & Research Institute (Deemed to be University), Belur math, Howrah, West Bengal. ( 2015-2017)
- **Guest Faculty at University;** At present working as **Guest Faculty** in the West Bengal State University, Barasat and taking Physiology classes for Post Graduate Students (from 2010 onwards)
- **Member, Board of Studies :** University of Burdwan , West Bengal (2011-2014)
- **Member, Board of Studies:** Dept of Yoga Arts and Science, Viswabharati University, Shantiniketan, Birbhum, West Bengal
- **Expert member Project evaluation committee:** Central Council for Research in Yoga and Naturopathy, New Delhi, (2012,2013 & 2014)
- **Guest Faculty** at Serampore college, Post graduate Physiology Dept, University of Calcutta (2011)

### **External Guest Faculty: PhD Course:**

Working as advisor of Yoga related studies /Ph.D students at West Bengal State University, Barasat, West Bengal. One of the study is in advanced stage. (from 2014 onwards)

### **Presentation in Mass Media:**

#### **1<sup>st</sup> International yoga day-**

Participated in an interview in All India radio (Akashvani) on the scientific aspects of yoga and its role in the popularization of yoga among masses.

Gave a write-up for '*Sambad Parkrama*' a Bengali language feature about significance of Int Yoga day and how yoga is getting from ancient India to recent times

#### **2<sup>nd</sup> International Yoga day:**

Travelled extensively due to activities for yoga training supervision for one month in both rural and Urban areas of West Bengal

#### **Organisation of Yoga Fest, West Bengal 2017**

Was actively involved in the event particularly in various aspects of Commemorative volume, seminars and panel discussions

### **Participation in collaborative program with other countries**

1. Participated in the project entitled "Human physiological responses during acute induction from the Tropical to the Arctic environment" – A Indo- Russian (Erstwhile Soviet Union) Soviet 'HIMDOM' research program, 1992. I was one of the active participants and went to the arctic –North Pole during Arctic winter.
2. Workshop on 'Exercise Testing and Interpretation' Harbor-UCLA Medical Center Los Angeles, U.S.A, March 1998.

### **Scientific expeditions to high altitude**

Participated in several scientific trials both in the Eastern and Western Himalayas And led the team in several trials .

**Chaired the session / panelist** - National & International Conferences (Mentioned selected ones)

Chair - A session in National seminar on emerging trends in yoga & naturopathy research , organized by CCRYN, Ministry of AYUSH, Delhi, 2016.

Chair- Yoga research and its advancement, International Conference on yoga research and cultural synthesis, Kaivalyadhama, Lonavala, Maharashtra 2009.

Panelist – On ethical aspects of yoga research, Int. Conf. of Yoga research & cultural synthesis, Kaivalyadham, Lonavala, 2009.

Chair –session Ergonomic interventions , Int Conf on Humanizing Work and work Environment, IIT, Mumbai 2002,

Chair session – Sports & Exercise Physiology, Annual conference of Physiological Society of India, 2003;

Chair – Sports Sciences, Conference on Sports Science, Sports Authority of India , JN Stadium,2004 Delhi .

Chair – Workshop on Sports Sciences, 2003, Armed Forces Sports Medicine Centre, Pune.

Chair – session on yoga research and applications. National Yoga Week, Morarji Desai National Institute of Yoga, Delhi 2004.

Chair - International Conference on Yoga research, 2005, Kaivalyadhama, Lonavala, Maharashtra.  
Panelist – Session on Yoga for the common man , Kaivalyadhama ,Lonavala,

Panelist –session on progress in yoga research in national and international perspective 2006 , Moraji Desai National Institute of Yoga 2007.

Panelist- Yoga & Health in Int. Conf. on Yoga, Swami Vivekananda Yoga Anusandhan Samsthan University, Bangalore, 2001

**Member Steering Committee & Project evaluation committee -**

Central Council for research in Yoga and Naturopathy & Morarji Desai National Institute of Yoga, Dept of AYUSH, Min of Health & Family Welfare.

**Life Member:**

- Physiological Society of India,
- Association of Physiologists & Pharmacologists of India
- Indian Science Congress Association.
- Indian yoga Association

**Examiner PhD Thesis**

Served as adjudicator of Ph. D thesis – Delhi University

**Reviewer of National & International Journals**

- Indian Journal of Medical research (Indian Council of Medical Research, Delhi)
- Journal of Alternative and complementary medicine (Australia)
- International Journal of Yoga (SVYASA-Bangalore)
- Yoga Mimansa (Kaivalyadham, Lonavala)
- Medicine & Science in Sports & Exercise (American College of Sports Medicine's flagship journal )

**Work experience in Foreign advanced laboratory**

Participated in a training programme on "Exercise testing and Interpretation" at Harbor-UCLA Medical Centre, USA

**Supervisor for PhD work (Physiology/life sciences)**

Bharthiar University, Coimbatore.

4 scholars have got their PhD degree under my Guidance

Title of the theses:

- Cardio respiratory changes during the practice of Surya namaskar'
- Energy cost and cardio respiratory changes during the actual practice of different 'Pranayamas'
- Antioxidant and redox status at high altitude in low landers and native Highlanders: Effect of environmental temperature and exercise.
- An age and ethnicity based study on stress related hormones in men at high Altitude: Cortisol, testosterone, prolactin, arginine vasopressin and proAtrial natriuretic peptide

**External Faculty MSc –PhD Course,**

Served as external faculty, Ambedkar Center for Biomedical Research, University of Delhi 2001, 2007, 2008 (as coordinator –faculty from DIPAS, DIPAs, DRDO, Delhi

### **Project Investigator/ Co investigator**

- **Principal Investigator in 5 Projects / tasks** related to physical performance, army training, **yoga**, high altitude acclimatization;
- **Co-investigator in 16 projects** related to neurophysiology including sleep, **Yoga**, hemorrhagic shock, occupational health, high altitude, heat and cold adaptation.

### **Awards and Honors:**

- Rear Admiral MS Malhotra prize for best paper (Co-awardees) 1989, 1993, 1996, 1999, 2007
- Laboratory scientist of the Year 2007 , DIPAS, DRDO
- SR Moitra oration, Physiological Society of India ,2004
- National Science day oration 2005, DIPAS, DRDO
- Best paper presentation award 2006, Kaivalyadham, Lonavala
- Best poster award (shared) Physiology section , Indian Science Congress 2005
- J Sen Gupta award 2006 , for best contribution and cooperation to the pursuit of scientific activity of DIPAS
- National technology day oration 2009, DRDO.

### **Invited Lectures Conferences /work shop/seminar (Important ones )-**

- a) Exercise at High altitude, perceived exertion –possibilities of its management  
Symposia on the 'Exercise & breathlessness' (**50 Years of J receptors**)

**An International Symposia to felicitate Prof AS Paintal -The discoverer of 'J' receptor  
Indian National Science Academy (Delhi), 2004**

- b) National seminar on emerging trends in yoga & naturopathy research, **Organised by  
CCRYN, Min of AYUSH, Delhi 2016.**
- c) Yoga: Wellness & Holistic Health. A special lecture at **Indian Science Congress  
Association on the eve of 2<sup>nd</sup> International Yoga day -2016**

- d) **Yoga and consciousness – a special lecture at the Annual meet of Indian Association of Neuro Scientists – West Bengal Chapter at Science College , Kolkata 2016**
- e) **International Conference on advances on yoga research, Kaivalyadham Lonavala, 2006 ,2010, 2013, 2016**
- f) **National Conferences Yoga research at Morarji Desai National Institute of Yoga, Delhi during ‘Yoga Utsav ‘ from 2007 to 2015**
- g) **Yoga and cardiovascular regulation. Special lecture- Vedic Society of India- annual conference, Delhi 2004**
- h) **Physical training in the Army: past, present and future. Indian Science Congress, Physiology Section, 2005**
- i) **Performance Improvement by yoga. Session in Translational Research , Section –Medical Science including Physiology. 100<sup>th</sup> Indian Science Congress 2013**
- j) **Conference of the Federation of Indian Physiological Societies, Delhi,2007**  
Aging and physical performance reduction at high altitude: it's possible management by physical training.
- j) **Symposia on Human growth and physical anthropology.**  
Anthropology Department, Delhi University, Delhi 2005
- k) **Seminar on ‘ Latest trends on physical and mental health in the Army’**  
Army School of Physical training, Pune 2004
- k) **Physical performance at high altitude: its management by Yoga**  
International Conference on Life & Living at high Altitude, Delhi 2008
- l) **National Congress on ‘Health ,fitness and sports sciences’**  
Govt of Maharastra & Symbiosis health education society. Pune 2004
- m) **Physical training at high altitude and yoga**  
**International Work shop on high altitude medicine & Biology, DIPAS, Delhi 2005**
- n) **Symposia on Role of Yoga in Enhancement of human performance and Contemporary medicine, 51<sup>st</sup> Annual conference of Association of Physiologists and Pharmacologists of India (APPICON 2005), JIPMER, Pondicherry. 2005.**
- o) **Annual Conference of Physiological Society of India, Kolkata, 2006.**

## **Conducted classes in Continuing education program for DRDO Scientists & different courses Outside DRDO.**

In the institute & army establishments:- Took classes on work stress evaluation and its applications management in different stressful environments

Occasionally took classes :

- Physiological basis of Yogic practices & its applications in different situations
- For the courses on yoga therapy for Allopaths and AYUSH specialists at Morarji Desai National Institute of Yoga, Delhi. At regular intervals.

## **Research Interest:**

1. Physical performance in stressful conditions like high altitude, cold and hot environments, ergonomic aspects in environmental science.
2. Facilitation of high altitude acclimatization by both non pharmacological and pharmacological means.
3. **Yogic practices and its applications in specific stressful conditions.**

## **Publications**

(In peer reviewed journals, articles in books etc, last 12 years)

**Publications which are related to yoga have been given in 'bold' text**

1. **Ray U.S, Pathak A, Tomar OS. 2010. Hatha yoga practices: Energy expenditure, respiratory changes and intensity of exercise. *Evidenced Based Alternative and Complimentary Medicine*. doi:10.1093/ecam/neq046**
2. Ray U.S. Propagation of Yoga in modern times: a scientific perspective. Yoga Utsav, West Bengal : A commemorative volume, Ramakrishna Mission Vivekananda University, Belur math ,West Bengal, 2017.
3. Sinha B, **Ray US**, Dasgupta Sinha T. Physiological study of Surya Namaskar, a yogic practice (research letter). *Altern Ther Health Med* 2011;17:62-4. 3.
4. Sinha S, Dutta A, Singh SN, **Ray US**. 2010. Protien nitration, lipid peroxidation and DNA damage at high altitude in acclimatized lowlanders and native high landers: Relation with oxygen consumption. *Respiratory Physiology and Neurobiology* 171: 115-121.



5. **Ray U S.** Role of yoga on middle aged persons to improve physical performance. National Yoga Week 2010-focal theme – Yoga for Middle Aged. Souvenir, Morarji Desai National Institute of Yoga, New Delhi. 2015. P.61-63.
6. Meenakshi S, S N Singh, YK Sharma, A K Salhan, **U S Ray.** 2010. Plasma proANP<sub>1-98</sub> response during high altitude stress: Effect of age and ethnicity. *Wilderness and environmental medicine* 21:11-16.
7. Meenakshi S, S N Singh, A K Salhan, **U S Ray.** 2010. Evaluation of plasma hormone concentrations using Enzyme-immunoassay / Enzyme-linked immunosorbent assay in healthy Indian men: effect of ethnicity. Indian Journal of Clinical Biochemistry. Manuscript .
8. **Ray U S.** Performance Improvement by Yoga: Role of mind and conciousness. National Yoga Week 2014 - focal theme – Yoga for Youth. Souvenir, Morarji Desai National Institute of Yoga, New Delhi. 2014. P.53-55.
9. **Ray U S.** Potential role of yoga among adolescents for all round development. National Yoga Week 2013-focal theme – Yoga for Middle Aged. Souvenir, Morarji Desai National Institute of Yoga, New Delhi. 2013. P.43-47.
10. **Ray U S.** Personality development by yoga: its physical aspects. National Yoga Week 2012-focal theme – Yoga for Holistic Personality Development. Souvenir, Morarji Desai National Institute of Yoga, New Delhi. 2012. P.47-50.
11. **Ray U S.** Development of Yoga packages for common man: A scientific perspective. National Yoga Week 2010-focal theme –For Life style disorders. Souvenir, Morarji Desai National Institute of Yoga, New Delhi. 2010. P.126-133.
12. Sinha S, **Ray US,** Tomar OS, Singh SN. 2009. Different adaptation patterns of antioxidant system in natives and sojourners at high altitude. *Respiratory Physiology and Neurobiology* 167: 255-260.
13. Sinha S, **Ray US,** Saha M, Singh SN, Tomar OS. 2009. Antioxidant and redox status after maximal aerobic exercise at high altitude in acclimatized lowlanders and native highlanders. *European Journal of Applied Physiology* 106: 807-814.
14. Sinha S, Singh SN, Saha M, Kain TC, Tyagi AK, **Ray US.** 2009. Antioxidant and oxidative stress responses of sojourners at high altitude in different climatic temperatures. *International Journal of Biometeorology* (DOI: 10.1007/s00484-009-0257-9)

15. Sinha S, Singh SN, **Ray US**. 2009. Total antioxidant status at high altitude in lowlanders and native highlanders: Role of uric acid. *High Altitude Medicine and Biology* 10:269-274.
16. Meenakshi S, S N Singh, **U S Ray**, A K Salhan. 2009. Impact of prolonged high altitude exposure on plasma prolactin in men: Effect of age and ethnicity. *High Altitude Medicine and Biology* 10:343-348.
17. **Ray US**. Physical Performance in Military Environment: Indian Scenario (A review article). In : In service of the Soldier – Life Sciences Perspective. ed. M K Mandal. Macmillan Advanced Research series. Delhi, Bangalore, Chennai 2008, 49-71.
18. **Ray U S**, Tomar OS, S S Purkayastha. 2008. Physical performance in different intensities of exercise and lactate threshold after yogic practices among young sedentary students. July-Sept., Oct.-Dec. 08 Yoga Vigyan , MDNIY, AYUSH| Min of health & Family welfare.Vol. II, Issue: 1 & 2.
19. Sinha S, Singh SN, Monga YP, **Ray US**. 2007. Improvement of glutathione and total antioxidant status with yoga. *The Journal of Alternative and Complementary Medicine* 13: 1085-1090
20. **Ray US**. Importance of yoga in the armed forces. National Yoga Week 2007. Souvenir, Morarji desai National Institute of Yoga, New Delhi. 2007. P.70-73.
21. **Ray US**. 2005. Role of yoga in the enhancement of physical performance with reference to aerobic capacity and possible mechanisms In: Dr. Madanmohan editor. Proceedings of the Symposia on Role of Yoga in Enhancement of human performance and contemporary medicine, 51st Annual conference of Association of Physiologists and Pharmacologists of India (APPICON 2005),JIPMER, Pondicherry , p 27-28.
22. B Sinha, **U S Ray**, A Pathak, W Selvamurthy. 2004. Cardio respiratory changes and energy cost during the practice of Suryanamaskar. *Indian J Physiol and Pharmacol*, 48: 37-53. .
23. **Ray.US**. Yoga and its relevance to the armed forces. DRDO Science Spectrum 2006, a compendium of National Science day orations, Ministry of Defense, DRDO, New Delhi, p 141 – 144.
24. **U S Ray**, B Sinha, O S Tomer, A Pathak, T DasGupta, W Selvamurthy. 2001. Aerobic capacity and perceived exertion after practice of Hatha yogic exercises. *Indian J Med Res*. 114: 215-221.
25. **U S Ray**, S Mukhopadhyaya, S S Purakayastha, V Asnani, O S Tomer, R Parshad, L Thakur, and W Selvamurthy. 2001. Effect of yogic exercises on physical and mental health of fellowship course trainees. *Indian J Physiol and Pharmacol*, 45 (1): 37-53.

26. **U S Ray**, S Mukhopadhyaya, O S Tomer, R Parshad, L Thakur, P K Banerjee and W Selvamurthy. 2001. A study on physiological stress among army marksmen to develop better training strategy. Proc. of international Congress of Humanizing Work and Work Environment. IIT, Bombay, 2001.
27. W Selvamurthy, S S Purkayastha, D Mojumdar, **U S Ray** and S Mukhopadhyaya. 2002. Physiological responses of tropical men during sojourn in polar environment. In: Advances in Marine and Antarctic Sciences, Chapter 13, Dept of Ocean development, Govt. of India.

## Reports

1. Review of acclimatization status at high altitude with special reference to duration, age and ethnicity. Roject no. SL-P1-2003/DIP-242 . Report No. DIPAS/03/2009. **Principal Investigator**
2. Evaluation of physical fitness of soldiers just after recruitment and at different stages of army training. Project RD-P1-2002/DIP238 (USR).Report no. DIPAS/9/2006, **Principal Investigator**
3. Application of Nitric oxide in treatment of high altitude pulmonary edema Project No. RD- P1-2002/DIP-235, Report no. DIPAS/03/2008. **Co-Investigator**
4. Miniaturization of Cooling Unit for Solid State Cooling garment for the Tank crew. Project No. RD/P1/DIP-232, Report No. DIPAS/10/2006. **Co-investigator**
5. **Effect of yogic exercises on the physiological and anti oxidant system in man (a Ministry of health & family welfare, CCRYN sponsored Project) Report No. DIPAS/6/2003. Principal investigator**
6. **Physiological responses during the actual practice of individual yogic exercises (Asana), Yogic breathing (Pranayama) and Meditation in yoga trainees and proficient. DRDO, Min of Defence, RD-P1-96/DIP-212 (USR) Report No. DIPAS/13/2000. Principal Investigator**

## Abstracts

1. Aging and physical performance reduction at high altitude: its possible management by physical Training. **U.S.Ray**, M.Saha, O.S.Tomer, T.C.Kain et al. Poceedings of the Conference of Federation of Indian Physiological Societies, Delhi, 2007.

2. Evaluation of Muscle strength after short and prolonged stay at high altitude M.Saha, **U.S.Ray**, O.S. Tomer et al. Proceedings of the Conference of Federation of Indian Physiological Societies, Delhi, 2007.
3. Effect of ageing on physical performance of man high altitude. **U.S. Ray**, M.Saha, O.S.Tomer,H.Kumar, D.Das, P.K. Banerjee, Proc. of Annual Conference of Physiological Society of India, Kolkata, 2006.
4. **Improvement of glutathione status by yogic training.** S. Sinha, Y.P. Monga and **U.S. Ray**. Proc. of Annual Conference of Physiological Society of India, Kolkata, 2006.
5. **Yogic training and central nervous sensory neural processing: A study on mid latency. Response of auditory evoked potential.** **U S Ray**, L Thakur and J P Anand. Proc. International Conference on advances on yoga research, Lonavala, 2006.
6. Training responses on leg and hand anaerobic power. M. Saha, **U.S Ray**, O.S.Tomer et al. Proc of the Annual Conference of association Physiologists and pharmacologists of India, Surat, 2006.
7. Effect of composite Indian herbal preparation on physical work capacity on men during operation at high altitude. **U. S. Ray**, O.S. Tomer, K.K. Srivastava. Proc. of International symposium, XXVI, IABMS Annual conference, Kolkata, 2005. P-44.
8. **Physical training, yoga and performance at high altitude.** U S Ray. Proc International work shop on Emerging trends in high altitude physiology and medicine. DIPAS, Delhi, 2005.
9. **Cardiovascular haemodynamic changes during the practice of yogic breathing maneuvers.** U S Ray, O S Tomer. Proc. of the section 'Medical sciences (including Physiology)', Indian science congress, 2005.
10. **Improvement in auditory sensory neural processing by yogic practice: yoga trainees and Proficients.** U S Ray, S Mukhopadhyaya, L Thakur. Proc. of the section 'Medical sciences (including Physiology)', Indian science congress, 2005.
11. Physical training in Armed forces: past, present and future. U S Ray. Proc. of the section 'Medical sciences, including Physiology', Indian science congress, 2005.

12. **Physical work capacity of Ladakhis: Effect of yoga during operation at high altitude**  
**U S Ray and O S Tomer. Proc. of the section 'Medical sciences, including Physiology',**  
**Indian science congress, 2004.**
13. Physiological changes during the actual practice of Yoga: Asana, pranayama and meditation. U S Ray. Proc. of Annual Conference of Physiological Society of India, Kolkata, 2004.

### **List of papers/ Publications (Before the year 2000)**

#### **Paperrs published:**

1. Optimal rate of work for mountaineers.  
P. K. Nag, R. N. Sen and **U. S. Ray**  
J. Appl. Physiol: Respirat. Environ. Exercise Physiol. 44(6): 952-955, 1978.
2. Cardio-respiratory performance of porters carrying loads on a treadmill.  
P. K. Nag, R. N. Sen and **U. S. Ray.** Ergonomics 22(8): 897-907, 1979.
3. **Improvement in muscular efficiency as related to a standard task after yogic Exercises in middle aged men.**  
**U. S. Ray,** K. S. Hegde and W. Selvamurthy  
Indian J. Med. Res. 83(3): 343-348, 1986
4. **Effect of Yogic Asanas and Physical exercise on body flexibility in middle aged men.**  
**U.S. Ray,** K. S. Hegde and W. Selvamurthy The yoga review. 3(2): 75-79, 1983.
5. Physiological and behavioral responses in rats and men during total solar eclipse, 1980. W. Selvamurthy and **U. S. Ray** Biomedicine 5(2): 25-28, 1985
6. Effect of induction to high altitude by road on autonomic nervous responses  
On residents of moderate altitude and low landers. **U. S. Ray** and C. S. Nair  
Proceedings of the 14 th Common Wealth Defense Conference (OCCE) IND- 7, Australia, 1985.
7. Effect of physical exercise and sleep deprivation on tolerance to 70° head –  
Up tilt on low landers after four week stay at 2, 200 meters altitude.  
**U. S. Ray** and C. S. Nair  
Proceedings of the 14 Th Common Wealth Defense Conference (OCCE) IND- 8,  
Australia ,1985.
8. Efferct of Moderate altitude training on physical performance.  
C. S. Nair, **U. S. Ray** and Jaishankar A. Proceedings of the 14 th Common Wealth Defence  
Conference (OCCE), IND-9, Australia 1985.

9. Finger temperature of natives of moderate altitude during cold exposure at sea level. A. Dasgupta, C. S. Nair and **U. S. Ray**  
Proceedings of the 14th Commonwealth Defence Conference (OCCE) IND-10, Australia. 1985.
10. Sleep patterns at an altitude of 3,500 meters..  
W. Selvamurthy, V.R.K.Raju, S.Ranganathan, K.S.Hegde and **U. S. Ray**  
Int. J. Biometeorol. 30(2): 123-135, 1986.
11. **Physiological responses to cold (10° C) in men after six months of practice of yogic exercises.** W. Selvamurthy, **U. S. Ray**, K. S. Hegde and R.P.Sharma.  
Int. J. Biometeorol. 32:188-193,1988.
12. Acute Toxicity of Methyl Isocyanate (MIC) administered subcutaneously in rabbits: Change in physiological, clinico- chemical and histological parameters. K. Jeevarathinam, W. Selvamurthy, **U. S. Ray**, S. Mukhopadhyay and Lalan Thakur Toxicology 51 : 223-240, 1988.
13. Role of xanthinol nicotinate in the revival of monkeys subjected to acute haemorrhagic shock. K.S. Hegde, W. Selvamurthy, **U. S. Ray** and S. K. B. Patil. Indian J.med Res. 94: 440 –446, 1991
14. Sleep pattern and circadian variations of some physiological functions of tropical men during sojourn in the Arctic winter.  
**U. S. Ray**, W. Selvamurthy, S. Mukhopadhyay, S.S. Purkayastha and G. Illavazhagan. In: V. Mohan Kumar, H. N. Mullick and U. Nayar. Eds. Sleep- Wakefulness. Wiely Eastern Limited, New Delhi, Bangalore, Calcutta,: 111-118. 1993.
15. Responses of arctic and tropical men to a standard cold test and peripheral vascular responses to local cold stress at Arctic.  
S. S. Purkayastha, G. Illavazhagan, **U. S. Ray** and W. Selvamurthy  
Aviat. Space Environ. Med. 64: 1113 – 1119, 1993.
16. Physiological responses during 10 weeks sojourn in extreme arctic cold environment.  
W. Selvamurthy, P. Bandopadhyaya, S.S. Purkayastha, G. Illavazhagan, **U. S. Ray**, S. Mukhopadhyaya  
In: Environment and Physiology. B. N. Mallick and R. Singh (Eds)  
Narora Publishing House, New Delhi. 1994.
17. Personality traits and performance of military parachutist trainees.  
V. M. Sharma, K. Sridharan, W. Selvamurthy, M. R. Panwar, A. K. Mukherjee, **U. S. Ray**, T. N. Upadhyaya, Vimla Asnani. Ergonomics July 1994.
18. **A new physiological approach to control essential hypertension**  
W. Selvamurthy, K. Sridharan, **U. S. Ray** et al  
Indian J Physiol. Pharmacol. 42(2): 205 –213. 1998
19. Auditory evoked responses in tropical men during sojourn in extreme arctic cold environment. S. Mukhopadhyaya, W. Selvamurthy, **U. S. Ray**  
Int. J. Biometeorol. 1994.

20. Acclimatization at High Altitude in gradual and acute induction  
S.S. Purkayastha, **U. S. Ray**, B. S. Arora, P. C. Chabra, L. Thakur, P. Bandopadhyay, W. Selvamurthy  
Appl. Physiol: Respirat. Environ. Exercise Physiol. 79 (2): 487 – 492. 1995.
21. Psychogenic Illness – A case study on Calcutta Telephones  
W. Selvamurthy, **U. S. Ray**, R. S. Tiwary, A. P. Singh and S. Ranganathan  
In: Ergonomics and Work Design. Emerging issues in organizational Sciences. Ed. P. K. Nag. New Age International (P) Ltd. New Delhi, Calcutta, Madras, London. P. 332 – 347, 1996.
22. Body composition in air and road inductees at high altitude  
**U. S. Ray** and W. Selvamurthy  
Int. J. Biometeorology 41: 120 – 124, 1998.

### Published reports

1. Central nervous mechanism in the genesis of high altitude pulmonary oedema.  
W. Selvamurthy, **U. S. Ray**, K. S. Hegde and S. Joseph  
Ministry of defence Report No. 9/82. AFMRC Project No. 1047/78
2. Evaluation of sleep pattern and associated physiological changes during sleep at high altitude.  
W. Selvamurthy, K. Prabha, S. Ranganathan, V. R. K. Raju, **U. S. Ray** and M. R. Panwar.  
AFMRC Project No. 1138/79, DIPAS/8/82
- 3 **Effect of yogic exercises on middle aged persons.**  
W. Selvamurthy, V. R. K. Raju, N.T. Joseph, V. M. Sharma **U. S. Ray**, K. S. Hegde  
Ministry of Defence Report No. DIPAS/3/84
4. Effect of hypoxia on the electrical activity of CNS during awake-sleep cycle in rats.  
W. Selvamurthy, **U. S. Ray**, S. Joseph, S. K. B. Patil, S. Mukhopadhyaya and K. S. Hegde. Ministry of Defence Report No. DIPAS/2/84
5. Effect of sympathetic blockers and cholinergic drugs on hypoxic tolerance and its possible role in the prevention of HAPO. W. Selvamurthy, S. Mukhopadhyaya, K. S. Hegde, **U. S. Ray**, L. Thakur, S. S. Purkayastha and D. V. K. Rao . RD - P1- 83/DIP-134
6. Pathophysiology of haemorrhagic shock.  
K.C. Sinha, W. Selvamurthy, B. K. Puri, S. Joseph, H. Faruqi, **U. S. ray** and K. S. Hegde  
Ministry of Defence Report No. DIPAS / 4 / 84
7. Role of xanthinol nicotinate in the revival of primates subjected to acute haemorrhagic shock W. Selvamurthy, K. C. Sinha, S. Joseph, H. Faruqi, **U. S. Ray** and K. S. Hegde. Ministry of Defence Report No. DIPAS / 2 / 84
8. **Role of baroreceptor mechanism in essential hypertension.**  
K. C. Sinha, W. Selvamurthy, K. Sridharan, R. S. Tiwary, **U. S. Ray**, K. S. Hegde

and U.Radhakrishnan.

Ministry of Defence Report No. DIPAS / 3 / 84

9. Biochemical and Physiological effects of methyl iso cyanate administered subcutaneously in rabbits. K. Jeevarathinam, W. Selvamurthy, K. S. Hegde, **U. S. Ray**, S. Mukhopadhyaya, S.S. Purakayastha and Lalan Thakur
10. Physiological and environmental investigations conducted at Telephone Bhavan, Calcutta. W. Selvamurthy, R. S. Tiwary, a. P. Singh, S. ranganathan and **U. S. Ray** A preliminary report, DIPAS,DRDO. 1987.
11. Analysis of Neurophysiological mechanism in determining the mental performance under various work environments. As co Investigator. Ministry of Defence Report No. DIPAS / 5 / 84
12. Circadian variations in some physiological functions of men from tropical and temperate zones and the natives in arctic winter. **U. S. Ray**, W. Selvamurthy, S.S. Purkayastha, G. Illavazhagan and S. Mukhopadhyaya In: Human physiological responses during acute induction from tropical to 11 Arctic environments. Report on Indo Soviet Project 'HIMDOM' 1992, Report No. DIPAS/7/92, p 60-87.
13. Physiological evaluation of cold protective clothing ensemble developed by DMSRDE(Kanpur) in the arctic environment. **U. S. Ray**, W. Selvamurthy, S. S. Purkayastha, G. Illavazhagan, P. Bandopadhyay and S.Mukhopadhyay. In: Human physiological responses during acute induction from tropical to arctic environment. Report on Indo Soviet Project 'HIMDOM' 1992, Report No. DIPAS/7/92, p 172-199.
14. Anthropometric characteristics and work capacity of tropical men during a brief sojourn in the Arctic winter. **U. S. Ray**, S. S. Purkayastha, G. Illavazhagan and W. Selvamurthy. In: Human physiological responses during acute induction from tropical to arctic environment. Report on Indo Soviet Project 'HIMDOM' 1992, Report No. DIPAS/7/92, p 461-491.
15. Auditory evoked potentials in tropical men during sojourn over the Arctic region. S. Mukhopadhyay, W. Selvamurthy and **U. S. Ray** In: Human physiological responses during acute induction from tropical to arctic environment. Report on Indo Soviet Project 'HIMDOM' 1992, Report No. DIPAS/7/92, p 157-171.
16. Responses of Arctic and tropical men to a standard cold test and peripheral responses to local cold stress. S. S. Purkayastha, G. Illavazhagan, **U. S. Ray** and W. selvamurthy In: Human physiological responses during acute induction from tropical to arctic environment. Report on Indo Soviet Project 'HIMDOM' 1992, Report No. DIPAS/7/92, p 106-130.



17. **Effect of yogic exercises on acclimatisation to high altitude illness.**  
**W. Selvamurthy, S. S. Purkayastha, D. Majumdar, S. Mukhopadhyay, U. S. Ray, L. Thakur, J. P. Anand, N. K. Satija, V. M. Sharma, M. R. Panwar**  
 Report No. DIPAS /7/90
18. Cold pressor responses in man inducted to high altitude by road and air.  
**U. S. Ray, L. Thakur, P. C. Chabra and W. Selvamurthy**  
 In: Effective and economical acclimatization procedure to high altitude with a view to prevent altitude illness. W. Selvamurthy, P. Bandopadhyay, S. S. Purkayastha, U. S. Ray et al  
 Report No. DIPAS/3/94 P.84-93.
19. Body composition changes in the air inductees and road inductees at high altitude during initial days of acclimatization.  
**U. S. Ray, W. Selvamurthy, Harish Kumar, J. P. Anand.**  
 In: Effective and economical acclimatization procedure to high altitude with a view to prevent altitude illness. W. Selvamurthy, P. Bandopadhyay, S. S. Purkayastha, U. S. Ray et al Report No. DIPAS/3/94 P.94-107.
20. Cardio-respiratory responses to exercises in men inducted to high altitude by road and air **U. S. Ray, S. S. Purkayastha, B. S. Arora and W. Selvamurthy**  
 In: Effective and economical acclimatization procedure to high altitude with a view to prevent altitude illness.  
 W. Selvamurthy, P. Bandopadhyay, S. S. Purkayastha, **U. S. Ray** et al  
 Report No. DIPAS/3/94 P.108- 135.
- 21 Basal cardiovascular responses and capillary blood gas picture for evaluating acclimatisation Procedure to high altitude in road inductees and air inductees.  
 S. S. Purkayastha, W. Selvamurthy, **U. S. Ray, B. S. Arora, P. C. Chabra, L. Thakur and P. Bandopadhyaya.**  
 In: Effective and economical acclimatization procedure to high altitude with a view to prevent altitude illness. W. Selvamurthy, P. Bandopadhyay, S. S. Purkayastha, **U. S. Ray** et al  
 Report No. DIPAS/3/94 P.14- 47.
- 22 **Effect of yogic exercises on electronic fellowship course trainees in improving health and efficiency. Principal Investigator**  
**Report No. DIPAS / 1 / 95**
23. Studies on Combat Stress : Physiological, Biochemical and Psychological correlates. (Anti- insurgency operation)  
**As co-investigator 11/ 96**
24. **Effect of yoga on stress management (A collaborative project with DLJ Jodhpur)**  
**Report No. DLJ/TC/CAM/99/15. Co-Investigator**

**Publications (Abstracts) in the Proceedings of National / International conferences :**

1. Improvement in hypothalamic thermoregulatory efficiency due to yogic training. W. Selvamurthy, **U. S. Ray**, R. K. Sharma, N. Krishnamurthy  
Proc. 16<sup>th</sup> Annual Conference of Indian science Congress, Calcutta. Section Physiology, February 1980.
2. Effect of solar eclipse on physiological and behavioural profile in man and animals.  
W. Selvamurthy, H. S. Nayar, K. Prabha and **U. S. Ray**  
Bulletin American Meteorological society 62 (1): 8 , 1981
3. EEG and cardiovascular responses to orthostasis at high altitude.  
**U. S. Ray** and C. S. Nair  
Proc. Association of Physiologists and pharmacologists of india, XXVIII Annual Conference. 26 (5):64.
4. Effect of sleep deprivation at high altitude  
K. S. Hegde, W. Selvamurthy, V.R. K. Raju and **U. S. Ray**  
Proc Association of Physiologists and Pharmacologists of india. XXXVIII Conference. 26(5): 61. 1982.
5. Effect of hypoxia on sleep – awake cycle in rats.  
**U. S. Ray**, W. Selvamurthy, S. K. B. Patil, S. Mukhopadhyaya  
Proc. Indian Association of Biomedical Scientists. %th Annual Conference, Madras . B-1, 1984.
6. Effect of water restriction on physical performance at an altitude of 3, 800 meter.  
C. S. Nair, **U. S. Ray** and A. Dasgupta. Proc . National Symposium on Physiology of Human performance, Delhi24-26 th december, 1987.
7. Circadian rhythm of cardiovascular and body temperature functions of men in the arctic winter.  
**U. S. Ray**, W. Selvamurthy, S. Mukhopadhyaya, S. S. Pukayastha and G. Illavazhagan.  
Ind. J. Physiol. Pharmacol. 35 (5) supplement, 1991.
8. Sleep pattern and circadian variations of some physiological functions of tropical men during sojourn in the arctic winter.  
**U. S. Ray**, W. Selvamurthy, S. Mukhopadhyaya, S.S. Purkayastha, G. Illavazhagan.  
Proc of International conference of sleep wakefulness, P-23 . september 1992.
9. Physical work capacity of men from tropical and temperate climates during a brief sojourn in the arctic winter. **U. S. Ray**, S. S. Purakayastha, W. Selvamurthy, G. Illavazhagan, S. Mukhopadhyaya  
Proc. Of the 81<sup>st</sup> session of Indian Science Congress, Physiology Section, Jaipur, 1994.
10. **Effect of yogic exercises on physical and mental health of young fellowship course trainees. U..S.Ray, S.S.Purkayastha, S.Mukhopadhyaya, O.S.Tomer, Vimla Asnani, Rajendra Parshad.**  
**Proc. 3<sup>rd</sup> International Conference of Yoga Research and Applications. Bangalore. P-191. 1995.**

- 11. Effect of yogic exercises on physical efficiency of young fellowship course trainees.**  
**U . S. Ray**, S.S. Purakayasthja, O.S. Tomer, Rajendra Parshad  
 Proc. 1<sup>st</sup> Conference of Federation of Indian Physiological Societies, Delhi, P-126. 1995.
- 12. The effect of composite Indian herbal preparation and yoga on physical work capacity during operation in high altitude.**  
**U. S. Ray**, O. S. Tomer, R Parshad, K. K. Srivastava.  
 Proc. 18<sup>th</sup> Annual conference of IABMS, Delhi, 22-24 March, S-1(4). 1997.
13. Physical work capacity and anaerobic threshold of Ladakhis: Effect of CIHP during operation at high altitude. **U.S. Ray**, O. S. Tomer, Rajendra Parshad, K.K. Srivastava  
 Proc. Indian Science Congress , physiology Section , Delhi, 1997
- 14. Effect of yogic practices on the physical work capacity of men at high altitudes in operational condition.**  
**U. S. Ray**, O. S. Tomer, Rajendra Parshad, K. K. Srivastava  
 Proc. International Conference on Yoga in Daily llife P-49. 1996.
15. Effect of physical and mental stress on exercise performance.  
**U. S. Ray**, O. S. Tomer, Rajendra Parshad, K. K. Srivastava  
 Proc of 2<sup>nd</sup> International conference on Ergonomics, Occupational Health and Safety and environment. S-2 (8). 1996
16. Effect of physical and mental stress on exercise performance.  
**U. S. Ray**, O. S. Tomer, Rajendra Parshad, K. K. Srivastava  
 Proc of 2<sup>nd</sup> International conference on Ergonomics, Occupational Health and Safety and environment. S-2 (8). 1996
- 17. Effect of yogic exercises on physical efficiency of young fellowship course trainees.**  
**U . S. Ray**, S.S. Purakayasthja, O.S. Tomer, Rajendra Parshad  
 Proc. 1<sup>st</sup> Conference of Federation of Indian Physiological Societies, Delhi, P-126. 1995.
- 18. Effect of yogic exercises on physical and mental health of young fellowship course trainees.**  
**U..S.Ray**, S.S.Purkayastha, S.Mukhopadhyaya, O.S.Tomer, Vimla Asnani, Rajendra Parshad.  
 Proc. 3<sup>rd</sup> International Conference of Yoga Research and Applications. Bangalore. P-191. 1995.
19. Physical work capacity of men from tropical and temperate climates during a brief sojourn in the arctic winter.  
**U. S. Ray**, S. S. Purakayastha, W. Selvamurthy, G. Illavazhagan, S. Mukhopadhyaya  
 Proc. Of the 81<sup>st</sup> session of Indian Science Congress, Physiology Section , Jaipur, 1994.
20. A study of Army Marksmen: army marksmen unit,  
 Mhow.(Cardiovascular and neurological) Report No. DIPAS/3/1999.  
 ( as Principal Investigator)

