

HEIDI R. KAST-WOELBERN, PH.D.

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3900 Lomaland

San Diego, CA 92106

EDUCATION

- Postdoctoral Fellow 2001-2002
University of California Los Angeles
Characterization of FXR null mice by gene expression analysis
- Ph.D. in Molecular Biology 1996-2001
University of California Los Angeles – Biological Chemistry
Advisor: Professor Peter Edwards
Thesis: *The Farnesoid-X-activated Receptor and its Role in Lipid Metabolism*
- B.S. Chemistry and B.A. Religious Studies 1991-1995
Westmont College, Santa Barbara, CA
Graduated *Magna Cum Laude*

PROFESSIONAL EXPERIENCE

- Point Loma Nazarene University** 2008 -
present
- Department of Biology
- Full Professor** 2024 - present
- Associate Professor** 2020 - 2024
- Assistant Professor** 2018 - 2020
- Part-time Professor** 2014 - 2018
- Adjunct Professor** 2008 - 2014
- University of California San Diego** 2009 - 2010
Center for Research on Educational Equity, Assessment and Teaching Excellence (CREATE)
Academic Coordinator I
Project Director for SEASAND, a professional development program targeting science teachers from low performing schools at the middle school and high school level.
- Ligand Pharmaceuticals**, San Diego, CA 2002 - 2007
Department of Molecular and Cell Biology

Senior Research Scientist (2005- 2007)

Project leader for an exploratory initiative which identified antagonists of the Hedgehog signaling pathway.

- Coordinated a team of scientists across disciplines (chemistry, pharmacology, molecular biology, and high-throughput screening) to identify novel Hedgehog pathway targets.
- Established the primary screening assay utilizing β -lactamase technology in 384 well format, resulting in increased output of data at a fraction of the cost (75% savings), and measuring multiple endpoints (potency and toxicity) in a single assay.
- Managed a team of scientists to create and optimize a set of assays for secondary and tertiary screening of lead compounds.

Research Scientist (2002 – 2005)

Contributing scientist for an exploratory project to define the role of PPARs in oncology.

- Designed and analyzed multiple micorarray studies of PPAR modulators in colorectal cancer cells that identified targets associated with growth inhibition, cell differentiation and apoptosis.
- Optimized and introduced branched DNA technology to Ligand for mRNA analysis. This technology reduced the time to obtain data and improved costs by 66%.

Team member in a metabolic disease alliance with Eli Lilly to identify novel PPAR modulators and the mechanism by which they modulate glucose metabolism as well as their negative side effects (such as weight gain and edema).

- Identified a molecular marker for weight gain occurring in type II diabetics.
- Determined the mechanism by which PPAR γ agonists and SREBP modulate the hepatic expression of INSIG-1 mRNA levels. These studies provided a link between insulin sensitizers and the regulation of lipid homeostasis.

Westmont College, Santa Barbara, CA
Department of Chemistry

1995 - 1996

Lecturer

1996

- Introduction to General Chemistry II

Laboratory Instructor

1995 - 1996

- General Chemistry Lab I and II – instructor and coordinator

COURSES TAUGHT

Point Loma Nazarene University

Introduction to General, Organic and Biological Chemistry Lab (CHE1003L)

General Chemistry I Lab (CHE1052L)

General Chemistry II Lab (CHE1053L)

Biotechnology and Society (BIO1004)

Introduction to Cell Biology and Biochemistry and Lab (BIO2010 and BIO2010L)

Ecological and Evolutionary Systems Lab (BIO2011L)

Microbiology of Infectious Diseases and Lab (BIO2020 and BIO2020L)

Genetics and Lab (BIO3045 and BIO3045L)

Research Methodology (BIO3052)
Developmental Biology Lab (BIO4000L)
Perspectives on Science (BIO6092)
Research Methods (BIO6043)

University of California Los Angeles

Nutritional Biochemistry – Teaching Assistant (medical students)
Introduction to Genetics (LS4) – Teaching Assistant (undergraduates)
Introduction to Molecular Biology (LS3) – Teaching Assistant (undergraduates)

Westmont College

General Chemistry II (CHE6)
General Chemistry I and II Lab (CHE5L and CHE6L)

PUBLICATIONS

1. **Kast-Woelbern, H.R.**, Martinho, S.K., Julio, K.T., Vazzana, A.M., Mandagie, A.E., and Jansma, A.L. (2025). The use of intrinsic disorder and phosphorylation by oncogenic viral proteins to dysregulate the host cell cycle through interaction with pRB. *Viruses* June; 17:835.
2. Malone, M., Maeyama, A., Ogden, N., Perry, K.N., Kramer, A., Bates, C., Camryn Marble, C., Orlando, R., Rausch, A., Smeraldi, C., Lowey, C., Fees, B., Dyson, H.J., Dorrell, M.I., **Kast-Woelbern, H.R.**, Jansma, A.L. (2024) The effect of phosphorylation efficiency on the oncogenic properties of the protein E7 from high-risk HPV. *Virus Research* Oct; 348:199446.
3. Dorrell, M.I., **Kast-Woelbern H.R.**, Botts, R.T., Bravo, S.A., Tremblay, J.R., Giles, S., Wada, J.F., Alexander, M.A., Garcia, E., Villegas, G., Booth, C.B., Purington, K.J., Everett, H.M., Siles, E.N., Wheelock, M., Silva, J.A., Fortin, B.M., Lowey, C.A., Hale, A.L., Kurz, T.L., Rusing, J.C., Goral, D.M., Thompson, P., Johnson, A.M., Elson, D.J., Tadros, R., Gillette, C.E., Coopwood, C., Rausch, A.L., and Snowbarger, J.M. (2021) A Novel Method of Screening Combinations of Angiostatics Identifies Bevacizumab and Temsirolimus as Synergistic Inhibitors of Glioma-Induced Angiogenesis. *PLoS ONE* 16(6):e0252233.
4. Shih, D.M., **Kast-Woelbern, H.R.**, Wong, J., Xia, Y.R., Edwards, P.A. and Lusic, A.J. (2006) A role for FXR and human FGF-19 in the repression of paraoxonase-1 gene expression by bile acids. *J. Lipid Res.* 47: 384-92.
5. Lee, F.Y., **Kast-Woelbern, H.R.**, Chang, J., Luo, G., Jones, S.A., Fishbein, M.C., and Edwards P.A. (2005) Alpha-crystallin is a target gene for the farnesoid X-activated receptor in human livers. *J. Biol. Chem.* 280: 31792-31800.

6. Anisfeld A.M., **Kast-Woelbern H.R.**, Lee H., Zhang Y., Lee F.Y., and Edwards P.A. (2005) Activation of the nuclear receptor FXR induces fibrinogen expression: a new role for bile acid signaling. *J. Lipid Res.* 46:458-468.
7. **Kast-Woelbern, H.R.**, Dana, S.L., Cesario, R.M., Sun L., de Grandpre, L.Y., Brooks, M.E., Osburn, D.L., Reifel-Miller, A., Klausing, K., and Leibowitz, M.D. (2004) Rosiglitazone induction of INSIG-1 in white adipose tissue reveals a novel interplay of PPAR γ and SREBP in the regulation of adipogenesis. *J. Biol. Chem.* 279: 23908-23915.
8. Anisfeld, A.M., **Kast-Woelbern, H.R.**, Meyer, M.E., Jones, S.A., Zhang, Y., Williams, K.J., Willson, T., Edwards, P.A. (2003) Syndecan-1 expression is regulated in an isoform specific manner by the farnesoid X receptor. *J. Biol. Chem.* 278: 20420-20428.
9. Downes, M., Verdecia, M., Roecker, A.J., Hughes, R., Hogenesch, J.B., **Kast-Woelbern, H.R.**, Bowman, M.E., Ferrer, J.L., Anisfeld, A.M., Edwards, P.A., Rosenfeld, J.M., Alvarez, J.G.A., Noel, J.P., Nicolaou, K.C., Evans, R.M. (2003) A chemical and structural analysis of the nuclear bile acid receptor FXR. *Molec. Cell* 11:1079-1092.
10. Zhang, Y., **Kast-Woelbern, H.R.** and Edwards, P.A. (2003) Natural structural variants of the nuclear receptor farnesoid X receptor affect transcriptional activation. *J. Biol. Chem.* 278: 104-110.
11. Mak, P.A., **Kast-Woelbern, H.R.**, Anisfeld, A.M., and Edwards, P.A. (2002) Identification of PLTP as an LXR target gene and apoE as an FXR target gene reveals overlapping targets for the two nuclear receptors. *J. Lipid Res.* 43: 2037-41.
12. Edwards, P.A., **Kast-Woelbern, H.R.**, and Kennedy, M.A. (2002) Cholesterol signaling. *Handbook of Cell Signaling* (eds. R. Bradshaw and E. Dennis) Volume 2. Pg 287-290.
13. Edwards, P.A., **Kast, H.R.**, and Anisfeld, A.M. (2002) BAREing it all: the adoption of LXR and FXR and their roles in lipid homeostasis. *J. Lipid Res.* 43: 2-12.
14. **Kast, H.R.**, Goodwin, B., Tarr, P.T., Jones, S.A., Anisfeld, A.M., Stoltz, C. M., Tontonoz, P., Kliewer, S., Willson, T.M., and Edwards, P.A. (2002) Regulation of multidrug resistance-associated protein 2 (ABCC2) by the nuclear receptors pregnane X receptor, farnesoid X-activated receptor, and constitutive androstane receptor. *J. Biol. Chem.* 277: 2908-2915.
15. **Kast, H.R.**, Nguyen, C. M., Sinal, C. J., Laffitte, B.A., Reue, K., Jones, S.A., Gonzalez, F.J., Willson, T.M., and Edwards, P.A. (2001) Activated FXR induces apoC-II transcription: a molecular mechanism linking plasma triglyceride levels to bile acids. *Mol Endo.* 15 (10): 1720-1728.
16. **Kast, H.R.**, Nguyen, C.M., Ericsson, J., and Edwards, P.A. (2001) CTP:phosphocholine Cytidylyltransferase; a new sterol- and SREBP- responsive gene controlling phospholipid biosynthesis. *J. Lipid Res.* 42:1266-1272.

17. Laffitte, B.A., Repa, J.J., Joseph, S.B., Wilpitz, D.C., **Kast, H.R.**, Mangelsdorf, D. J., and Tontonoz, P. (2001) LXR α controls lipid-inducible expression of the apolipoprotein E gene in macrophages and adipocytes. *Proc. Natl. Acad. Sci.* 98: 507-512.

18. Laffitte, B.A., **Kast, H.R.**, Nguyen, C.M., Zavacki, A.M., Moore, D.D., and Edwards, P.A. (2000) Identification of the DNA binding specificity and potential target genes for the farnesoid X-activated receptor. *J. Biol. Chem.* 275: 10638-10647.

19. Edwards, P.A., Tabor, D., **Kast, H.R.**, and Venkateswaran A. (2000) Regulation of gene expression by SREBP and SCAP. *Biochimica et Biophysica Acta* 1529: 103-113.

PRESENTATIONS and CONFERENCES

1. Martinho, S*, Rubin, G.* and Julio, K., **Woelbern, H.** and Dorrell, M. (Heidi Woelbern and Mike Dorrell). “*CRISPR/Cas9 Mediated Mutagenesis of the CYP2U1 Gene to Generate a Patient-Specific Eye Disease Model*”. Presented by Sarah Martinho and Gavin Rubin at the 2025 West Coast Biological Sciences Undergraduate Research Conference at UC San Marcos, April 2025.
2. Kramer, A.*, Fees, B.*, Maeyama, A., Malone, M., Mazza, K., Jansma, A., Dorrell, M., and **Woelbern, H.** “*The Effect of Phosphorylation Efficiency on the Oncogenic Properties of the Protein E7 from High-Risk HPV.*” Presented by Andrew Kramer and Bronson Fees at the 2025 West Coast Biological Sciences Undergraduate Research Conference at UC San Marcos, April 2025
3. Halbert, T.*, Fox, A., Fisher, H., Dorrell, M., and **Woelbern, H.** “*Antibody Directed Enzyme Prodrug Therapy*”. Presented by Tess Halbert at the 2025 West Coast Biological Sciences Undergraduate Research Conference at UC San Marcos, April 2025
4. Maeyama, A.*, Kramer, A., Dorrell, M and **Woelbern, H.** “The Proliferative and Anti-Senescence Effects of the HPV-Derived Oncogenic E7 Protein In Infected Cells.” Oral presentation by Ava Maeyama at the West Coast Biological Sciences Undergraduate Research Conference at Santa Clara University on April 6, 2024.
5. Maeyama, A.*, Kramer, A.*, Fees, B.*, **Woelbern, H.**, and Dorrell, M. “The Proliferative and Anti-Senescence Effects of the HPV-Derived Oncogenic E7 Protein in Infected Cells.” Presented at the AAAS-PD Conference at University of San Diego on June 18, 2024.
6. Martinho, S.*, Rubin, G.*, **Woelbern, H.** and Dorrell, M. “CRISPR/Cas9 Mediated Mutagenesis of the CYP2U1 Gene to Generate a Patient Specific Eye Disease Model.” Presented at the AAAS-PD Conference at University of San Diego on June 18, 2024.
7. Maeyama, A.*, Kramer, A., Dorrell, M and **Woelbern, H.** “The Proliferative and Anti-Senescence Effects of the HPV-Derived Oncogenic E7 Protein in Infected Cells.” Oral presentation by Ava Maeyama at the West Coast Biological Sciences Undergraduate Research Conference at Santa Clara University on April 6, 2024.
8. Armstead, N.*, **Woelbern, H.** “Protein analysis in cell lines retrovirally infected with oncogenic E7 protein variants from high risk HPV.” Oral presentation at PLNU Honors Scholar Program; April 15, 2023.
9. Morin, E. *, Dormoy, S., Dorrell, M. and **Woelbern, H.** “Antibody directed enzyme prodrug therapy (ADEPT).” Oral presentation at PLNU Honors Scholar Program; April 15, 2023.
10. Armstead, N.*, Maeyama, A.* and **Woelbern, H.** “Protein analysis in cells lines retrovirally infected with oncogenic E7 protein variants from high-risk HPV. Oral presentation at the West Coast Biological Science Undergraduate Research Conference held at Loyola Marymount University, April 22, 2023.

11. Ruiz, D.*, Keller, S., Carpio, K., **Woelbern, H.**, Eade, K. and Dorrell, M. “CRISPR/Cas9 mediated mutagenesis of the ELOVL4 gene to generate a patient specific Stargardt’s eye disease model.” Poster presentation at the West Coast Biological Science Undergraduate Research Conference held at Loyola Marymount University, April 22, 2023.
12. Garcia, I. *, Marble, C*, **Woelbern, H** and Jansma A. “Sequential analysis of the oncogenic protein E7 from high and low risk human papilloma virus.” Oral presentation at PLNU Honors Scholar Program; April 2, 2022.
13. Johnson, K*, Mills, E.*, Dorrell, M. and **Woelbern, H.** “Characterization of the interaction between glioblastoma cells and tumor-associated macrophages (TAMs) within the tumor microenvironment.” Oral presentation at PLNU Honors Scholar Program, April 2, 2022.
14. Mills, E*, Giek, A.*, Johnson, K., Chang, S., Wiggins, A., **Woelbern, H.** and Dorrell, M. “Characterization of the interaction between macrophages and glioblastoma tumors within the tumor microenvironment.” Oral presentation at the West Coast Biological Science Undergraduate Research Conference held at Point Loma Nazarene University, April 9, 2022.
15. **Woelbern, H.** and Jansma, A. “Elucidating differences between high risk and low risk HPV – where biology and chemistry meet.” Oral presentation of Faculty Scholarship Day held at Point Loma Nazarene University, August 23, 2021.
16. Bates, C. *, Dorrell, M. and **Woelbern, H.** “Degradation of pRB by retrovirally infected cell lines.” Oral presentation at PLNU Honors Scholar Program; May 22, 2021.
17. Alonso, A. *, **Woelbern, H.** “Navigation of macrophage polarization by tumors.” Oral presentation at PLNU Honors Scholar Program; April 13, 2019.
18. Fortin, B.*, Hale, A.*, Lowey, C., Rausch, A., Snowbarger, J., **Woelbern, H.**, and Dorrell, M. “Identification of Avastin and Torisel as a synergistic angiostatic combination to treat cancer.” Oral presentation at West Coast Biological Student Undergraduate Research Conference (WCBSURC) held at University of San Diego; April 6, 2019.
19. Culpepper, L. *, Lowey, C. *, Rausch, A., Jansma, A., **Woelbern, H.** and Dorrell, M. “Studying the oncogenic effects of HPV viral proteins on Retinoblastoma activity and degradation.” Poster presentation at WCBSURC held at University of San Diego; April 6, 2019.
20. Alonso, A.*, Fortin, B., Dorrell, M. and **Woelbern, H.** “Understanding macrophage polarization by tumors.” Poster presentation at WCBSURC held at University of San Diego; April 6, 2019.
21. Coopwood, C., Campbell, M., **Woelbern, H.R.**, and Dorrell, M. “Isolation and characterization of mutant CPA for use in ADEPT treatment of cancer.” Oral presentation at 43rd West Coast Biological Student Undergraduate Research Conference (WCBSURC) held at St. Mary’s College; April 14, 2018.
22. **Woelbern, H.R.** “Cancer Therapies that Specifically Target the Tumor.” Oral presentation at the Faculty Development and Scholarship Day held at Point Loma Nazarene University, August 22, 2017.
23. Coopwood C.*, Campbell, M.*, Gates, C., Rausch, A., Garcia, E., Silva, J. **Woelbern, H.R.** and Dorrell, M. “Targeted Cancer Therapies: Creating and Purifying a Mutated Version of Carboxypeptidase-A to Activate Capped Methotrexate for use in Antibody Directed Enzyme Pro-Drug Therapy (ADEPT).” Oral presentation at the West Coast Biological Sciences Undergraduate Research Conference held at Santa Clara University; April 22, 2017.

24. **Kast-Woelbern, H.R.** “FXR Target Genes Identified by Suppression Subtractive Hybridization in Combination with Microarray Analysis.” Invited speaker at Hot Topics in Endocrinology (2002), New Orleans, Louisiana.
25. **Kast-Woelbern, H.R.** “Regulation of multidrug resistance-associated protein 2 (ABCC2) by the nuclear receptors PXR, FXR and CAR.” Poster presentation at Keystone Symposia (2002), Snowbird, Utah.
26. **Kast, H.R.** “The Isolation and Characterization of Genes Regulated by the Farnesoid X-Activated Receptor.” Invited speaker at Deuel Lipid Conference (2001), Laguna Hills, California.

SERVICE

PLNU

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| 2025-2026 | Faculty Mentor |
| 2023-present | General Education Committee |
| 2021-2022 | Faculty Resource Committee |
| 2019-2020 | Intercollegiate Athletics Committee |
| 2019-2020 | Pre-Health Committee, (<i>conduct pre-med and pre-vet interviews for sophomores and juniors; provide feedback on application materials</i>) |
| 2019 - 2024 | Commencement Honor Guard |
| 2017- 2025 | Biology Summer Research Program |
| | 2025, Bronson Fees, Alison Fox, Ryan Ham, Anna Pallancaoe, Gavin Rubin, Natalie Tambursten, Adelin Tulcan, Josiah Wong, |
| | 2024, Ava Maeyama, Sarah Martinho, Gavin Rubin, Bronson Fees, Andrew Kramer, Tess Halbert, Kayla Julio, Ryan Ham, Alison Fox |
| | 2023, Ava Maeyama, Ella Carlos, Sarah Martinho, Andrew Behne, Andrew Kramer, Tess Halbert, Kayla Julio, Hailey Fischer |
| | 2022, Naomi Armstead, Ella Carlos, Sam Chang, Madi Deder, Sebastien Dormoy, Anna Giek, Ava Maeyama, Ethan Morin, Alyssa Wiggins, |
| | 2021, Alyssa Arnold, Sam Chang, Christina de Jong, Anna Giek, Katherine Johnson, Elizabeth Mills, Ethan Morin, David Ruiz Ovando, Alyssa Wiggins |
| | 2019, Caleb Bates, Bridget Fortin, Andrew Greer, Allison Hale, Connor Lowey, Caleb Smeraldi, Jeffrey Snowbarger |
| | 2018, Carley Coopwood, Bridget Fortin, Allison Hale, Connor Lowey, Amy Rausch |
| | 2017, Carley Coopwood, Eric Garcia, Charisa Gates, Amy Rausch, Jordan Silva |
| 2016 - 2024 | Honors Project Committees (<i>*denotes my advisees</i>) |
| | 2024-25, Hannah Nguyen and Zach Cheeseman (advisor Matthieu Rouffet) |
| | 2024-25, Abbey Mandagie and Audrey Vazanna (advisor Ariane Jansma) |
| | 2024-25, Mercedes Coppola (advisor David Cummings) |

2024-25, Kelsey Williams (advisor Brandon Sawyer)
 2023-24, Ava Maeyama and Andrew Kramer (advisor Mike Dorrell)
 2023-24, Sarah Martinho and Kayla Julio (advisor Mike Dorrell)
 2023-24, Tess Halbert and Hailey Fischer (advisor Mike Dorrell)
 2023-24, Natalie Woo (advisor Ariane Jansma)
 2023-24, Ally Osburn (advisor Laurence Beauvais)
 2022-23, Naomi Armstead *
 2022-23, Mason Hayashi (advisor David Cummings)
 2022-23, David Ruiz Ovando, Sam Keller and Kenny Carpio (advisor Mike Dorrell)
 2022-23, Miya Rutz and Hannah Knipmeyer (advisor Laurence Beauvais)
 2022-23, Ethan Morin and Sebastien Dormoy (advisor Mike Dorrell)
 2022-23, Nathan Dickman (advisor Ariane Jansma)
 2021-22, Isabel Garcia* and Camryn Marbel
 2021-22, Elizabeth Mills and Kate Johnson (advisor Mike Dorrell)
 2021-22, Abbey Hebert and Shelby Shaw (advisor Walter Cho)
 2020-21, Caleb Bates *
 2020-21, Joshua Merrill (advisor David Cummings)
 2019-20, Madison Malone (advisor Ariane Jansma)
 2019-20, Madelaine Brown (advisor David Cummings)
 2019-20, Bridget Fortin and Allison Hale (advisor Mike Dorrell)
 2019-20, Connor Lowey and Andrew Greer (advisor Mike Dorrell)
 2018-19, Audrianna Alonso*
 2018-19, Kimberly Woolery (advisor Mark Perry)
 2018-19, Shelby Kenney (advisor David Cummings)
 2018-29, Ryan Orlando (advisor Ariane Jansma)
 2017-18, Meghan Campbell and Carley Coopwood (advisor Mike Dorrell)
 2016-17, Ellen Asselin (advisor Mike Mooring)

External

2024 Manuscript Reviewer – Journal of Biosciences and Medicine
 2022 Judge for posters and oral presentations at the West Coast Biological Science Undergraduate Research Conference.
 2020-23 Board Member – Covid Relief Committee (Redeemer Presbyterian Church)
 2017 Panelist - Integration of faith and science (Redeemer Presbyterian Church)
 2009-11 Science Education Association San Diego SEASAND (*community outreach team for middle school and high school science teachers*)

PROFESSIONAL MEMBERSHIPS

The Endocrine Society (2002-2007)

American Society for Biochemistry and Molecular Biology (2004-07, 2023-present)

AWARDS AND HONORS

GRANTS

PLNU Research and Special Project (RASP) Grant	2025
Identification of oncogenic pathways utilized by viruses in cancer progression.	
PLNU Research and Special Project (RASP) Grant	2024
Developing an organoid model system to emulate the tumor microenvironment.	
PLNU Alumni Association Faculty Grant and RASP	2023
The elucidation of the causative agents driving cancer progression by high risk HPV.	
PLNU Research and Special Project (RASP) Grant	2022
The elucidation of the molecular mechanisms of the oncogenic protein E7 from high risk HPV.	
PLNU Alumni Association Faculty Grant and RASP	2020
The elucidation of the molecular mechanisms of the oncogenic protein E7 from high risk HPV.	
PLNU Research and Special Project (RASP) Grant	2019
The elucidation of the molecular mechanisms of the oncogenic protein E7 from high risk HPV.	
PLNU Alumni Association Faculty Grant and RASP Grant	
2018	
Combination therapies to inhibit angiogenesis.	
PLNU Research and Special Project (RASP) Grant	2017
Expression and purification of wild-type and mutant forms of Carboxypeptidase A.	
George Popjak Scholar Award	2001
Department of Education Training Grant	1998-1999
Westmont College Presidential Scholarship	
1991-1995	
Westmont College – Dean’s List	1991-1995

PATENTS:

“Methods and Compositions for Regulating Multi-drug Resistance Associated Protein 2”
 Inventors: Peter A. Edwards (UCLA), **Heidi Kast** (UCLA) and Bryan Goodwin (GlaxoSmithKline).

“Antibody Directed Enzyme Pro-drug Therapy (ADEPT) for Cancer Treatment”
 Inventors: Michael Dorrell (PLNU), Heidi Woelbern (PLNU) and Matthieu Rouffet (PLNU)