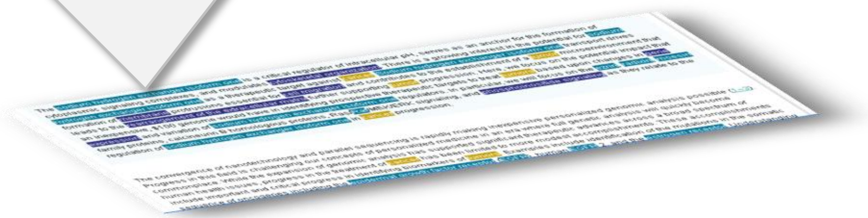
Enriching Content with Semantic Tagging



ICIC 2013, Vienna

Molecular Connections, Bangalore, India

www.molecularconnections.com

Outline

- Introduction to MC
- Content Enrichment – Concept
- Content Enrichment Use Case
- Key Take Aways

About MC

OPERATIONS

- Information curation and annotation expertise
  - work with leading R & D Institutions , STM publishing & IP Search & Law Firms
- Right mix of human resources and scale
  - LifeScience (Bio – Chem), Engineering, IP, information and technology background
- Established workflow and processes to ensure quality and on time delivery
- ISO 27001: 2005 Certified knowledge management platforms and workflow systems

CORPORATE

- Established in 2001
- Executive team backed by renowned informaticans & strong advisory board -~ 1000 strong
- Scalable & state of the art infrastructure
- Global footprint
- Core Values: Customer focused, Quality, Ethics, Excellence, Accountability

Verticals

Text mining & Informatics

Life Sciences companies

Publishing, R & D Institutions

IP

- ✓ MCPaIRS
- ✓ MCDESiGN
- ✓ Patent Search Services

MOLECULAR CONNECTIONS
Knowledge Solutions for Accelerated Research

MC - Solutions

End <– to –> End Solutions

- Indexing (automatic and semi-automatic),
- Abstraction (manual and semi-automatic)
- Open Access Data Mining
- Content Enrichment
- Semantic Tagging & systematic review of literature
- MC Outlink - Text Mining & Discovery
- Developing customized text mining engines

CONTENT MINING

Highly Customized Services

CONTENT MANAGEMENT

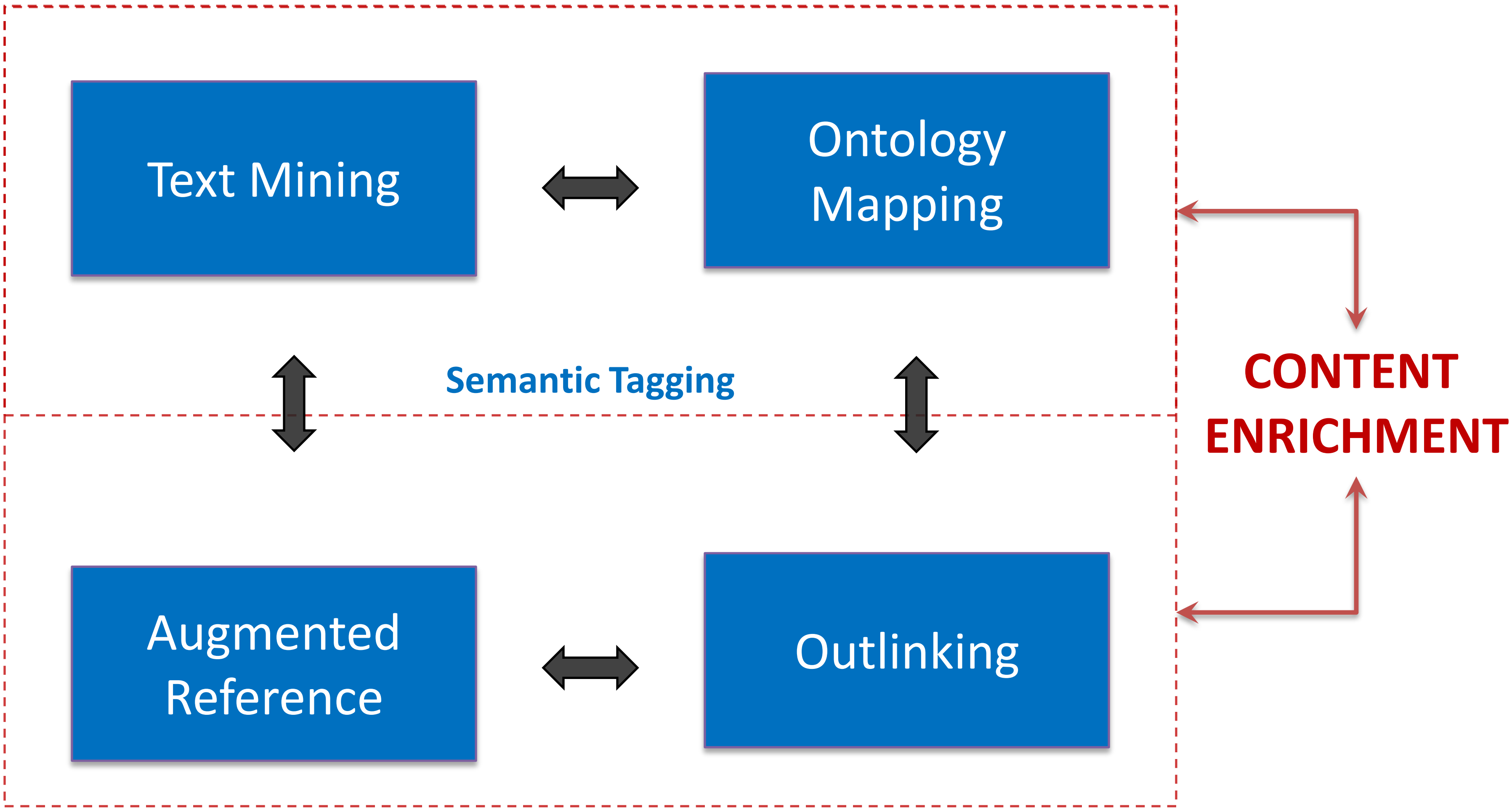
CONTENT REPRESENTATION / DELIVERY

- Ontology Building
- Custom Dbase Creation
- Content Normalization

- App Development
- User Interface Design
- Visualization
- Analytics

Over 3500 Man Years of expertise

Enriching Content



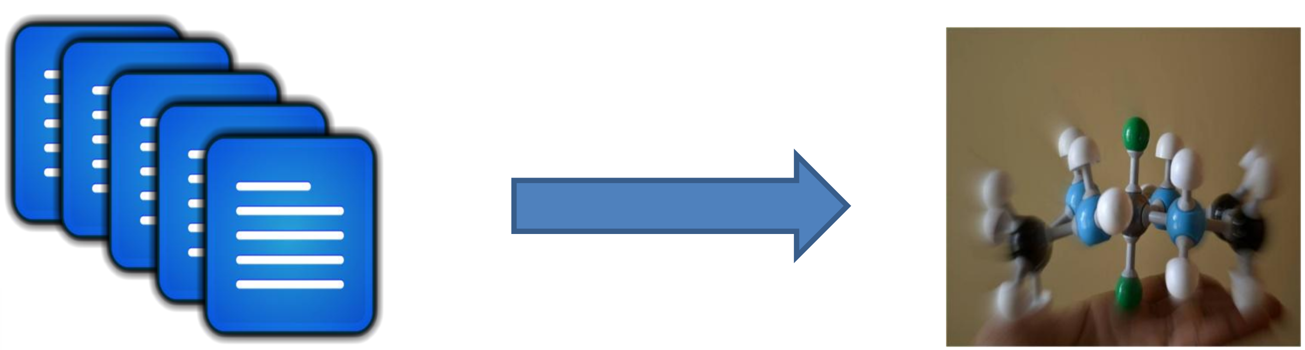
Why CE?

- Enables deeper knowledge discovery from diverse sources like patent, databases, journal etc.

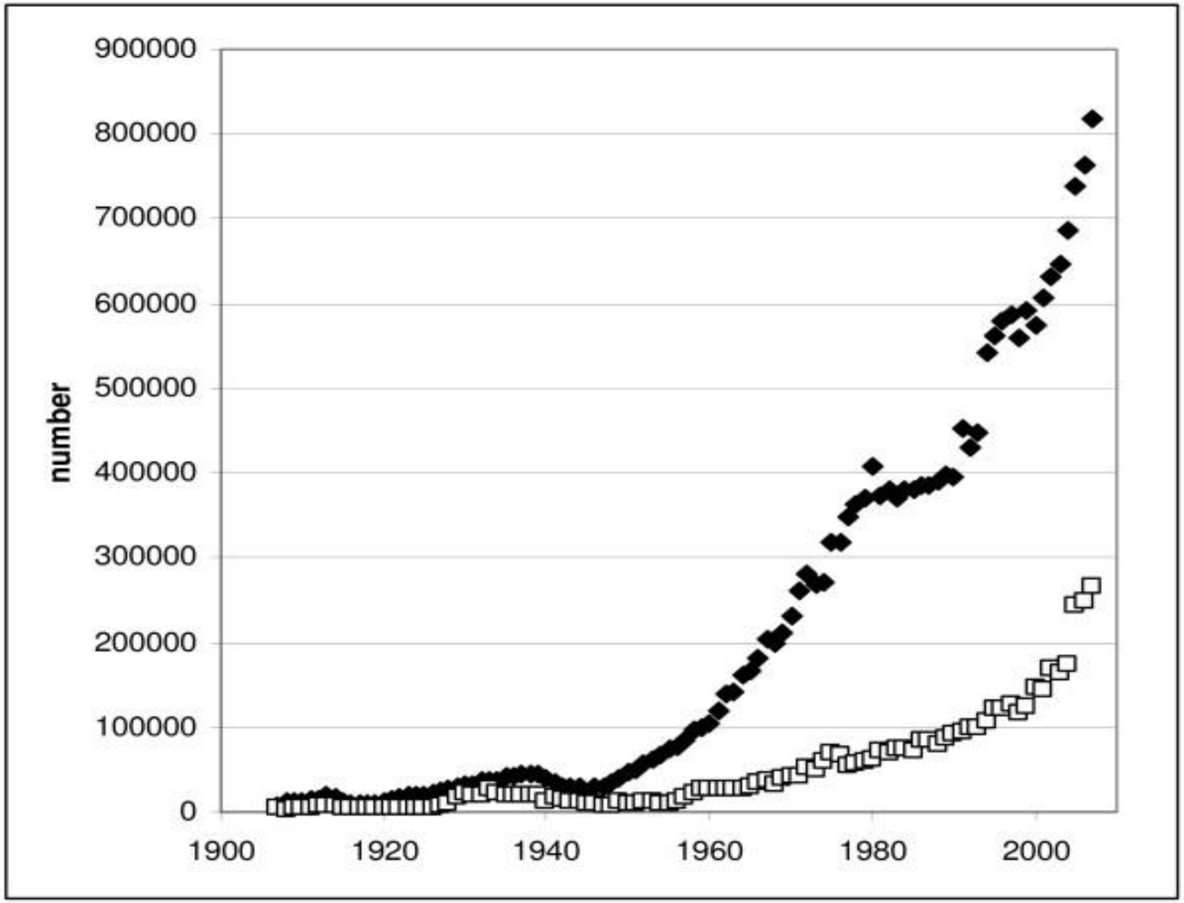
- Semantic tagging ensures that different names of an entity are mapped to standard name and hence, searchable by any name.

  For Instance: Discoverability is a challenge in pharma patents as entities of interest may be named differently in different patents by different authors.

- Publishers are quick to adopt CE, time to adopt it for patents?



Unlocking Small Data to Big Data



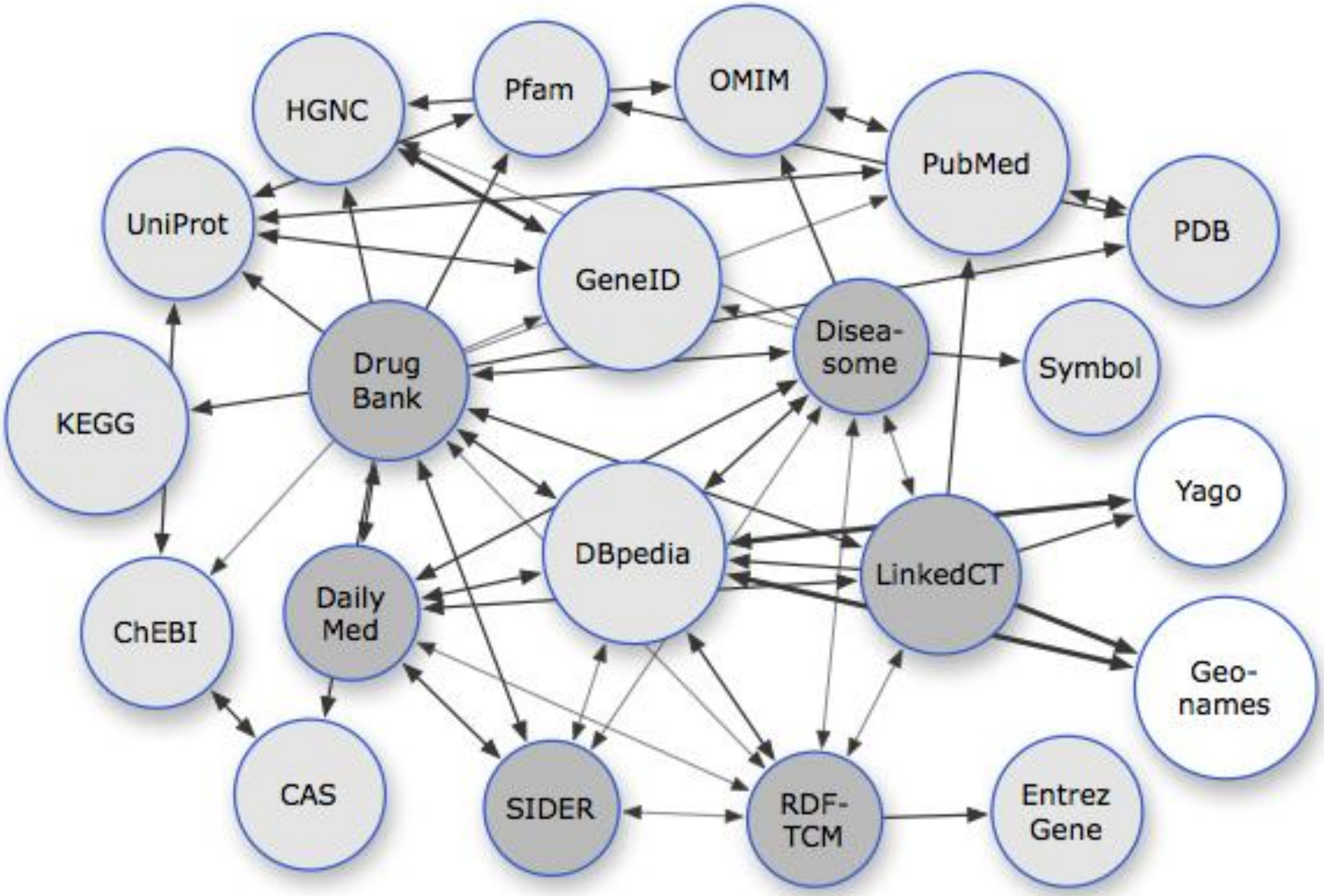
Number of articles (diamonds) and patents (open boxes) abstracted annually by *Chemical Abstracts Services*
Bachrach *Journal of Cheminformatics* 2009 **1**:2 doi:10.1186/1758-2946-1-2

DrugBank Open Data Drug & Drug Target Database
UniProt
PubChem
ChEMBL
DBpedia
GO the Gene Ontology
PubMed

Need Smarter Content

MOLECULAR CONNECTIONS Knowledge Solutions for Accelerated Research

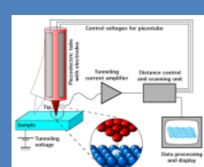
Leveraging Linked Data



Implementation - Content Enrichment Levels

- **Entity**
  - Author/Assignee, Protein, Gene, Drug, Chemical, Disease, Reaction, Organism, Technology, Organization
- **Document**
  - Journal article
  - Patent
  - Book chapter

- **Others**
  - Image
  - Table
  - Multimedia
  - News links



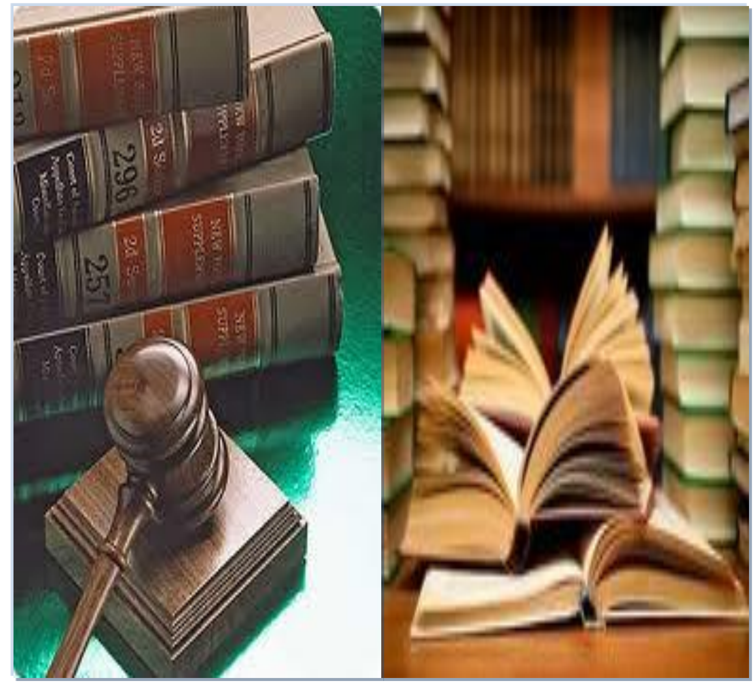
Content Enrichment – Use Case

MCPaIRS ™ (Proprietary Indian Patent Database)

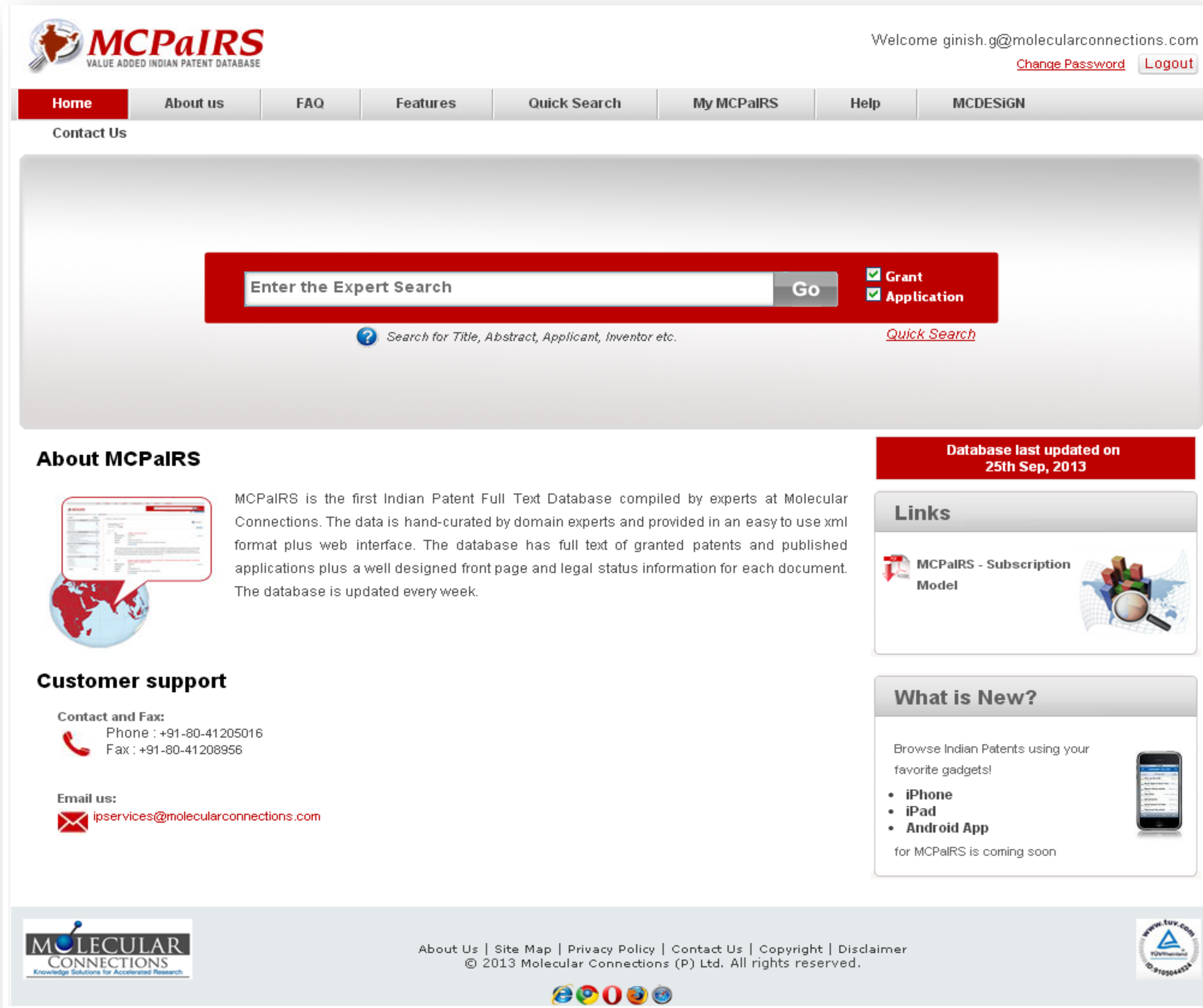
Molecular Connections Patent Information Retrieval System

- "Expertly , Manually Curated, Fully Searchable, Value Added Knowledgebase" of Full Text of Indian Granted and Applied Patents

- Caters to a diversified user-base of bench Scientists, Engineers, R&D Managers & Business Professionals.

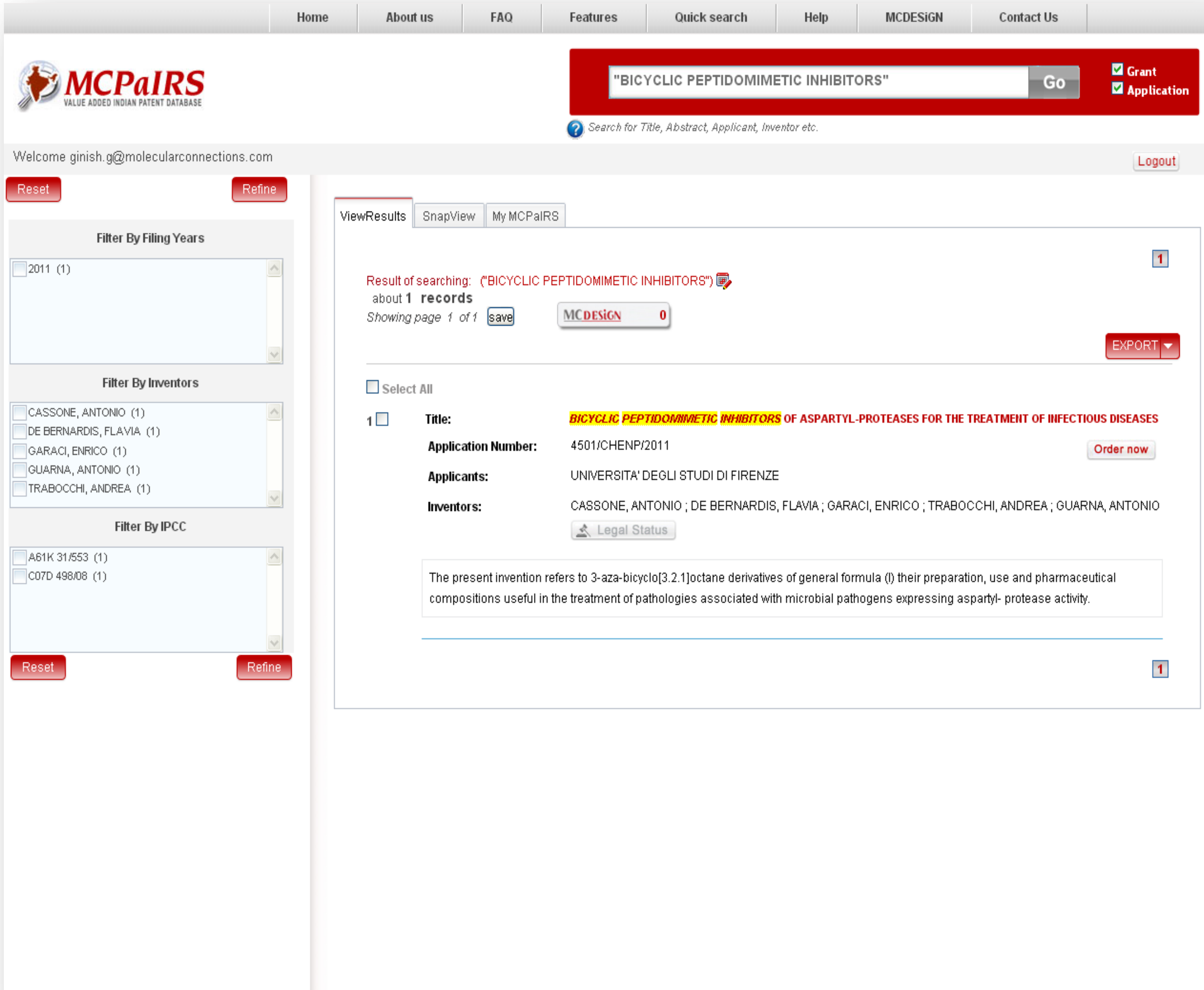


MCPaIRS ™ – Homepage

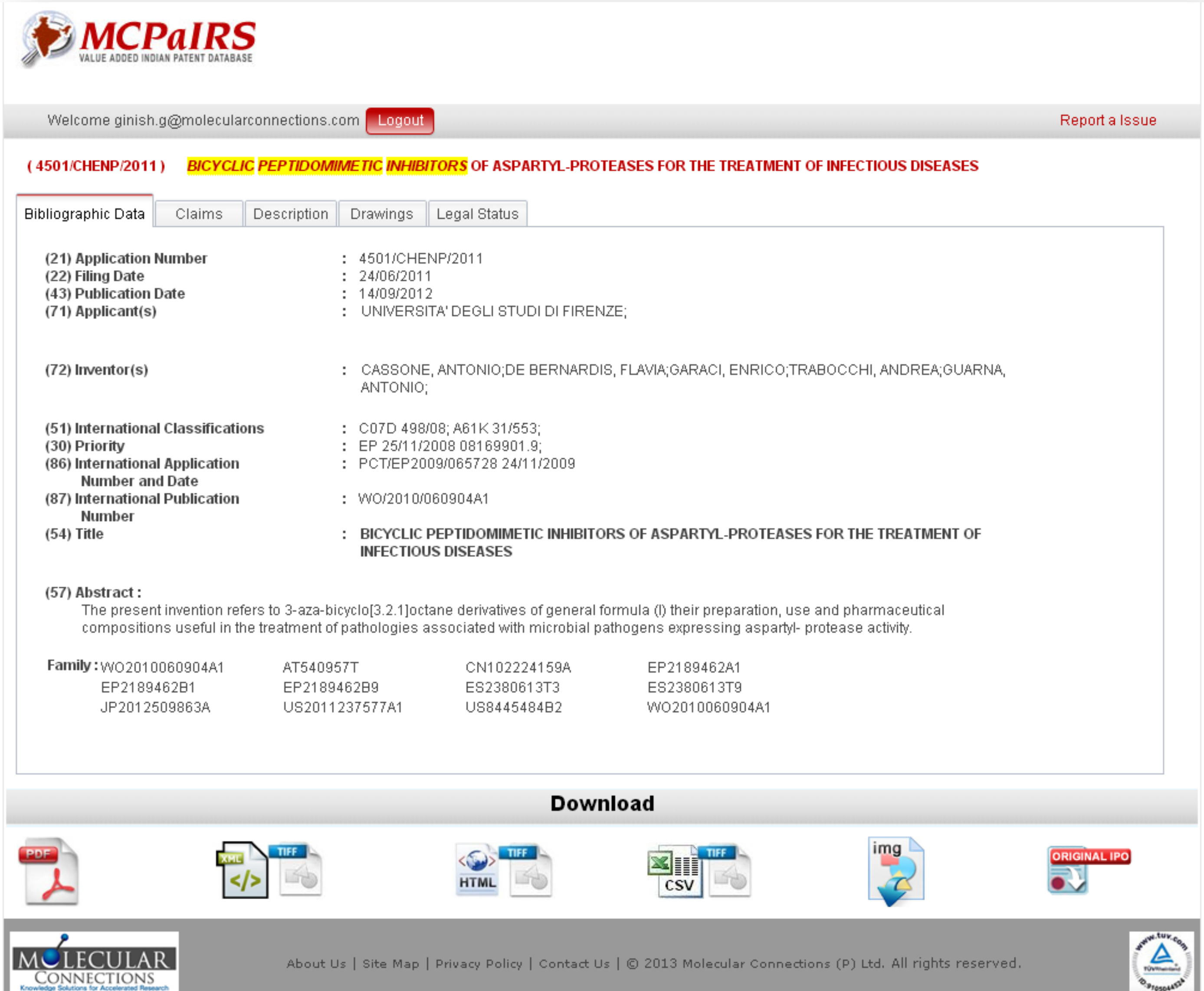


MOLECULAR CONNECTIONS
Knowledge Solutions for Accelerated Research

MCPaIRS TM – Search



MCPaIRS ™ – View Patent

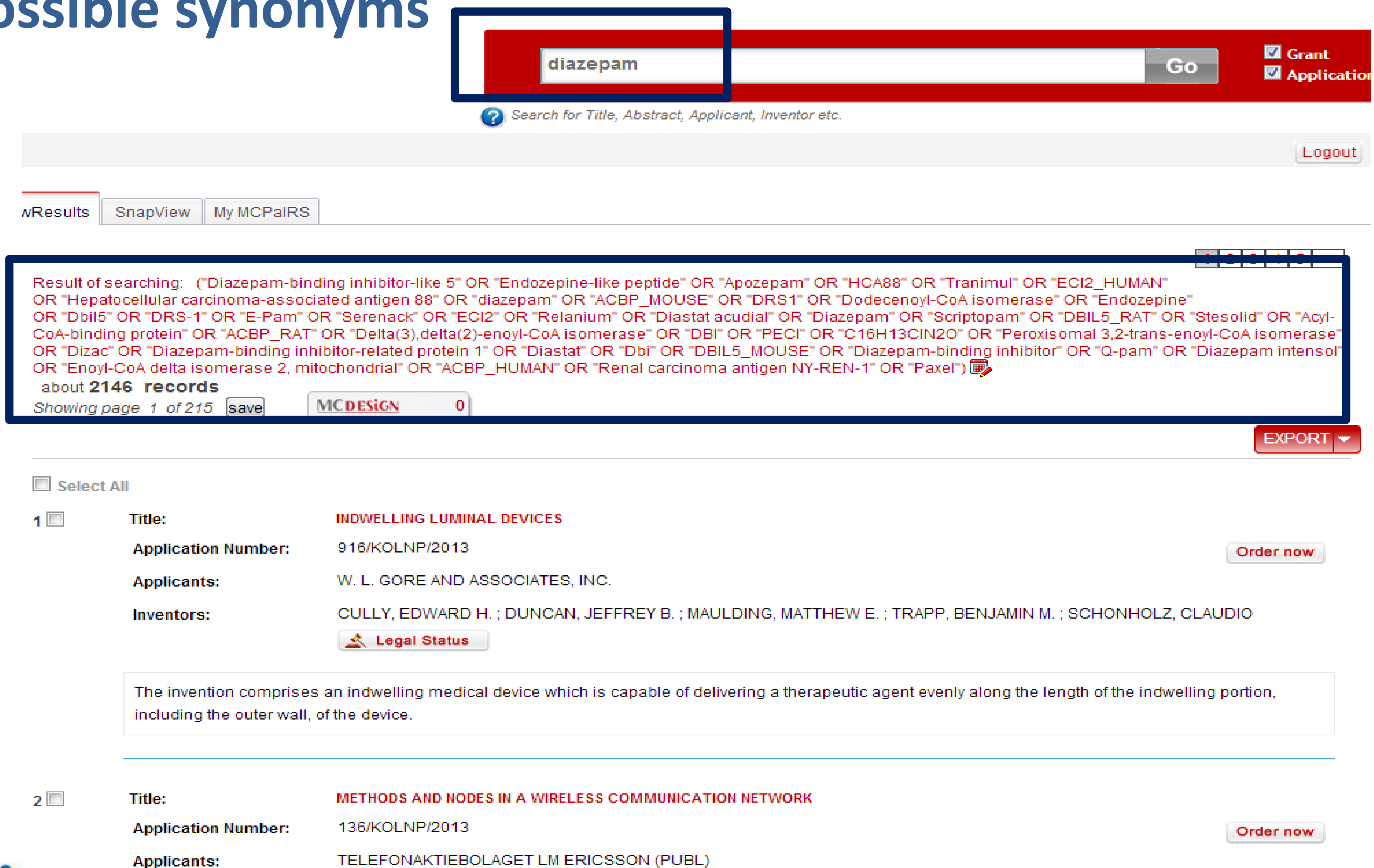


[Demo of actual full text document]

Benefits of Semantic Search Cartridge Enabled MCPaIRS ™

- ✓ **All results in a single query**
- ✓ **Automatic Expansion of the query with all possible synonyms**
- ✓ **Broadening of the search query**
- ✓ **Complex search queries possible**
- ✓ **All the synonyms highlighted**

Automatic Expansion of the query with all possible synonyms



Automatic Expansion of the query with all possible synonyms

CD2 Go

Grant
Application

Search for Title, Abstract, Applicant, Inventor etc.

Logout

Results | SnapView | My MCPaIRS

1 2 3 4 5 >>

Result of searching: ("CIN85" OR "T-cell surface antigen T11/Leu-5" OR "Human Src family kinase-binding protein 1" OR "Mets1" OR "CS1" OR "SLAM family member 9" OR "Mesenchyme-to-epithelium transition protein with SH3 domains 1" OR "CD2-associated protein" OR "SLAM family member 7" OR "CD2AP" OR "PPIP1_HUMAN" OR "CD2F10" OR "H-PIP" OR "Cas ligand with multiple SH3 domains" OR "KIAA1178" OR "CD2 family member 10" OR "CD2 subset 1" OR "CD2-binding protein 1" OR "CD2-binding protein 3" OR "Membrane protein FOAP-12" OR "CD2_RAT" OR "SRBC" OR "SLAF7_HUMAN" OR "Cd2" OR "Lymphocyte antigen 37" OR "Adapter protein CMS" OR "OX-34 antigen" OR "SH3KBP1" OR "Ly-37" OR "LFA-2" OR "CD2_HUMAN" OR "SH3K1_HUMAN" OR "Proline-serine-threonine phosphatase-interacting protein 1" OR "SH3 domain-containing kinase-binding protein 1" OR "Cd2ap" OR "CD2B2_MOUSE" OR "CD2 antigen cytoplasmic tail-binding protein 2" OR "CD84 homolog 1" OR "CD2BP1" OR "Novel Ly9" OR "CD2BP2" OR "CD2" OR "PSTPIP1" OR "Rosette receptor" OR "Cbl-interacting protein of 85 kDa" OR "T-cell surface antigen CD2" OR "CD2AP_MOUSE" OR "SLAMF9" OR "CD2-like receptor-activating cytotoxic cells" OR "CD2B2_HUMAN" OR "U5 snRNP 52K protein" OR "SLAMF7" OR "CD2AP_HUMAN" OR "LFA-3 receptor" OR "Cd2bp2" OR "Protein 19A" OR "Erythrocyte receptor" OR "SLAF9_HUMAN" OR "CD2_MOUSE")

about **1997 records**

Showing page 1 of 200 save

MCDESIGN 0

EXPORT

Select All

1 **Title:** 5-(BIPHENYL-4-YL)-3-PHENYL-1,2,4-OXADIAZOLYL DERIVATIVES AS LIGANDS ON THE SPHINGOSINE 1-PHOSPHATE (S1P) RECEPTORS

Application Number: 320/KOLNP/2013 — Order now

Applicants: MERCK SERONO S.A.

Inventors: BOMBRUN AGNES ; QUATTROPANI ANNA ; GONZALEZ JEROME ; DORBAIS JEROME ; KNIGHT CHRIS ; BAKER-GLENN CHARLES

Legal Status

The present invention provides compounds of Formula (I), as selective S1 P1 inhibitors, as well as their use for treating multiple sclerosis and other diseases.

2 **Title:** ANTI-CD48 ANTIBODIES AND USES THEREOF

Application Number: 832/KOLNP/2013 — Order now

MOLCON Knowledge Solut

Multiple key-words highlighted for the search: VEGF

Select All

Title: DUAL INHIBITORS OF MET AND *VEGF* FOR THE TREATMENT OF CASTRATION- RESISTANT PROSTATE CANCER AND OSTEOBLASTIC BONE METASTASES

Application Number: 998/KOLNP/2013

Order now

Applicants: EXELIXIS, INC.

Inventors: SMITH, DAVID ; HUSSAIN, MAHA

Legal Status

This invention is directed to the treatment of cancer, particularly castration-resistant prostate cancer and osteoblastic bone metastases, with a dual inhibitor of MET and *VEGF*.

Title: *ROCK2* AND ROCK3 TWO NEW GAIN-OF-FUNCTION VARIANTS OF THE CYTOKININ RECEPTORS AHK2 AND AHK3

Application Number: 424/CHENP/2012

Order now

Applicants: FREIE UNIVERSITAT BERLIN

Inventors: SCHMULLING, THOMAS ; WERNER, TOMAS ; BARTRINA Y MANNS, ISABEL ; BRAUN, HELEN

Legal Status

The present invention relates to two new gain of function variants of the cytokinin receptor proteins AHK2 and AHK3 namely *rock2* and rock3 to transgenic organisms comprising at least one of said new gain-of-function cytokinin receptor variants and to a method for the manufacturing of a transgenic plant comprising at least one of the new gain-of-function variants.

Title: BIOLOGICAL MARKERS FOR MONITORING PATIENT RESPONSE TO *VEGF* ANTAGONISTS

Application Number: 58/MUMNP/2012

Order now

Applicants: F. HOFFMANN-LA ROCHE AG (CH)

Inventors: BAIS, CARLOS ; BRAUER, MATTHEW ; KAMINKER, JOSHUA ; SINGH, MALLIKA

Legal Status

The invention provides methods and compositions to detect expression of one or more biomarkers for monitoring the effectiveness of treatment of with *VEGF* antagonists. The invention also provides methods for identifying and treating patients who are likely to be responsive to *VEGF* antagonist therapy. The invention

Complex Queries can be performed by using operators

Salbutamol AND CD48

Go

Grant

Application

Search for Title, Abstract, Applicant, Inventor etc.

Logout

ViewResults | SnapView | My MCPaIRS

1

Result of searching: ("Volmax" OR "C13H21NO3" OR "SALBUTAMOL" OR "Ventolin HFA" OR "Albuterol" OR "Proventil" OR "Combivent" OR "Duoneb" OR "Salbutamol" OR "ALBUTEROL" OR "Proair HFA" OR "PROVENTIL-HFA" OR "Proventil HFA" OR "Accuneb" OR "Ventolin") AND ("sgp-60" OR "Signaling lymphocytic activation molecule 2" OR "TCT.1" OR "CD48_RAT" OR "CD48 antigen" OR "BCM1 surface antigen" OR "Leukocyte antigen MEM-102" OR "CD48_MOUSE" OR "BLAST-1" OR "MRC OX-45 surface antigen" OR "Cd48" OR "CD48" OR "BLAST1" OR "SLAM family member 2" OR "HM48-1" OR "B-lymphocyte activation marker BLAST-1" OR "BCM1" OR "Bcm-1" OR "CD48_HUMAN")

about **4 records**

EXPORT

Select All

1 **Title:** NICOTINE IMMUNONANOTHERAPEUTICS

Application Number: 3540/DELNP/2011

Order now

Applicants: MASSACHUSETTS INSTITUTE OF TECHNOLOGY ; PRESIDENT AND FELLOWS OF HARVARD COLLEGE ; THE BRIGHAM AND WOMEN'S HOSPITAL, INC.

Inventors: MATTEO, IANNACONE ; ULRICH, VON ANDRIAN ; OMID, C. FAROKHZAD ; FRANK, ALEXIS ; PAMELA, BASTO ; JINJUN, SHI ; ELLIOTT, ASHLEY MOSEM ; ROBERT, LANGER ; ELENA, TONTI

Legal Status

The present invention pro-vides compositions and systems for delivery of nanocarriers to cells of the immune sys-tem. The invention provides nanocarriers capable of stimulating an immune response in T cells and/or in B cells. The invention provides nanocarriers that comprise an im-munofeature surface having a plurality of nicotine moieties. The invention provides pharmaceutical compositions comprising nanocarriers. The present invention pro-vides methods of designing, manufacturing, and using nanocarriers and pharmaceutical compositions thereof For example, the present invention describes nanocarriers ca-pable of eliciting an immune response and the production of anti-nicotine antibodies.

Boolean search is performed

2 **Title:** TARGETING OF ANTIGEN PRESENTING CELLS WITH IMMUNONANOTHERAPEUTICS

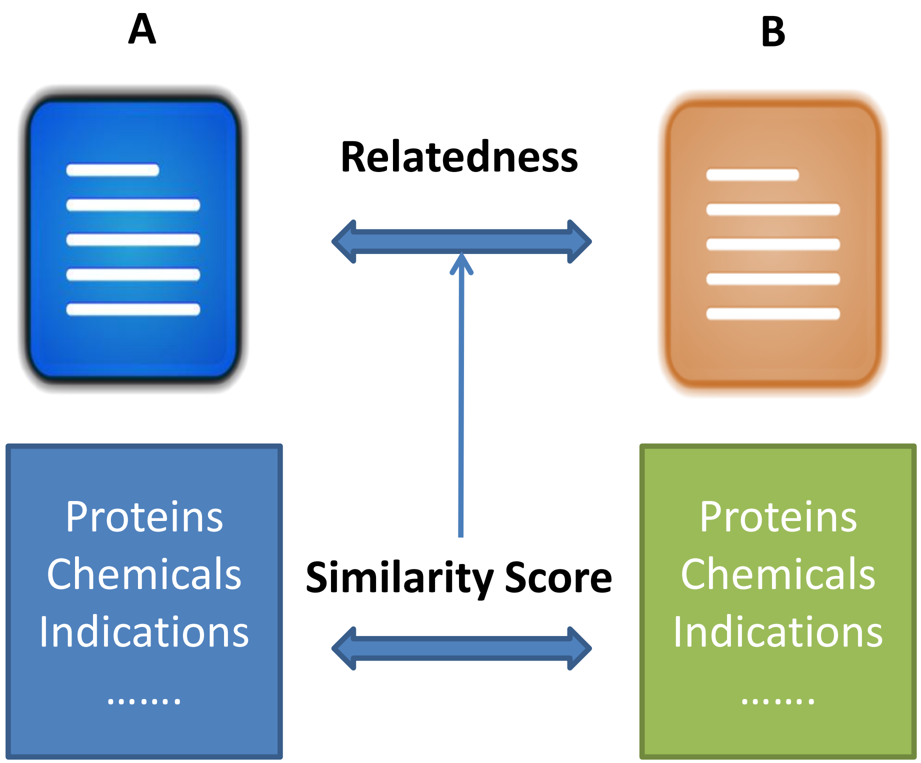
MOLECULAR CONNECTIONS

Knowledge Solutions for Accelerated Research

Sample queries with Semantic Search Cartridge

No	Query	No of results in iPairs	No of results in mcpairs	No of results in mcpairs with semantic search cartridge
1	Salbutamol	27	1560	**2548**
2	Amethocaine	0	58	**954**
3	Diazepam	4	1725	**2146**
4	Valsartan	84	1372	**1429**
5	Imatinib	65	1703	**1999**
6	Tamoxifen	16	3950	**4190**
7	Aspirin	61	5679	**6427**
8	Paracetamol	74	1161	**3696**
9	MyoD	2	130	**138**
10	Pax3	1	49	**56**
11	Sox9	0	39	**58**
12	FGF10	0	43	**131**
13	VEGF	192	4808	**6058**
14	BMP2	5	137	**214**
15	Salbutamol AND CD48	0	0	**4**

Benefit - Identifying Related Patents



Content Enrichment Approaches

- Manual
  - ✓ high quality, costly, not scalable, slow
- Automated
  - ✓ fast, quality below par, cost effective, scalable
- Hybrid
  - ✓ high quality, cost effective, scalable, reasonable speed

Molecular Connections is a pioneer in the use of hybrid approach to content enrichment

MOLECULAR CONNECTIONS
Knowledge Solutions for Accelerated Research

Key Takeaways

✓ Content Enrichment can improve search and retrieval immensely

✓?? CE can be looked at various levels

- Biology / chemistry / both / authors etc.

✓ You can bring the Web into the document through CE

- e.g. Augmented reference cards

✓ Growing Adoption of Content Enrichment

- Publishing (Early adopters)
- Patents

Thank You

Molecular Connections

www.molecularconnections.com