BIODATA

1. Name: **Gajendra P. S. Raghava**
2. Date of Birth: **25th May 1963**
3. Current Position and Address:

Chief Scientist, Coordinator Bioinformatics Centre,

CSIR-Institute of Microbial Technology,

Sector 39A, Chandigarh, PIN 160036

WebSite: **http://www.imtech.res.in/raghava/** Email: **raghava@imtech.res.in**

Phone: **+91-172-2690557** Mobile: **+91-9915656900**

4. Education Qualification:

S.N.	Degree	Year	University/Institute	Subjects
1.	**B. Sc.**	**1982**	**Meerut Univ**	**Mathematics, Physics, Chemistry**
2	**M. Sc.**	**1984**	**Meerut Univ**	**Physics (Sp. Electronics)**
3.	**M. Tech.**	**1986**	**I. I. T. Delhi**	**Energy Studies (Sp. Computers)**
4.	**Ph. D.**	**1996**	**Panjab Univ/ CSIR-IMTECH**	**Science***

* **Ph.D** **supervisor:** Dr. Girish Sahni (DG, CSIR), **Thesis Title:** Computer Aided Prediction of Protein Conformation from Amino Acid Sequences of Biotechnological Relevance.

5. Academic/Research Experience/Employement

S.N.	Jobs	From	To	Organization	Position Held
1.	**Employement**	**1986**	**1991**	**CSIR-IMTECH**	**Jr. Scientist**
2.		**1991**	**1996**	**CSIR-IMTECH**	**Scientist**
3.		**1996**	**2002**	**CSIR-IMTECH**	**Sr. Scientist**
4.		**2002**	**2008**	**CSIR-IMTECH**	**Principal Scientist**
5.		**2008**	**2013**	**CSIR-IMTECH**	**Senior Principal Scientist**
6.		**2013**	**Cont.**	**CSIR-IMTECH**	**Chief Scientist**
1.	**Foreign Assignments**	**1996**	**1998**	**Oxford Univ, UK**	**Postdoctoral fellow**
2.		**2002 (Sept)**	**2003 (March)**	**UAMS, Little Rock, USA**	**Bioinformatics Expert**
3.		**2004 (March)**	**2004 (Sept)**	**POSTECH, South Korea**	**Visiting Professor**
4.		**2006 (March)**	**2006 (Sept)**	**UAMS, Little Rock, USA**	**Bioinformatics Specialist**

6. Area of Specialization:

Bioinformatics (Sp. Computer-aided vaccine & drug design; Genome & proteome annotations; Peptide-based therapeutics)

7. Honors/Awards Received

National Recognitions

- Shanti Swarup Bhatnagar Award 2008 in Biological Sciences by CSIR
- Prestegious JC Bose National Fellowship, 2010-15 & 2015-2020 (extenstion), by Department of Science and Technology, India
- NASI-Reliance Industries Platinum Jubilee Award (2009)
- National Bioscience Award for Carrier Development 2006, by Department of Biotechnology
- Lakshmipat Singhania-IIM Lucknow National Leadership Awards 2011 (Young Leader in category of Science and Technology)
- One paper listed in top 70 highly cited papers (ranked 18) published by CSIR scientists in last 70 years

International recognition

- Listed in "**The World's Most Influential Scientific Minds**" by Thompson Reuters. This list contains 3200 individuals who published the greatest number of highly cited papers in one of 21 broad fields, 2002-2012. Highly cited papers rank in the top 1% by citations for their field and year of publication
- Thomson Reuters Research Excellence - India Research Front Awards 2009

8. Professional Affilations:
   - **Fellow of National Academy of Sciences (FNASc), India**
   - **Fellow of Indian Academy of Sciences (FASc), Bangalore**

9. (a) Number of research prublications: **~200(List enclosed Annexure I)**
   - Published around 200 papers in high impact factor (IF) journals (average IF > 4) including one paper in Genome Research (IF 14.4), one paper in Trends in Biotechnology (IF 9.6), 16 paper in Nucleic Acids Research (IF 9.1). Most of papers are highly cited, got around 8000 citations with h-index 47. It includes 23 papers, each got more than 100 citations and 116 papers each got ciatations more than 10 times (See https://scholar.google.co.in/citations?user=XK5GUiYAAAAJ&hl=en).

(b) Impact of the contributions

Raghava's group has developed more than 200 in silico products (web servers and databases), each product is based on novel algorithm or data. Most of publications based on these in silico products are highly cited. Students and scientific community in the field of education, vaccine and drug discovery heavily use these services. Total social impact in terms of money is around Rs. 792 crore (Details are given in Annexure). These papers are published in highly reputed journals, following is summary of impact factors of these papers.

Name of Journal	Impact Factor*	No. of Papers	Total Impact	Comment
Genome Research	14.6	1	14.6	*Impact factor is either latest if paper published long time back or maximum impact factor if
Trends in Biotech.	11.9	1	11.9	
Briefings in Bioinformatics	9.6	1	9.6	
Nucleic Acids Res.	9.1	16	145.6	

Journal Biol. Chemistry	**6.4**	**3**	**19.2**	**multiple papers published in different years.**
Bioinformatics	**6.0**	**11**	**66.0**	
BMC Bioinformatics	**5.4**	**22**	**118.8**	
Scientific Reports (Nature)	**5.6**	**15**	**84.0**	**It exclude impact factor of papers published in new jounals or protocols**
Biology Direct	**4.7**	**7**	**32.9**	
BMC Genomics	**4.4**	**5**	**22.0**	
Plos One	**4.4**	**16**	**70.4**	
Proteins	**4.4**	**7**	**30.8**	
Protein Science	**4.1**	**5**	**20.5**	
Other journals	**~3.0**	**70**	**210**	
Total Impact factor (around) of papers			**856**	

10. Number of books Authored/Edited:

More than 15 chapters in books (List enclosed Annexure II)

11. (a) Number of patents granted/applied:

Patents

1. Raghava GPS, Gautam A, Nandanwar HS: Cell Penetrating Peptide for Biomolecule Delivery. Patent WO2015075747-A1 .

Copyrights

More than 70 copyrights **(List enclosed Annexure III)**

12. Dissertations supervised:

(a) Ph.D. : **24 students completed**

(b) Post-graduation: **Around 5 students**

13. Commercializtion of technology(ies) and Product(s)/ Service(s):

- **Contributed in the development of BioSuite which is a bioinformatics software developed by Tata Consultancy Services (TCS) with experts in bioinformatics under the NMITLI programme. Hon'ble President of India Dr APJ Abdul Kalam has launched this package, on 14th July 2004.**
- **In collaboration with a private company, Biomantra, group developed a software package. This software "VaxiPred: Computer aided vaccine design", based on research carried out at my group. Director General, CSIR Dr R A Mashlekar on 15th of December 2004, has launched this package.**

14. Products developed for community & its social impact

Group have developed number of web services (servers and databases), each service is based on novel algorithm or data, published in reputed journals. Most of publications

of education, vaccine and drug discovery heavily uses these services. Total social impact in term money is around Rs. 792 crore upto December 2015 (Detail is given in Annexure IV)

15. Human resource development (No. of people managed/trained)

- **Long term training:** More than 80 students have been trained (PA, RA, Summer trainees) that includes 36 Ph.D students (24 completed).
- **Short Training:** More than 700 students got short term training as workshop/conference participants. Two international & more than 10 national workshop/training/conference were organized.
- **Bioinformatics Course**: Taught around 200 pre-phd students over the years; full one session. In addition, we are organizing small traing programmes for faculty and student of IMTECH from last 20 years.
- **Virtual skill development**: In addition to direct training, we are providing training to users via our online computational resources. All tutorials/ documents/presentations related to bioinformatics are available from our sites. Under GPSR package we provide PERL code required to write core script in the field of compuational biology. All over the world students and young faculties are using theses source codes for learning as well as for developing their own software packages.

16. Socio Economic Intervenations

No. of Technology(ies) developed: **Around 150 software/algorithams developed**

- **Computer-Aided Vaccine Design:** Group is working in the field of immunoinformatics from last 12 years in order to understand the immune system with help of computer. More than 25 web-servers have been developed for predicting immune response against a peptide this include simulation of adaptive and innate immune system (http://www.imtech.res.in/raghava/vacci.html).
- **BioDrugs (In silico Designing of Therapeutic Peptides):** Biomolecules are possible alternative to traditional drugs based on small chemical compounds. Around 15 web-servers have been developed that includes; ToxinPred (Prediction of toxicity), THPpred (Designing of tumor homing peptide), CellPPD (Prediction of highly effective cell penetrating peptides), AntiCP (Discovering novel anticancer peptides).
- **Personalized or Strain specific Medicines** : In the era of next generation sequencing where sequencing of whole genome of pathogens (bacteria/fungus/virus) and human is affordable; it is important to develop person or strain-specific medicine. Group developed more than 10 server which will help community to design personalized druds and therapeutics against process of developing in silico tools for personalized medicine.
- **Protein Structures Prediction** : Group have developed around 20 web server for predicting structural content of protein that includes prediction of secondary structure, interacting residues, turns.
- **Molecular Interactions in Biology :** More than 10 web servers has been developed for predicting different type of interactions that includes interaction of proteins with peptide, DNA, RNA and ligand. Following are major web servers developed by his group.
- **Annotation of Genomes:** In order to annotate genomes, group have developed around 15 tools for predicting i) protein coding region in prokaryotic genomes using Fast Fourier Transformation, ii) similarity aided ab Initio method for

identification of spectral repeats using FFT and iv) genome-wide similarity search using BLAST and FASTA.

- **Functional annotation of Proteoms:** It is difficult to predict function of a protein directly, thus group developed methods for predicting important class of proteins and proteins reside in specific location of a cell. Group have developed around 25 software and web servers for predicting function and class of protein.
- **Chemoinformatics for drug discovery:** In order to provide alternate to commerical software in the field of drug discovery, group developed around 15 web servers. Major web-services developed by his group includes DrugMint (Prediction of drug-like molecules), MDRIpred (Identification of inhibitor against drug resistant M. Tuberculosis).

17. Any other achievement/information:

- **Specialized Trainings:** A customized training was organized for employees of a private company from South Korea in the year of 2002, for which we recieved Rs 4.55 lakhs. We also organized training for Department of Electronics (DOE) in year 2003, on PERL in Bioinformatics for which we received Rs 2.80 lakhs.
- **CSIR-Informatics Portal:** CSIR laboratories have developed number of software, databases, mirror sites and web services in different fields of science and technology that includes chemoinformatics, bioinformatics, pharmacoinformatics etc. We developed web based portal that maintain various informatics related services developed by CSIR laboratories (http://info.csir.res.in/).

Annexure I

Publication List of G P S Raghava, IMTECH, Chandigarh

1) Agrawal P, Bhalla S, Usmani SS, Singh S, Chaudhary K, Raghava GP and Gautam A. (2016) CPPsite 2.0: a repository of experimentally validated cell-penetrating peptides. **Nucleic Acids Res. 44:D1098-103.**

2) Chaudhary K, Kumar R, Singh S, Tuknait A, Gautam A, Mathur D, Anand P, Varshney GC and Raghava GP. (2016) A Web Server and Mobile App for Computing Hemolytic Potency of Peptides. **Sci Rep. 6:22843.**

3) Chaudhary K, Nagpal G, Dhanda SK and Raghava GP. (2016) Prediction of Immunomodulatory potential of an RNA sequence for designing non-toxic siRNAs and RNA-based vaccine adjuvants. **Sci Rep. 6:20678**.

4) Dhanda SK, Chaudhary K, Gupta S, Brahmachari SK and Raghava GP. (2016) A web-based resource for designing therapeutics against Ebola Virus**. Sci Rep. 6:24782.**

5) Dhanda SK, Usmani SS, Agrawal P, Nagpal G, Gautam A and Raghava GP (2016) Novel in silico tools for designing peptide-based subunit vaccines and immunotherapeutics. **Brief Bioinform. 2016.**

6) Dhanda SK, Vir P, Singla D, Gupta S, Kumar S and Raghava GP. A Web-Based Platform for Designing Vaccines against Existing and Emerging Strains of Mycobacterium tuberculosis. **PLoS One. 2016;11:e0153771**.

7) Gautam A, Chaudhary K, Kumar R, Gupta S, Singh H and Raghava GP. (2016) Managing Drug Resistance in Cancer: Role of Cancer Informatics. **Methods Mol Biol. 1395:299-312.**

8) Gautam A, Nanda JS, Samuel JS, Kumari M, Priyanka P, Bedi G, Nath SK, Mittal G, Khatri N and Raghava GP. (2016) Topical Delivery of Protein and Peptide Using Novel Cell Penetrating Peptide IMT-P8. **Sci Rep. 6:26278.**
9) Gupta S, Chaudhary K, Kumar R, Gautam A, Nanda JS, Dhanda SK, Brahmachari SK and Raghava GP. (2016) Prioritization of anticancer drugs against a cancer using genomic features of cancer cells: A step towards personalized medicine. **Sci Rep. 6:23857.**
10) Kumar R and Raghava GP. (2016) ApoCanD: Database of human apoptotic proteins in the context of cancer***. Sci Rep. 6:20797***.
11) Nupur LN, Vats A, Dhanda SK, Raghava GP, Pinnaka AK and Kumar A. (2016) ProCarDB: a database of bacterial carotenoids. **BMC Microbiol. 16:96.**
12) Randhawa HK, Gautam A, Sharma M, Bhatia R, Varshney GC, Raghava GP and Nandanwar H. (2016) Cell-penetrating peptide and antibiotic combination therapy: a potential alternative to combat drug resistance in methicillin-resistant Staphylococcus aureus. **Appl Microbiol Biotechnol. 100:4073-83.**
13) Singh H and Raghava GP. (2016) BLAST-based structural annotation of protein residues using Protein Data Bank. **Biol Direct. 11:4.**
14) Singh H, Kumar R, Singh S, Chaudhary K, Gautam A and Raghava GP. (2016) Prediction of anticancer molecules using hybrid model developed on molecules screened against NCI-60 cancer cell lines. **BMC Cancer. 2015;16:77.**
15) Singh H, Srivastava HK and Raghava GP. (2016) A web server for analysis, comparison and prediction of protein ligand binding sites. **Biol Direct. 11:14.**
16) Singh Nanda J, Kumar R and Raghava GP. dbEM: (2016) A database of epigenetic modifiers curated from cancerous and normal genomes. **Sci Rep. 6:19340.**
17) Singh S, Chaudhary K, Dhanda SK, Bhalla S, Usmani SS, Gautam A, Tuknait A, Agrawal P, Mathur D and Raghava GP. (2016) SATPdb: a database of structurally annotated therapeutic peptides. **Nucleic Acids Res. 44:D1119-26.**
18) Bhatia R, Gautam A, Gautam S, Mehta D, Kumar V, Raghava GP, and Varshney GC. (2015) Assessment of SYBR Green I Dye-Based fluorescence Assay for Screening Antimalarial Activity of Cationic Peptides and DNA Intercalating Agents. Antimicrob. **Agents Chemother. 59(5):2886-9.**
19) Dhar J, Chakrabarti P, Saini H, Raghava GP, Kishore R. (2015) ω-Turn: A novel β-turn mimic in globular proteins stabilized by main-chain to side-chain C-H···O interaction. **Proteins. 83(2):203-14.**
20) Gautam A, Sharma M, Vir P, Chaudhary K, Kapoor P, Kumar R, Nath SK, Raghava GPS (2015) Identification and characterization of novel protein-derived arginine-rich cell-penetrating peptides. **Eur J Pharm Biopharm. 89:93-106.**
21) Kumar R, Chaudhary K, Singh Chauhan J, Nagpal G, Kumar R, Sharma M, Raghava GPS (2015) An in silico platform for predicting, screening and designing of antihypertensive peptides. **Sci Rep. 5:12512**.
22) Kumar R, Chaudhary K, Sharma M, Nagpal G, Chauhan JS, Singh S, Gautam A, Raghava GP. (2015) AHTPDB: a comprehensive platform for analysis and presentation of antihypertensive peptides. **Nucleic Acids Res. 43:956-62.**
23) Kumar R, Chauhan JS, Raghava GP. (2015) In Silico Designing and Screening of Antagonists against Cancer Drug Target XIAP. **Curr Cancer Drug Targets (In Press).**
24) Nagpal G, Gupta S, Chaudhary K, Kumar Dhanda S, Prakash S, Raghava GPS (2015) VaccineDA: Prediction, design and genome-wide screening of oligodeoxynucleotide-based vaccine adjuvants. **Sci Rep. 5:12478**.
25) Panwar B, Raghava GP. (2015) Identification of protein-interacting nucleotides in a RNA sequence using composition profile of tri-nucleotides. **Genomics. pii: S0888-7543(15)00022-1.**
26) Singh H, Singh S, Singla D, Agarwal SM, Raghava GPS. (2015) QSAR based model for discriminating EGFR inhibitors and non-inhibitors using Random forest. **Biol Direct. 10:10.**
27) Singh H, Singh S, Raghava GP. (2015) In silico platform for predicting and initiating β-turns in a protein at desired locations. **Proteins. 83(5):910-21.**

28) Tyagi A, Tuknait A, Anand P, Gupta S, Sharma M, Mathur D, Joshi A, Singh S, Gautam A, Raghava GPS (2015) CancerPPD: a database of anticancer peptides and proteins. **Nucleic Acids Res. D837-43.**

29) Ahmed, S., Gupta, S., Kumar, R., Varshney, G.C. and Raghava, G.P. (2014) Herceptin Resistance Database for Understanding Mechanism of Resistance in Breast Cancer Patients. **Scientific Report 4:4483.**

30) Chauhan JS, Dhanda SK, Singla D, Open Source Drug Discovery Consortium, Agarwal SM and Raghava, GP (2014) QSAR-Based Models for Designing Quinazoline/ Imidazothiazoles/ Pyrazolopyrimidines Based Inhibitors against Wild and Mutant EGFR. **PLoS ONE 9(7): e101079.**

31) Gautam A, Sharma M, Vir P, Chaudhary K, Kapoor P, Kumar R, Nath SK, Raghava GP. (2014) Identification and characterization of novel protein derived arginine-rich cell penetrating peptides. **Eur J Pharm Biopharm. pii: S0939-6411(14)00347-6.**

32) Gautam A, Chaudhary K, Singh S, Joshi A, Anand P, Tuknait A, Mathur D, Varshney GC, Raghava GP. (2014) Hemolytik: a database of experimentally determined hemolytic and non-hemolytic peptides. ***Nucleic Acids Res. 42(Database issue):D444-9.***

33) Gautam A, Kapoor P, Chaudhary K, Kumar R, Consortium OSDD, Raghava G.P.S. (2014) Tumor Homing Peptides as Molecular Probes for Cancer Therapeutics, Diagnostics, and Theranostics. **Current Medicinal Chemistry 21(21):2367-91.**

34) Kumar, R., Chaudhary, K., Singhla, D., Gautam A. and Raghava G.P. (2014) Designing of promiscuous inhibitors against pancreatic cancer cell lines. **Scientific Report 4:4668.**

35) Mehta D, Anand P, Kumar V, Joshi A, Mathur D, Singh S, Tuknait A, Chaudhary K, Gautam SK, Gautam A, Varshney GC, Raghava GP. (2014) ParaPep: a web resource for experimentally validated antiparasitic peptide sequences and their structures. **Database (Oxford) bau051.**

36) Nagpal G, Sharma M, Kumar S, Chaudhary K, Gupta S, Gautam A, Raghava GP. (2014) PCMdb: Pancreatic Cancer Methylation Database. **Scientific Report. 4:4197**

37) Panwar B, Raghava GP. (2014) Prediction of uridine modifications in tRNA sequences. **BMC Bioinformatics. 15:326.**

38) Panwar B, Arora A, Raghava GP. (2014) Prediction and classification of ncRNAs using structural information. ***BMC Genomics 15(1):127.***

39) Sharma A, Singla D, Rashid M, Raghava GP. (2014) Designing of peptides with desired half-life in intestine-like environment. **BMC Bioinformatics. 15:282.**

40) Singh H, Singh S, Raghava GP. (2014) Evaluation of protein dihedral angle prediction methods. **PLoS One. 9(8):e105667.**

41) Yadav IS, Singh H, Imran Khan M, Chaudhury A, Raghava GP, Agarwal SM. (2014) EGFRIndb: Epidermal Growth Factor Receptor Inhibitor Database. **Anticancer Agents Med Chem 14(7):928-35.**

42) Ahmed, F., Kaundal, R., and Raghava, G. P. (2013) PHDcleav: a SVM based method for predicting human Dicer cleavage sites using sequence and secondary structure of miRNA precursors, ***BMC bioinformatics 14*, S9.**

43) Bhartiya, D., Pal, K., Ghosh, S., Kapoor, S., Jalali, S., Panwar, B., Jain, S., Sati, S., Sengupta, S., and Sachidanandan, C. (2013) lncRNome: a comprehensive knowledgebase of human long noncoding RNAs, ***Database: the journal of biological databases and curation 2013***

44) Chauhan, J. S., Rao, A., and Raghava, G. P. (2013) In silico Platform for Prediction of N-, O-and C-Glycosites in Eukaryotic Protein Sequences, ***PloS one 8*, e67008.**

45) Dhanda, S. K., Singla, D., Mondal, A. K., and Raghava, G. P. (2013) DrugMint: A webserver for predicting and designing of drug-like molecules, ***Biology direct 8*, 28.**

46) Dhanda SK, Gupta S, Vir P, Raghava GP. (2013) Prediction of IL4 inducing peptides. ***Clin Dev Immunol. 2013:263952.***

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48) Gautam, A., Chaudhary, K., Singh, S., Joshi, A., Anand, P., Tuknait, A., Mathur, D., Varshney, G. C., and Raghava, G. P. (2013) Hemolytik: a database of experimentally determined hemolytic and non-hemolytic peptides, ***Nucleic acids research*, gkt1008.**
49) Gautam, A., Chaudhary, K., Kumar, R., Sharma, A., Kapoor, P., Tyagi, A., and Raghava, G. P. (2013) In silico approaches for designing highly effective cell penetrating peptides, ***Journal of translational medicine 11*, 74.**
50) Gupta, S., Kapoor, P., Chaudhary, K., Gautam, A., Kumar, R., Raghava, G. P., and Consortium, O. S. D. D. (2013) In Silico Approach for Predicting Toxicity of Peptides and Proteins, ***PloS one 8*, e73957.**
51) Gupta S, Ansari HR, Gautam A; Open Source Drug Discovery Consortium, Raghava GP. (2013) Identification of B-cell epitopes in an antigen for inducing specific class of antibodies. ***Biol Direct. 8:27.***
52) Iquebal MA, Jaiswal S, Dhanda SK, Arora V, Dixit SP, Raghava GP, Rai A, Kumar D. (2013) Development of a model webserver for breed identification using microsatellite DNA marker. ***BMC Genet. 14(1):118.***
53) Kumar, S., Vikram, S., and Raghava, G. P. S. (2013) Genome Annotation of Burkholderia sp. SJ98 with Special Focus on Chemotaxis Genes, ***PloS one 8*, e70624.**
54) Kumar, R., and Raghava, G. P. (2013) Hybrid Approach for Predicting Coreceptor Used by HIV-1 from Its V3 Loop Amino Acid Sequence, ***PloS one 8*, e61437.**
55) Kumar, R., Chaudhary, K., Gupta, S., Singh, H., Kumar, S., Gautam, A., Kapoor, P., and Raghava, G. P. (2013) CancerDR: Cancer Drug Resistance Database, ***Scientific reports 3: 1445***.
56) Mangal, M., Sagar, P., Singh, H., Raghava, G. P., and Agarwal, S. M. (2013) NPACT: Naturally Occurring Plant-based Anti-cancer Compound-Activity-Target database, ***Nucleic acids research 41*, D1124-D1129.**
57) Panwar, B., Gupta, S., and Raghava, G. P. (2013) Prediction of vitamin interacting residues in a vitamin binding protein using evolutionary information, ***BMC bioinformatics 14*, 44**.
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63) Vikram S, Pandey J, Kumar S, Raghava GP. (2013) Genes Involved in Degradation of para-Nitrophenol Are Differentially Arranged in Form of Non-Contiguous Gene Clusters in Burkholderia sp. strain SJ98. ***PLoS One 23;8(12):e84766.***
64) Aithal A, Sharma A, Joshi S, Raghava GP, Varshney GC (2012). PolysacDB: a database of microbial polysaccharide antigens and their antibodies. **PLoS One. 7(4):e34613**
65) Bhat AH, Mondal H, Chauhan JS, Raghava GP, Methi A, Rao A (2012). ProGlycProt: a repository of experimentally characterized prokaryotic glycoproteins. **Nucleic Acids Res. 40(Database issue):D388-93.**
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68) Kapoor P, Singh H, Gautam A, Chaudhary K, Kumar R, Raghava GP (2012). TumorHoPe: a database of tumor homing peptides. **PLoS One. 7(4):e35187.**
69) Kumar S, Kushwaha H, Bachhawat AK, Raghava GP, Ganesan K (2012). Genome sequence of the oleaginous red yeast Rhodosporidium toruloides MTCC 457. **Eukaryot Cell. 11(8):1083-4.**
70) Kumar S, Randhawa A, Ganesan K, Raghava GP, Mondal AK (2012). Draft genome sequence of salt-tolerant yeast Debaryomyces hansenii var. hansenii MTCC 234. **Eukaryot Cell. 11(7):961-2.**
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72) Kumar S, Vikram S, Subramanian S, Raghava GP, Pinnaka AK (2012). Genome sequence of the halotolerant bacterium Imtechella halotolerans K1T. **J Bacteriol. 194(14):3731.**
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74) Singh H, Chauhan JS, Gromiha MM; Open Source Drug Discovery Consortium, Raghava GP (2012). ccPDB: compilation and creation of data sets from Protein Data Bank. **Nucleic Acids Res. 40(Database issue): D486-9.**
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Annexure IV

Social Impact of Web Services Developed by Raghava's Group

Group have developed number of web services (servers and databases), each service is based on novel algorithm or data, published in reputed journals. Most of publications based on these services are highly cited. Scientific community in the field of education, vaccine and drug discovery heavily uses these services. Following is procedure used to calculate social impact on society.

1. Hits per year for 125 services is computed from Apache log of six months
2. Total hits per server are computed by multiplying per year hits with time (years) service is online.
3. Number of scientific pages visited and job submitted were computed by dividing hits by factor of three and six respectively.
4. Social impact is computed by charging Rs 5 for visiting a scientific page and Rs 500 for executing/submitted a job.

Total social impact in term money is around Rs. 792 crore

(Detail is given in table below)

Web-Servers	**Online (Years)**	**Hits/year**	***Total hits***	***Pages/visited***	***Jobs executed***	**Social Impact (Rs in lakhs)**
dnabinder	9	1218502	10966518	3655506	1827753	9321
pcmdb	3	2387778	7163334	2387778	1193889	6088
metapred	6	929140	5574840	1858280	929140	4738
mhcbn	13	366192	4760496	1586832	793416	4046
rnapred	7	633188	4432316	1477438	738719	3767
cancerdr	4	916792	3667168	1222389	611194	3117
cppsite	4	762016	3048064	1016021	508010	2590
bcepred	13	214590	2789670	929890	464945	2371
sarpred	11	232384	2556224	852074	426037	2172
proprint	8	292022	2336176	778725	389362	1985
lbtope	3	774590	2323770	774590	387295	1975
propred	14	155590	2178440	726146	363073	1851
pepstr	9	229592	2066328	688776	344388	1756
hmrbase	8	247044	1976352	658784	329392	1679
npact	3	499456	1498368	499456	249728	1273
glycoep	3	484306	1452918	484306	242153	1234
abcpred	10	139888	1398880	466293	233146	1189
ccpdb	4	332040	1328160	442720	221360	1128

nppred	7	189214	1324498	441499	220749	1125
hslpred	12	107388	1288656	429552	214776	1095
apssp	15	77752	1166280	388760	194380	991
cancerppd	2	562058	1124116	374705	187352	955
eslpred	12	93444	1121328	373776	186888	953
antigendb	6	172270	1033620	344540	172270	878
rnacon	4	257562	1030248	343416	171708	875
bcipep	12	83396	1000752	333584	166792	850
btxpred	10	99834	998340	332780	166390	848
dipcell	2	459386	918772	306257	153128	780
hemolytik	3	275756	827268	275756	137878	703
propred1	13	62924	818012	272670	136335	695
haptendb	12	62870	754440	251480	125740	641
algpred	9	72116	649044	216348	108174	551
polyapred	7	92420	646940	215646	107823	549
ctlpred	11	58078	638858	212952	106476	543
Ccdb	5	124528	622640	207546	103773	529
biadb	6	102020	612120	204040	102020	520
betatpred	13	43472	565126	188375	94187	480
tumorhope	4	138970	555880	185293	92646	472
Ftg	14	36358	509012	169670	84835	432
herceptinr	3	169462	508386	169462	84731	432
antibp	9	53776	483984	161328	80664	411
alphapred	12	36738	440856	146952	73476	374
ahtpdb	1	426226	426226	142075	71037	362
betaturns	12	35518	426216	142072	71036	362
nhlapred	11	37572	413292	137764	68882	351
toxipred	5	76006	380030	126676	63338	323
mitpred	8	46524	372192	124064	62032	316
betatpred3	1	366568	366568	122189	61094	311
betatpred2	12	30144	361728	120576	60288	307
tappred	12	30142	361704	120568	60284	307

rslpred	8	44148	353184	117728	58864	300
pslpred	11	31550	347050	115683	57841	294
polysacdb	6	55904	335424	111808	55904	285
pprint	8	41228	329824	109941	54970	280
eslpred2	8	39568	316544	105514	52757	269
rbpred	9	30562	275058	91686	45843	233
parapep	3	89468	268404	89468	44734	228
anticp	3	87962	263886	87962	43981	224
tbbpred	12	21154	253848	84616	42308	215
cellppd	3	82646	247938	82646	41323	210
mmbpred	13	17678	229814	76604	38302	195
ntegfr	2	109954	219908	73302	36651	186
egpred	12	18014	216168	72056	36028	183
antibp2	7	30174	211218	70406	35203	179
gpcrpred	12	17118	205416	68472	34236	174
gammapred	12	15542	186504	62168	31084	158
bteval	12	14552	174624	58208	29104	148
srtpred	8	21758	174064	58021	29010	147
chpredict	14	12348	172872	57624	28812	146
igpred	4	43030	172120	57373	28686	146
vicmpred	7	24384	170688	56896	28448	145
gwblast	11	15240	167640	55880	27940	142
cbtope	6	27918	167508	55836	27918	142
glycopp	4	41256	165024	55008	27504	140
gwfasta	12	13514	162168	54056	27028	137
toxinpred	4	39726	158904	52968	26484	135
hivsir	5	30070	150350	50116	25058	127
Gdoq	8	17854	142832	47610	23805	121
rnapin	3	46612	139836	46612	23306	118
kidoq	7	18914	132398	44132	22066	112
egfrindb	2	65730	131460	43820	21910	111
ifnepitope	3	40010	120030	40010	20005	102

proglycprot	5	23866	119330	39776	19888	101
drugmint	3	36518	109554	36518	18259	93
trnamod	2	52068	104136	34712	17356	88
pcleavage	10	9950	99500	33166	16583	84
ntxpred	9	10900	98100	32700	16350	83
phdcleav	6	15324	91944	30648	15324	78
prrdb	9	10216	91944	30648	15324	78
desirm	5	17962	89810	29936	14968	76
ar_nhpred	12	7452	89424	29808	14904	76
nrpred	13	6368	82784	27594	13797	70
bhairpred	11	7504	82544	27514	13757	70
atpint	7	10556	73892	24630	12315	62
vgichan	9	7076	63684	21228	10614	54
tumorhpd	4	15684	62736	20912	10456	53
egfrpred	2	29308	58616	19538	9769	49
pseapred	8	6662	53296	17765	8882	45
icaars	5	10362	51810	17270	8635	44
dmkpred	5	9452	47260	15753	7876	40
gpcrsclass	10	4618	46180	15393	7696	39
Hlp	2	22370	44740	14913	7456	38
nadbinder	6	7350	44100	14700	7350	37
gstpred	8	5444	43552	14517	7258	37
pfmpred	7	5882	41174	13724	6862	34
premier	6	6628	39768	13256	6628	33
cancer_pred	5	7558	37790	12596	6298	32
gtpbinder	7	5040	35280	11760	5880	29
oxypred	9	3868	34812	11604	5802	29
vitapred	3	11376	34128	11376	5688	29
Mdri	4	8440	33760	11253	5626	28
ahtpin	1	32314	32314	10771	5385	27
oxdbase	7	4538	31766	10588	5294	26
cytopred	8	3810	30480	10160	5080	25

il4pred	3	8942	26826	8942	4471	22
marspred	4	6682	26728	8909	4454	22
dprot	8	3286	26288	8762	4381	22
hivcopred	3	7694	23082	7694	3847	19
chemopred	7	2888	20216	6738	3369	17
vaccineda	1	17388	17388	5796	2898	14
fadpred	6	2682	16092	5364	2682	13
xiapin	1	13030	13030	4343	2171	11
paaint	2	4988	9976	3325	1662	8
antiangiopred	1	8356	8356	2785	1392	7
Total	**880**	**16993588**	**93216050**	**31071990**	**15535982**	**79233**