



Special Technical Report

**AMRI Contributions to Science:
Review of Scientific Publications in 2008**

**John W. Lippert, Ph.D., Margarita Kirova-Snover, Ph.D.
and R. Jason Herr, Ph.D.
Medicinal Chemistry Department**

Abstract: *As we have drawn the year 2008 to a close, we would like to take a moment to sum up the number of technological communications that AMRI scientists have contributed to the scientific community during this year. Please read through this document for a full list of abstracts (as they appear either with the original documents or taken from the SciFinder database) for all of the publications, presentations and patent applications that appeared during the year. We hope to make this bibliographical summary a regular year-end contribution.*

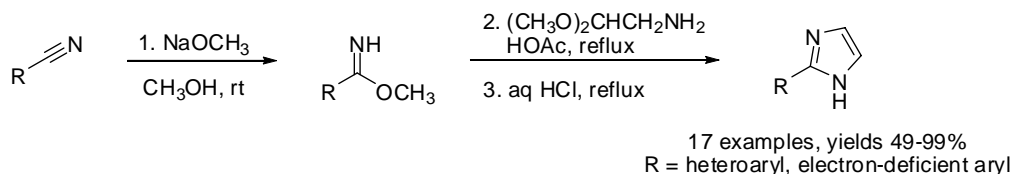
2009 AMRI Research Publications

During 2008, **twelve** research articles have appeared in peer-reviewed scientific journals that described innovations conceived by AMRI scientists. In most of these cases, these manuscripts were written by AMRI lead authors to communicate independent research, or were co-authored with customers to communicate research in collaboration with AMRI. Below are the bibliographies for these publications, including the abstracts, as they appeared with the original documents. The underlined name(s) indicate the lead author(s).

1. “A simple and convenient one-pot method for the preparation of heteroaryl-2-imidazoles from nitriles”, *Tetrahedron* **2008**, *64*(4), 645-651.

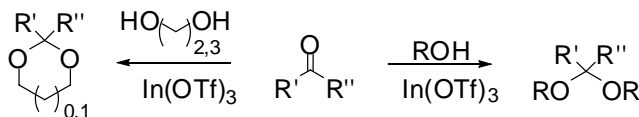
Matthew E. Voss,¹ Catherine M. Beer,¹ Scott A. Mitchell,² Peter A. Blomgren² and Paul E. Zhichkin¹

¹Medicinal Chemistry Department, AMRI and ²CGI Pharmaceuticals, Inc.



2. “Indium(III)trifluoromethanesulfonate as a mild, efficient catalyst for the formation of acetals and ketals in the presence of acid sensitive functional groups”, *Tetrahedron* **2008**, *64*(15), 3287-3295.

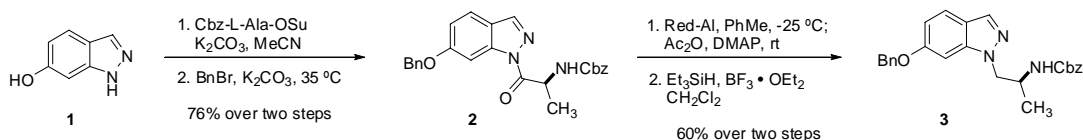
Brian T. Gregg, Kathryn C. Golden and John F. Quinn
Medicinal Chemistry Department, AMRI



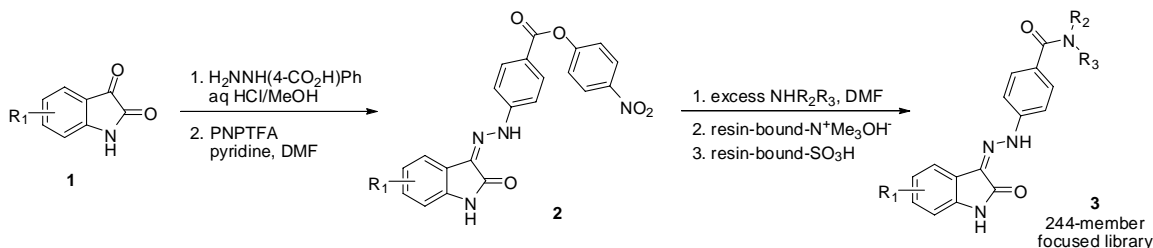
3. “Two-step N-acylindazole to N-alkylindazole reduction. Further synthetic studies on the serotonergic agonist AL-34662”, *Tetrahedron Letters* **2008**, *49*(3), 2348-2350.

Raymond E. Conrow,¹ Pete Delgado,¹ W. Dennis Dean,¹ Gary R. Callen² and Scott V. Plummer²

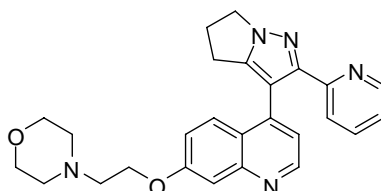
¹Alcon Research, Ltd and ²AMRI Syracuse Research Center



4. “**Solution phase synthesis of a 3,5,7-substituted indolin-2-one library as potential CDK2 inhibitor isosteres**”, *Letters in Drug Design & Discovery* **2008**, *5*(1), 43-47.
Dmytro O. Tymoshenko, Brian T. Gregg, Matthew J. Hirsch and Jennifer L. Butcher
 Medicinal Chemistry Department, AMRI

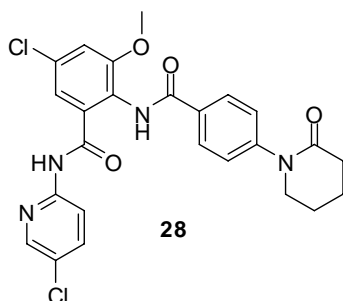


5. “**Optimization of a Dihydropyrrolopyrazole Series of Transforming Growth Factor- β Type I Receptor Kinase Domain Inhibitors: Discovery of an Orally Bioavailable Transforming Growth Factor- Receptor Type I Inhibitor as Antitumor Agent**”, *Journal of Medicinal Chemistry* **2008**, *51*(7), 2302–2306.
Hong-yu Li,¹ William T. McMillen,¹ Charles R. Heap,⁶ Denis J. McCann,² Lei Yan,³ Robert M. Campbell,⁴ Sreenivasa R. Mundla,⁵ Chi-Hsin R. King,⁶ Elizabeth A. Dierks,² Bryan D. Anderson,⁴ Karen S. Britt,⁴ Karen L. Huss,⁴ Matthew D. Voss,⁵ Yan Wang,¹ David K. Clawson,¹ Jonathan M. Yingling³ and J. Scott Sawyer¹
¹Discovery Chemistry Research and Technology, ²Drug Disposition Research, ³Cancer Research, ⁴Lead Optimization Biology and ⁵Chemical Product Research and Development Departments, Lilly Research Laboratories, A Division of Eli Lilly and Company and ⁶Medicinal Chemistry Department, AMRI



15d (LY2109761)

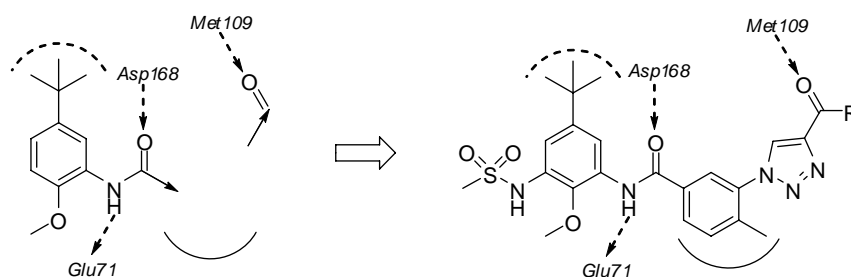
6. “**Structure–activity relationships of anthranilamide-based factor Xa inhibitors containing piperidinone and pyridinone P4 moieties**”, *Bioorganic & Medicinal Chemistry Letters* **2008**, *18*(9), 2845–2849.
James R. Corte,¹ Tianan Fang,¹ Donald J. P. Pinto,¹ Wei Han,^a Zilun Hu,¹ Xiang-Jun Jiang,¹ Yun-Long Li,¹ Jolicia F. Gauuan,² Mark Hadden,² Darren Orton,² Alan R. Rendina,¹ Joseph M. Luetgen,¹ Pancras C. Wong,¹ Kan He,¹ Paul E. Morin,¹ Chong-Hwan Chang,¹ Daniel L. Cheney,¹ Robert M. Knabb,¹ Ruth R. Wexler¹ and Patrick Y. S. Lam¹
¹Bristol-Myers Squibb Research and Development, Princeton, NJ and ²Medicinal Chemistry Department, AMRI



7. “**Structure-based design and subsequent optimization of 2-tolyl-(1,2,3-triazol-1-yl-4-carboxamide) inhibitors of p38 MAP kinase**”, *Bioorganic & Medicinal Chemistry Letters* **2008**, *18(11)*, 3251–3255.

D. A. Cogan,¹ R. Aungst,⁴ E. C. Breinlinger,⁴ T. Fadra,¹ D. R. Goldberg,¹ M. H. Hao,¹ R. Kroe,³ N. Moss,¹ C. Pargellis,² K. C. Qian¹ and A. D. Swinamer¹

Departments of ¹Medicinal Chemistry, ²Immunology and Inflammation and ³Biologics and Biomolecular Sciences, Boehringer Ingelheim Pharmaceuticals, Inc., Research and Development Center, 900 Ridgebury Road, Ridgefield, CT 06877 USA and ⁴Medicinal Chemistry Department, AMRI



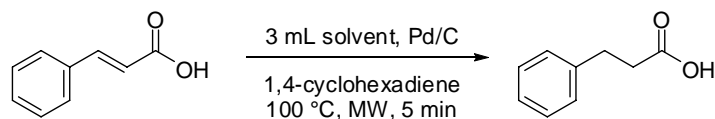
8. “**Reversible derivatization to enhance enzymatic synthesis: chemoenzymatic synthesis of doxorubicin-14-O-esters**”, *Biotechnology and Bioengineering* **2008**, *101(3)*, 435-40.

Ian C. Cotterill,¹ Joseph O. Rich,² Marc D. Scholten,¹ Lyudmila Mozhaeva¹ and Peter C. Michels¹

¹Discovery R&D, Metabolism and Biotransformations Department, AMRI and ²United States Department of Agriculture, Agricultural Research Service, National Center for Agricultural Utilization Research, Bioproducts and Biocatalysis, 1815 N. University St., Peoria, Illinois

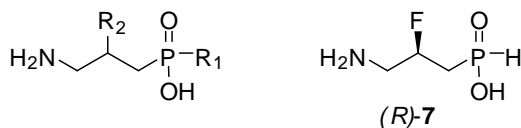
9. “**1,4-Cyclohexadiene with Pd/C as a rapid, safe transfer hydrogenation system with microwave heating**”, *Tetrahedron Letters* **2008**, *49(42)*, 6137-6140.

John F. Quinn, Dana A. Razzano, Kathryn C. Golden and Brian T. Gregg
Medicinal Chemistry Department, AMRI



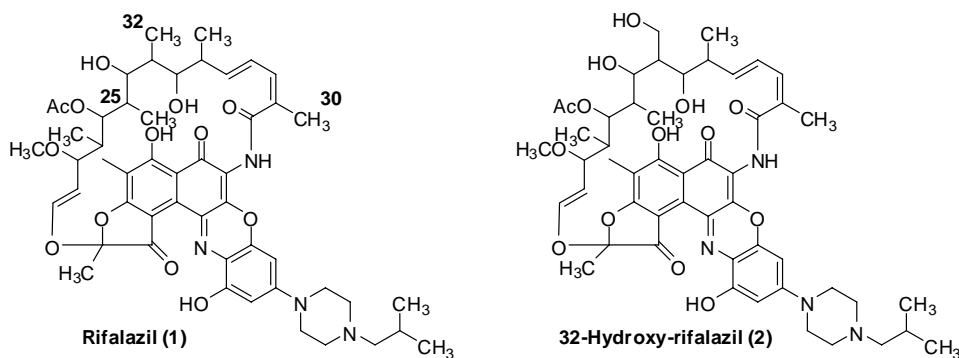
10. “**Synthesis and Pharmacological Evaluation of Novel γ -Aminobutyric Acid Type B (GABA_B) Receptor Agonists as Gastroesophageal Reflux Inhibitors**”, *Journal of Medicinal Chemistry* **2008**, 51(14), 4315-4320.

Christer Alstermark,¹ Kosrat Amin,¹ Sean R. Dinn,² Thomas Elebring,¹ Ola Fjellström,¹ Kevin Fitzpatrick,² William B. Geiss,² Johan Gottfries,¹ Peter R. Guzzo,² James P. Harding,² Anders Holmén,¹ Mohit Kothare,² Anders Lehmann,¹ Jan P. Mattsson,¹ Karolina Nilsson,¹ Gunnel Sundén,¹ Marianne Swanson,¹ Sverker von Unge,¹ Alex M. Woo,² Michael J. Wyle² and Xiaozhang Zheng²
¹AstraZeneca R&D Mölndal, S-431 83 Mölndal, Sweden and ²Medicinal Chemistry Department, AMRI



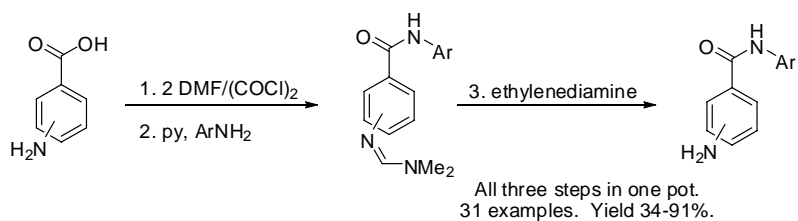
11. “**Extractive biotransformation for production of metabolites of poorly soluble compounds: synthesis of 32-hydroxy-rifalazil**”, *Drug Metabolism and Disposition* **2008**, 36(10), 1998-2004.

Vadim V. Mozhaev, Lyudmila V. Mozhaeva, Peter C. Michels and Yuri L. Khmel'nitsky
Discovery R&D, Metabolism and Biotransformations Department, AMRI



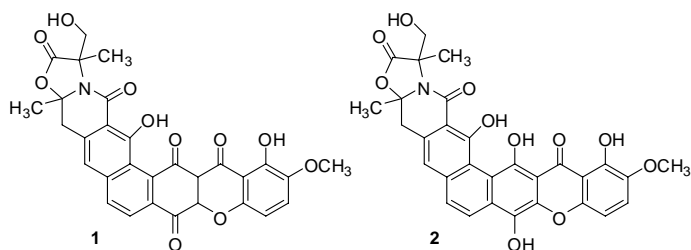
12. “**The Use of Formamidine Protection for the Derivatization of Aminobenzoic Acids**”, *Journal of Organic Chemistry* **2008**, 73(22), 8954-8959.

Paul E. Zhichkin, Lisa H. Peterson, Catherine M. Beer and W. Martin Rennells
Medicinal Chemistry Department, AMRI



13. “Citreamicins with Potent Gram-Positive Activity”, *Journal of Natural Products* (2008, 71(12), 2032-2035.

D. Craig Hopp, Dennis J. Milanowski, Joshua Rhea, Daniel Jacobsen, John Rabenstein, Chris Smith, Khadija Romari, Midori Clarke, Linda Francis, Macarena Irigoyen, Michele Luche, Grant J. Carr and Ulla Mocek
Discovery R&D, Bothell Research Center, AMRI



2008 AMRI Review Publications (including Book Chapters)

AMRI scientists were also lead authors on **five** review publications during 2008, many appearing as chapters in serial book series or in scientific journals, and are abstracted in scientific databases.

1. **“Benzoheteropines with fused pyrrole, furan and thiophene rings”** in *Advances in Heterocyclic Chemistry, Volume 96*, A. R. Katritzky, Ed.; Elsevier Academic Press: Oxford, 2008, pgs 1-80.
Dmytro O. Tymoshenko, Medicinal Chemistry Department, AMRI
2. **“Microwave-assisted Claisen and aza-Claisen rearrangements”**, *Mini-Reviews in Organic Chemistry* **2008**, 5(2), 85-95.
Dmytro O. Tymoshenko, Medicinal Chemistry Department, AMRI
3. **“Pyrazoles”** in *Comprehensive Heterocyclic Chemistry III, Volume 4*, A. R. Katritzky, C. A. Ramsden, E. F. V. Scriven and R. J. K. Taylor, Eds.; Elsevier Academic Press: Oxford, 2008, pgs 1-142.
Larry Yet, Singapore Research Centre, AMRI
4. **“Five membered ring systems: with more than on N atom”** in *Progress in Heterocyclic Chemistry, Volume 19*, G. W. Gribble and J. A. Joule, Eds. Elsevier Ltd: London, 2008, pgs 208-241.
Larry Yet, Singapore Research Centre, AMRI
5. **“Book Review of ‘Chirality in Drug Research’ by E. Francotte and W. Lindner”**, *Synthesis* **2008**, 4, 660.
Steven J. Collier, Singapore Research Centre, AMRI

AMRI Research Presented (Oral Papers and Posters)

At least **seven** presentations were given by AMRI scientists during the year 2008, both as talks given at scientific meetings (**two**) and as posters presented (**four**). At this year's Northeast Regional American Chemical Society Meeting, these two presentations were given by AMRI scientists to audiences of about fifty attendees.

1. Poster Presentation: "Synthesis and SAR of novel 11'-vinorelbine, 12'-vinblastine, and 12'-vincristine alkaloid analogs", MEDI-477: Abstracts of Papers, 236th ACS National Meeting, Philadelphia, PA, United States, August 17-21, 2008. Matthew E. Voss,¹ Jeffery M. Ralph,¹ Dejian Xie,¹ David D. Manning,² Mark A. Wolf,² Paolo Pasetto,¹ Matthew D. Surman,² Yeyu Cao,² Thomas D. Friedrich,³ Denise Peace³ and Ian L. Scott²

¹Medicinal Chemistry and ²Discovery Research & Development, Chemistry Departments, AMRI and ³Center for Immunology and Microbial Disease, Albany Medical College

2. Poster Presentation: "Design and synthesis of a focused 3-(hetero)arylpyrazolo[1,5-*a*]pyrimidine-6-carboxamide library", ORGN-156: Abstracts of Papers, 236th ACS National Meeting, Philadelphia, PA, United States, August 17-21, 2008.

Brian T. Gregg
Medicinal Chemistry Department, AMRI

3. Oral Presentation: "Diversity Oriented Synthesis of Small Molecule Heterocyclic Compound Libraries", NERM-050: Abstracts of Papers, 37th Northeast Regional Meeting of the American Chemical Society, Burlington, VT, United States, June 29-July 2, 2008.

Brian T. Gregg, John F. Quinn, Dmytro O. Tymoshenko, Kathryn C. Golden, Dana A. Razzano
Medicinal Chemistry Department, AMRI

4. Oral Presentation: "Iridium- and Palladium-Catalyzed Syntheses of (*S*)-(+ and (*R*)-(-) Coniine from Enantiopure Allylic Alcohols", NERM-123: Abstracts of Papers, 37th Northeast Regional Meeting of the American Chemical Society, Burlington, VT, United States, June 29-July 2, 2008.

R. Jason Herr, Matthew S. Dowling, Amanda C. Scampini, Tiffany M. Smith
Medicinal Chemistry Department, AMRI

5. Poster Presentation: "2,3-Diaminopyrazines as Inhibitors of Rho Kinase", NERM-251: Abstracts of Papers, 37th Northeast Regional Meeting of the American Chemical Society, Burlington, VT, United States, June 29-July 2, 2008.

Alan J. Henderson, Mark Hadden, Cheng Guo, Neema Douglas, Neema; Helene Y. Decornez, Mark R. Hellberg, Andrew Rusinko, Martin B. Wax, Marsha McLaughlin, Naj Sharif, Colene Drace, Raj Patil
Discovery Research & Development, Chemistry Department, AMRI

6. Poster Presentation: “Discovery of 2-aminobenzoxazole carboxamides as 5-HT3 receptor antagonists”, MEDI 205 (Division of Medicinal Chemistry), 235th ACS National Meeting, New Orleans, LA, April 6-10, 2008.

Brian I. Bliss,¹ Kevin L. Christensen,² Marlene L. Cohen,⁵ Russell J. DeOrazio,⁴ Svetlana Dobritsa,² David J. Fairfax,¹ Kevin Fitzpatrick,⁴ Peter R. Guzzo,⁴ James P. Harding,¹ Carla Hassler,⁴ Matthew Isherwood,⁴ John P. Lindsay,³ Jun-Ho Maeng,⁴ David D. Manning,⁴ Liaqat Masih,⁴ Vadim V. Mozhaev,³ Zhicai Yang⁴ and Julianne V. Zaremba³
¹Medicinal Chemistry, ²Discovery Research & Development, In Vitro Biology, ³Discovery Research & Development, Metabolism and Biotransformation and ⁴Discovery Research & Development, Chemistry Departments, AMRI and ⁵Creative Pharmacology Solutions LLC

7. Poster Presentation: “Process Development for Pilot Scale Production of Nargenicin A1”, SIM Annual Meeting Program & Abstracts, San Diego, CA, United States, August 10-14, 2008.

Christopher S. Renzi, David Brzozowski, Matthew Chase, Ian C. Cotterill, Ph.D., Amanda Madjid-Yunus, and Thomas Phillips
Discovery Research and Development, Metabolism and Biotransformations, AMRI

8. Poster Presentation: “Process Development for Pilot Scale Production of Nodusmicin”, SIM Annual Meeting Program & Abstracts, San Diego, CA, United States, August 10-14, 2008.

David B. Brzozowski, Matthew W. Chase, Ian C. Cotterill, Ph.D., Amanda Madjid-Yunus, Thomas B. Phillips, and Christopher S. Renzi
Discovery Research and Development, Metabolism and Biotransformations, AMRI

Patent Applications Filed and Issued containing AMRI Scientists

The process of obtaining a patent for an invention often takes several years, from the filing of the application through the subsequent review and issuance by various national patent offices. During this year, **nine** patent applications were filed by AMR Technology, Inc, USA (our corporate holding company for patents assigning all rights to AMRI as the owner of the intellectual property). In addition, **three** previously filed patent applications were issued as full US patents. In all cases, AMRI scientists were named as co-inventors. Several other patent applications filed by customers and collaborators were also published during the year, in which AMRI scientists were named as co-inventors (**four** listed below).

Patent applications filed by AMRI covering novel intellectual property (IP) owned by AMR Technology, Inc., USA:

1. **“Aryl- and heteroaryl-substituted tetrahydrobenzazepines and use thereof to block reuptake of norepinephrine, dopamine, and serotonin”**, originally filed as US Patent Application Publication 2007/0021408 A1 and PCT International Application Publication 2007/011820 A2, then as US Patent Application Publication 2008/0207595 A9 (AMR Technology, Inc., USA; Bristol-Myers Squibb Company).
Bruce F. Molino,¹ Shuang Liu,¹ Aruna Sambandam,¹ Peter R. Guzzo,¹ Min Hu,¹ Congxiang Zha,¹ Kassoum Nacro,¹ David D. Manning,¹ Matthew L. Isherwood,¹ Kristen N. Fleming,¹ Wenge Cui¹ and Richard E. Olson²
¹Discovery R&D, Chemistry Department, AMRI and ²Bristol-Myers Squibb Company
2. **“Preparation of 5-furo[3,2-*c*]pyridinone substituted indazoles as modulators of melanin-concentrating hormone (MCH1) receptor”**, PCT International Application Publication WO 2008/086409 A1 (AMR Technology, Inc., USA).
Peter Guzzo and Matthew D. Surman
Discovery R&D, Chemistry Department, AMRI
3. **“Preparation of 5-pyridinone substituted indazoles as modulators of melanin-concentrating hormone (MCH1) receptor”**, PCT International Application Publication WO 2008/086404 A1 (AMR Technology, Inc., USA).
Peter Guzzo, Matthew D. Surman, Alan J. Henderson, Mark Hadden and May Xiaowu Jiang
Discovery Research R&D, Chemistry Department, AMRI
4. **“Preparation of vinorelbine derivatives as antitumor agents”**, US Patent Application Publication US 2008/0125451 A1 and PCT International Application Publication WO 2008/033935 A2 (AMR Technology, Inc., USA).
Mark W. Wolf,¹ Peter R. Guzzo¹ and Ian L. Scott²
¹Discovery R&D, Chemistry and ²Discovery R&D, Lead Discovery, AMRI

5. **“Preparation of vinca alkaloid derivatives as antitumor agents”**, US Patent Application Publication 2008/0119502 A1 and PCT International Application Publication WO 2008/033930 A2 (AMR Technology, Inc., USA).

Mark W. Wolf,¹ Peter R. Guzzo¹ and Ian L. Scott²

¹Discovery Research R&D, Chemistry and ²Discovery R&D, Lead Discovery, AMRI

6. **“2-Aminobenzoxazolecarboxamides as 5HT3 modulators and their preparation, pharmaceutical compositions and use in the treatment of CINV, IBS-D and other disease”**, PCT International Application Publication WO 2008/019372 A2 (AMR Technology, Inc., USA).

David J. Fairfax¹ and Zhicai Yang²

¹Medicinal Chemistry and ²Discovery R&D, Chemistry, AMRI

7. **“2-Alkylbenzoxazolecarboxamides as 5HT3 modulators and their preparation, pharmaceutical compositions and use in the treatment of CINV, IBS-D and other disease”**, US Patent Application Publication 2008/0214601 A1 and PCT International Application Publication WO 2008/019363 A2 (AMR Technology, Inc., USA).

David J. Fairfax¹ and Zhicai Yang²

¹Medicinal Chemistry and ²Discovery R&D, Chemistry, AMRI

8. **“Aryloxy-and heteroaryloxy-substituted tetrahydrobenzazepines and use thereof to block reuptake of norepinephrine, dopamine, and serotonin”**, PCT International Application Publication WO 2008/141082 A1 (AMR Technology, Inc., USA and Bristol-Myers Squibb Company, USA).

Shuang Liu,¹ Yuh-Lin Allen Yang,¹ Aruna Sambandam,¹ Bruce F. Molino¹ and Richard E. Olson²

¹Discovery R&D, Chemistry, AMRI and ²Bristol-Myers Squibb Company

9. **“Aryl- and heteroaryl-substituted tetrahydrobenzo-1,4-diazepines and use thereof to block reuptake of norepinephrine, dopamine, and serotonin”**, PCT International Application Publication WO 2008/141081 A1 (AMR Technology, Inc., USA and Bristol-Myers Squibb Company, USA).

Peter R. Guzzo,¹ Bruce F. Molino,¹ Wenge Cui,¹ Shuang Liu¹ and Richard E. Olson²

¹Discovery R&D, Chemistry, AMRI and ²Bristol-Myers Squibb Company

Issued patents previously filed as applications by AMRI:

1. **“Preparation of cyclosporin alkyne analogues for pharmaceutical use”**, originally filed as US Patent Application Publication 2006/0069016 A1 and PCT International Application Publication 2006/039163 A2 (AMR Technology, Inc., USA), issued as US Patent 7,378,391 B2 (2008).

Bruce F. Molino and Zhicai Yang

Discovery Research R&D, Chemistry, AMRI

2. **“Preparation of cyclosporin alkynes as pharmaceutical agents”**, originally filed as US Patent Application Publication 2006/0074015 A2 and PCT International Application Publication 2006/041631 A2 (AMR Technology, Inc., USA), issued as US Patent 7,361,636 B2 (2008).

Bruce F. Molino and Zhicai Yang
Discovery Research R&D, Chemistry, AMRI

3. **“4-Phenyl substituted tetrahydroisoquinolines and therapeutic use thereof”**, originally filed as US Patent Application Publication 2002/0091134 A1 and PCT International Application Publication 2002/004455 A2 (Dupont Pharmaceuticals Company, USA), then as US Patent Application Publication 2006/0025435 A1 (AMR Technology, Inc., USA), issued as US Patent 7,419,985 B2 (2008).

James P. Beck,¹ Anthony D. Pechulis² and Arthur E. Harms²

¹DuPont Pharmaceuticals Company and ²Medicinal Chemistry Department, AMRI

Some patents filed by collaborators/customers of AMRI containing AMRI scientists as co-inventors, but for which AMRI is not a co-assignee (NOT a fully inclusive list):

1. **“Pyridazinone derivatives useful as glucan synthase inhibitors”**, PCT International Application Publication WO 2008/115381 A1 (Schering Corporation, USA and AMRI). Pauline C. Ting,¹ Robert G. Aslanian,¹ Jianhua Cao,¹ David Won-Shik Kim,¹ Rongze Kuang,¹ Gang Zhou,¹ R. Jason Herr,² Andrew J. Zych,² Jinhai Yang,² Heping Wu¹ and Nicolas Zorn¹

¹Medicinal Chemistry Department, Schering-Plough Research Institute and ²Medicinal Chemistry Department, AMRI

2. **“4-Phenyl substituted tetrahydroisoquinolines and therapeutic use thereof”**, originally filed as US Patent Application Publication 2006/0058295 A1 and PCT International Application Publication WO 2004/050659 A1 (Eli Lilly and Company, USA), issued as US Patent 7,405,299 B2 (2008).

Douglas W. Beight,¹ Timothy P. Burkholder,¹ Todd V. Decollo,¹ Alexander G. Godfrey,¹ Charles R. Heap,² Chi-Hsin Richard King,¹ Hong-Yu, Li,¹ William T. McMillen,¹ J. Scott Sawyer,¹ Yan Wang,¹ Clive G. Diefenbacher,¹ Thomas A. Engler,¹ Sushant Malhotra¹ and Sreenivasa R. Mundla¹

¹Eli Lilly and Company and ²Medicinal Chemistry Department, AMRI

3. **“Preparation of aryl-substituted heterocyclalkanoic acid derivatives for the oral delivery of a glucagon like peptide-1 compound or a melanocortin 4 receptor agonist peptide”**, US Patent Application Publication 2008/0214448 A1 (Emisphere Technologies, Inc, USA) and PCT International Application Publication WO 2005/2005019184 A1 (Eli Lilly and Company, USA).

R. Jason Herr,¹ Louis N. Jungheim,² John M. McGill, III,² Kenneth J. Thrasher² and Muralikrishna Valluri¹

¹Medicinal Chemistry Department, AMRI and ²Eli Lilly and Company

4. **“Preparation of *N*-aryl-1*H*-indole-2-carboxamides as cytokine inhibitors”**, originally filed as US Patent Application Publication 2004/0186114 A1 and PCT International Application Publication WO 2005/016918 A2 (Boehringer Ingelheim Pharmaceuticals, Inc., USA), issued as US Patent 7,335,657 B2 (2008).
Pier F. Cirillo,¹ Donghong A. Gao,¹ Daniel R. Goldberg,¹ Abdelhakim Hammach,¹ Ming-Hong Hao,¹ Victor M. Kamhi,¹ Neil Moss,¹ Matthew R. Netherton,¹ Kevin C. Qian,¹ Mark. S. Ralph,¹ Lifen Wu,¹ Zhaoming Xiong¹ and Ronald A. Aungst, Jr.²
¹Boehringer Ingelheim Pharmaceuticals, Inc. and ²Medicinal Chemistry Department, AMRI