CURRICULUM VITAE

Anna Lois Means, PhD

PERSONAL DATA

Work address: Anna L. Means
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EDUCATION

Ohio University (Athens, OH), BS. (Honors Tutorial College, major in Zoology)

University of Wisconsin—Madison (Madison, WI), PhD. Graduate studies in the Cell and Molecular Biology Program with Dr. Peggy J. Farnham in the Department of Oncology.

Thesis title: Identification, Purification, and Characterization of HIP1: A Protein That Positions Transcription Initiation Of The Dihydrofolate Reductase Gene.

Cornell University Medical College (NY, NY). Postdoctoral associate with Dr. Lorraine J. Gudas, Department of Pharmacology.

Vanderbilt University Medical Center (Nashville, TN). Research Associate, Division of Surgical Oncology.

ACADEMIC APPOINTMENTS

Vanderbilt University Medical Center

2000-2004. Research Assistant Professor, Department of Surgery;
2004-2012: Assistant Professor, Departments of Surgery and of Cell and Developmental Biology;
2012-present, Research Associate Professor, Departments of Surgery and of Cell and Developmental Biology.

PROFESSIONAL ORGANIZATIONS

Intramural:
Vanderbilt-Ingram Cancer Center
Vanderbilt Digestive Disease Research Center

Vanderbilt Diabetes Research and Training Center
Vanderbilt Program in Developmental Biology

Extramural:
American Association for Cancer Research
Society for Developmental Biology
American Society for Cell Biology
American Pancreatic Association

PROFESSIONAL ACTIVITIES

Intramural:

Vanderbilt Pancreatic Cancer Researchers (VPCR), Founder and organizer, 2010-present
I brought together all those at Vanderbilt studying pancreatic cancer both at bench and at bedside for a monthly research conference. I continue to organize and host each meeting.

Beta Cell Interest Group, 2004-2011
Organizer, 2009-2011, seminar series for internal investigators to report and get feedback on studies related to pancreas development and function.

Pilot & Feasibility Grant Review Panel, Vanderbilt Digestive Disease Research Center, 2007-2009.

Extramural:

NIH CIGP study section, ad hoc reviewer, 2006.

World Cancer Research Fund, International (London). Ad hoc grant reviewer. 3/2013.

Agence Nationale De La Recherche (Paris). Ad hoc grant reviewer. 4/2013.

Research Foundation – Flanders (Fonds Wetenschappelijk Onderzoek - Vlaanderen, FWO). Ad hoc grant reviewer. 5/2013.

University of Washington, Diabetes Research Center (Seattle, WA). Ad hoc grant reviewer. 3/2014.

Pancreatic Cancer Action Network, Nashville Chapter
Volunteer, 2010-present.

TEACHING ACTIVITIES

Graduate school:

Molecular Developmental Biology (CDB 341)
Introductory module
Endodermal development, lecture and discussion, 2004-2007
Ectodermal development, lecture and discussion, 2005-2007
Branching morphogenesis module
Branching morphogenesis in the pancreas, lecture and discussion, 2007

Tissue morphogenesis module, 2008
- Organized 4 week module (8 classes)
- Invited and hosted outside speaker
- Led four lectures and discussion sessions
- Worked with other investigators to present remaining four sessions

Size regulation via Hippo/Warts pathway, 2012
- Organized 4 week module (8 classes)
- Invited and hosted outside speaker
- Led five lecture and discussion sections
- Supervised senior graduate student leading one lecture/discussion

Cancer and Embryonic Development (CDB320/CB320)
- Epithelial-mesenchymal interactions, lecture and discussion, 2007, 2009
- Pancreatic cancer: developmental aspects, lecture, 2015

Epithelial Pathobiology (CDB 324)
- Tubulogenesis lecture and discussion, 2008

RESEARCH SUPERVISION

Undergraduate students:

Leah McMillan, 2004, 2006
Katherine Guess, 2008
Kayla Bell, 2010
Elizabeth Moss, 2011
Katherine Lee, 2011
Emily Buzhardt, 2013
Bronson Wessinger, 2014-2017
Barbara Xiong, 2016-2017
Benjamin Rabinowitz, 2016-present
Tristan Chari, 2017-present

Graduate summer programs:

Kevin Branch, 2005. Incoming IGP student.
Susan Anthony, 2005. Incoming IGP student.
Ben Adebayo, 2008. Vanderbilt Diabetes Research Training Program for medical students
Khaisha Johnson, 2010. Vanderbilt Diabetes Research Training Program for medical students
Nathanael Smith, 2014. HHMI Medical Research Fellows Program
Jessica Kim, 2014. Vanderbilt Student Research Training program for medical students
Jade Lewis, 2016. Vanderbilt-Meharry Alliance research training program for medical students
Vian Pulous, 2017. Vanderbilt Student Research Training program for medical students

Graduate student trainees:

Billy J. Carver, IGP student, 2006-2008.
Luke Woodbury, IGP student, 2015-present.

Postdoctoral Trainee:

Stacy A. Blaine, 2006-2009.

Tasia Brown, 2014-present.

Other training:

Isolation and culture of primary pancreatic acinar cells:

Howard Crawford (Lynne Matrisian lab), 2001
Yiannis Drosos (Beatriz Sosa-Pineda lab), 2010
Jackie Ellis (Joseph Kissil lab), 2010

Dissection and culture of embryonic pancreas:

Ben Rhoades (Anil Rustgi lab), 2004
Elizabeth Tweedie Ables (Maureen Gannon lab), 2005
Michelle Guney (Maureen Gannon lab), 2007

CURRENT RESEARCH SUPPORT

P50CA095103 (Robert J. Coffey, PI), NIH/NCI, 06/01/2008 – 05/31/2010 15% effort
SPORE in GI Cancer
Role: Co-investigator. The goal of this project is to use a novel model of obstructive chronic pancreatitis to understand the role of the tumor microenvironment in tumor progression and maintenance.

PAST RESEARCH SUPPORT (Chronological)

P01 DK42502 (Mark Magnuson, PI) NIH/NIDDK, 7/01/00 - 06/30/05 25% effort
"Pancreatic Morphology Core, Genes of Pancreatic Function and Development" $1,849,532
Role: Co-Investigator. The goal of this project was to understand the molecular and morphological underpinnings of pancreas development. Dr. Means was responsible for supervising core services for tissue processing and immunohistochemistry, aiding in planning and interpretation of histological experiments, and training for members of the program project grant.

1 R01 CA98322-02 (Anna L. Means, PI), NIH/NCI, 3/1/04 - 2/28/08 50-70% effort
"Heparin-binding EGF in pancreatic disease" $656,000
The goal of this project was to elucidate the roles of the epidermal growth factor receptor and its ligand, HB-EGF, in establishment of the pancreatic fibrosis that is associated with both chronic pancreatitis and pancreatic cancer. We found that secreted HB-EGF coordinately regulated epithelial and stromal responses often seen in pancreatic disease. In islets, the transmembrane form of HB-EGF impaired insulin secretion while the secreted form improved endocrine function.

UO1 CA84239 (Robert J. Coffey, PI) NIH/NCI, 4/1/04 - 3/31/09 5% effort
"Prevention and metastasis: Final frontiers in colon cancer" $629,243
Role: Co-Investigator. The goals of this grant were to understand the genetic and environmental influences on establishment and metastasis of colon cancer using mouse models. Dr. Means's role in this project was to establish mouse tumor models that have conditional deletion of tumor suppressor genes specifically in the intestinal tract and pancreas.

5P30 DK58404 (D. Brent Polk, PI) NIH/NIDDK

"Molecular and Cellular Basis for Digestive Diseases"

Pilot& Feasibility Study (Means, Anna L., PI), 6/1/05 – 5/31/07 3% effort

"Regulation of differentiation in the embryonic pancreas" $11,000

The goal of this project was to elucidate the role of EGFR signaling in early branching and differentiation of the embryonic pancreas. We found that two family members, Egfr and ErbB4, were both active at the site of mesenchymal-epithelial interaction and that this interaction was required for branching and differentiation.

R21CA123061-01 (Anna L. Means, PI), NIH/NCI, 7/1/06 – 6/30/09 15% effort

"The role of EGFR signaling in progression of Kras-induced pancreatic tumors" $250,000

The goal of this grant was to determine the role that signaling through the epidermal growth factor receptor plays in pancreatic tumors that result from activation of Kras. These experiments used genetically engineered mice to express mutated Kras in combination with either increased or decreased EGFR signaling. We found that activation of EGFR removed constraints on mutant Kras, allowing rapid and complete transformation of the pancreas.

JDRF 1-2006-759 (Anna L. Means, PI), 07/01/06-06/30/09 20% effort

Juvenile Diabetes Research Foundation $450,000

"Generating New Islets In Vivo And In Vitro"

The goal of this project was to understand how duct-associated endocrine cells arise in association with activation of the EGF receptor and how that process could be manipulated to generate new endocrine tissues for diabetic patients.

P50CA095103 (Robert J. Coffey, PI), NIH/NCI, 06/01/2008 – 05/31/2010

SPORE in GI Cancer

Pilot & Feasibility Award (Means, PI) 5% effort

"The roles of Kras and EGFR signaling in pancreatic and intestinal tumorigenesis" $30,000

This pilot grant enabled us to determine whether different endodermal tissues had different susceptibilities to the $Kras^{G12D}$ oncogene. We found that tissues most exposed to the environment (oral mucosa, lungs) were most susceptible to $Kras^{G12D}$-induced tumorigenesis while the intestinal tract was quite resistant. The pancreas developed lesions consistent with earliest adenoma (PanIN) stage.

PEER-REVIEWED PUBLICATIONS

1. Farnham, P.J., and **Means, A.L**. 1990. Sequences downstream of the transcription initiation site modulate the activity of the murine dihydrofolate reductase promoter. Mol. Cell. Biol. 10: 1390-1398.

2. **Means, A.L**., and Farnham, P.J. 1990. Transcription initiation from the DHFR promoter is positioned by HIP1 protein binding at the initiation site. Mol. Cell. Biol. 10: 653-661.

3. **Means, A.L**., Slansky, J.E., McMahon, S.L., Knuth, M.W., and Farnham, P.J. 1992. The HIP1 binding site is required for growth regulation of the DHFR promoter. Mol. Cell. Biol. 12: 1054-1063.

4. **Means, A.L**. and Gudas, L.J. 1996. FGF-2, BMP-2, and BMP-4 regulate retinoid binding proteins and receptors in 3T3 cells. Cell Growth and Differentiation 7: 989-996.

5. **Means, A.L**. and Gudas, L.J. 1997. The CRABP I gene contains two separable, redundant regulatory regions active in neural tissues in transgenic mouse embryos. Developmental Dynamics 209: 59-69.

6. **Means, A.L**., Thompson, J.R., and Gudas, L.J. 2000. Transcriptional regulation of the cellular retinoic acid binding protein I gene in F9 teratocarcinoma cells. Cell Growth and Differentiation 11: 71-82.

7. Scoggins CR, Meszoely IM, Wada M, **Means AL**, Yang L, Leach SD. 2000. p53-dependent acinar cell apoptosis triggers epithelial proliferation in duct-ligated murine pancreas. Am J Physiol Gastrointest Liver Physiol. (5):G827-36.

8. Meszoely, I.M., **Means, A.L**., Scoggins, C.R., Leach, S.D. 2001. Developmental aspects of early pancreatic cancer. Cancer Journal 7: 242-250.

9. **Means, A.L**. and Leach, S.D. 2001. Lineage commitment and cellular differentiation in exocrine pancreas. Pancreatology 1: 587-596.

10. **Means, A.L**., Ray, K.C., Singh, A.B., Washington, M.K., Whitehead, R.H., Harris, R.C., Wright, C.V.E., Coffey, R.J., and Leach, S.D. 2003. Overexpression of heparin-binding EGF-like growth factor in mouse pancreas results in fibrosis and epithelial metaplasia. Gastroenterology 124: 1020-1036.

11. Samaras, S.E., Zhao, L., **Means, A**., Henderson, E., Matsuoka, T., and Stein, R. 2003. The islet b cell-enriched RIPE3b1/Maf transcription factor regulates *pdx*-1 expression. J. Biol. Chem. 278: 12263-70.

12. Matsuoka, T., Zhao, L. Jarrett, H.W., Friedman, D., **Means, A**., Stein, R. 2003. Members of the large Maf transcription family regulate insulin gene transcription in islet beta-cells. Mol Cell Biol.: 23:6049-62.

13. Matsuoka, T.A., Artner, I., Henderson, E., **Means, A**., Sander, M., Stein, R. 2004. The MafA transcription factor appears to be responsible for tissue-specific expression of insulin. Proc Natl Acad Sci USA 101:2930-3.

14. Nomura, S., Settle, S.H., Leys, C., **Means, A.L**., Peek, R., Leach, S.D. Wright, C.V., Coffey, R.J., and Goldenring, J.R. 2005. Evidence for repatterning of the gastric fundic epithelium associated with Ménétrier's disease and TGFa overexpression. Gastroenterology 128: 1292-1305.

15. **Means, A.L**., Chytil, A., Moses, H.L., Coffey, R.J., Wright, C.V.E., Taketo, M.M., Grady, W.M. 2005. The keratin 19 gene drives Cre recombinase expression throughout the early post-implantation mouse embryo. Genesis 42: 23-27.

16. **Means, A.L**., Meszoely, I.M., Suzuki, K., Miyamoto, Y., Rustgi, A.K., Coffey, R.J., Wright, C.V., Stoffers, D.A., and Leach, S.D. 2005. Pancreatic epithelial plasticity mediated by acinar cell transdifferentiation and generation of nestin-positive intermediates. Development 132: 3767-3776.

17. **Means, A.L**., Xu, Y., Zhao, A., Ray, K.C., and Gu, G. 2008. A CK19-CreER^{T} knockin mouse line allows for conditional DNA recombination in epithelial cells in multiple endodermal organs. Genesis 46: 318-323.

18. Ray, KC, Blaine, SA, Washington, MK, Braun, A.H., Singh, A.B., Harris, R.C., Harding, P.A., Coffey, R.J. and **Means, A.L**. 2009 Transmembrane and soluble isoforms of heparin-binding EGF-like growth factor regulate distinct processes in the pancreas. Gastroenterology 137: 1785-1794. PMC2767440

19. Blaine, S.A., Ray, K.C., Branch, K.M., Robinson, P.S., Whitehead, R.H., and **Means, A.L**. 2009. The epidermal growth factor receptor regulates pancreatic fibrosis. Am J Physiol, Gastrointest Liver Physiol 297: 434-441. PMC2739824

20. Zhang H, Ables ET, Pope CF, Washington MK, Hipkens S, **Means AL**, Path G, Seufert J, Costa RH, Leiter AB, Magnuson MA, Gannon M. (2009). Multiple, temporal roles for HNF6 in pancreatic endocrine and ductal differentiation. Mech Dev 126: 958-973. PMC2783291

21. Wescott MP, Rovira M, Reichert M, von Burstin J, **Means A**, Leach SD, Rustgi AK. (2009) Pancreatic Ductal Morphogenesis and the Pdx-1 Homeodomain Transcription Factor. Mol Biol Cell 20: 4838-4844. PMC2777112

22 Blaine, SA, Ray, KC, Anunobi, R, Gannon MA, Washington, MK, **Means, AL**. 2010. Adult pancreatic acinar cells give rise to ducts but not endocrine cells in response to growth factor signaling. Development 137:2289-2296. PMC2889602

23. Ray, KC, Bell, KM, Yan, J, Gu, G, Chung, CH, Washington, MK, **Means, AL**. 2011. Epithelial tissues have varying degrees of susceptibility to KrasG12D-initiated tumorigenesis in a mouse model. PlosOne 6: e16786. PMC3032792

24. Guney, MA, Petersen, CP, Boustani, A, Duncan, MR, Gunasekaran, U, Menon, R, Warfield, C, Grotendorst, GR, **Means, AL**, Economides, AN, Gannon, M. 2011. Connective tissue growth factor acts within both endothelial cells and beta cells to promote proliferation of developing beta cells. PNAS 108:15242-15247. PMC3174622

25. Vanderpool, C, Sparks, EE, Huppert, KA, Gannon, M, **Means, AL**, Huppert, SS. 2012. Genetic interactions between hepatocyte nuclear factor-6 and notch signaling regulate mouse intrahepatic bile duct development in vivo. Hepatology 55: 233-243. PMC3235248

26. Freeman, TJ, Smith, JJ, Chen, X., Washington MK, Roland, JT, **Means, AL**, Eschrich, SA, Yeatman, TJ, Deane, NG, and Beauchamp, RD. 2012. Smad4-mediated signaling inhibits intestinal neoplasia by inhibiting expression of beta-catenin. Gastroenterology 142: 562-571. PMC3343368.

27. Westmoreland JJ, Drosos Y, Kelly J, Ye J, **Means AL**, Washington MK, Sosa-Pineda, B. 2012. Dynamic distribution of claudin proteins in pancreatic epithelia undergoing morphogenesis and neoplastic transformation. Dev. Dyn. 241: 583-594. PMC3288608

28. Powell, AE, Yi, L, Franklin, JL, Wang, Y, Higginbotham, JN, Meador, CB, Poulin, E, **Means AL**, Washington, MK, Haigis, KM, Coffey, RJ. 2012. Lrig1, a pan-ErbB negative regulator, marks quiescent intestinal stem cells and acts as a tumor suppressor. Cell, 149(1):146-158. PMC3563328.

29. Al-Greene NT, **Means AL**, Lu P, Jiang A, Schmidt CR, Chakravarthy AB, Merchant NB, Washington MK, Zhang B, Shyr Y, Deane NG, Beauchamp RD. 2013. Four jointed box 1 promotes angiogenesis and is associated with poor patient survival in colorectal carcinoma. PLoS One 8:e69660. PMC3726759.

30. Ray, KC, Moss, ME, Franklin, JL, Weaver, CJ, Higginbotham, J, Song, Y, Revetta, FL, Blaine, SA, Bridges, LR, Guess, KE, Coffey RJ, Crawford, HC, Washington, MK, **Means, AL**. 2014. Heparin-Binding Epidermal Growth Factor-like Growth Factor eliminates constraints on activated Kras for the rapid promotion of pancreatic neoplasia. Oncogene 33: 823-831. PMC3929321.

31. Shi C, Washington MK, Chaturvedi R, Drosos Y, Revetta FL, Weaver CJ, Buzhardt E, Yull FE, Blackwell TS, Sosa-Pineda B, Whitehead RH, Beauchamp RD, Wilson KT, **Means AL**. 2014. Fibrogenesis in pancreatic cancer is a dynamic process regulated by macrophage-stellate cell interaction. Lab Invest 94: 409-421. PMC3992484.

32. Pekala, KR, Ma, X, Kropp, PA, Petersen, CP, Hudgens, CW, Chung, CH, Shi C, Merchant, N, Maitra, A, **Means AL*,** Gannon, M*. 2014. Loss of HNF6 expression correlates with human pancreatic cancer progression. Lab Invest, 94: 517-527. PMC4068339. *, co-corresponding authors.

33. Salaria, S., **Means, A.**, Revetta, F., Idrees, K., Liu, E., Shi, C. 2015. Expression of CD24, a Stem Cell Marker, in Pancreatic and Small Intestinal Neuroendocrine Tumors. Am J Clin Pathol 144:642-648. PMC4576728.

34. Drosos, Y, Neal, G, Ye, J, Paul, L, Kuliyev, E, Maitra, A, **Means, AL**, Washington, MK, Rehg, J, Finkelstein, DB, Sosa-Pineda, B. 2016. *Prox1*-Heterozygosis Sensitizes the Pancreas to Oncogenic *Kras*-Induced Neoplastic Transformation. Neoplasia 18: 172-184. PMC4796801

35. Gaskill CF, Carrier EJ, Kropski JA, Bloodworth NC, Menon S, Foronjy RF, Taketo MM, Hong CC, Austin ED, West JD, **Means AL**, Loyd JE, Merryman WD, Hemnes AR, De Langhe S, Blackwell TS, Klemm DJ, Majka SM. 2017. Disruption of linage specification in adult pulmonary mesenchymal progenitor cells promotes microvascular dysfunction. J Clin Invest. Jun 1;127(6):2262-2276. PMCID: PMC5451236.

36. Padmanabhan, C, Rellinger, EJ, Zhu, J, An H, Woodbury, LG, Chung, DH, Waterson, AG, Lindsley, CW, Means, AL, Beauchamp, RD. 2017. cFLIP critically modulates apoptotic resistance in epithelial-to-mesenchymal transition. Oncotarget, [Epub ahead of print] July 25.

37. Erdogan B, Ao M, White LM, **Means AL**, Brewer BM, Yang L, Washington MK, Shi C, Franco OE, Weaver AM, Hayward SW, Li D, Webb DJ. 2017. Cancer-associated fibroblasts promote directional cancer cell migration by aligning fibronectin J Cell Biol. Oct 11. pii: jcb.201704053. doi: 10.1083/jcb.201704053. [Epub ahead of print] jcb.201704053. PMID: 29021221.

REVIEWS AND BOOK CHAPTERS

1. **Means, AL**. and Gudas, LJ. 1995. The roles of retinoids in vertebrate development. Annu. Rev. Biochem. 64: 201-233.

2. **Means, AL**. 1997. Transgenic Mice in Cancer Research. In Encyclopedia of Cancer, Vol. III. J. R. Bertino, Editor-in-Chief. Academic Press: San Diego. Pp. 1777-1784.

3. Meszoely, I.M., **Means, A.L**., Scoggins, C.R., Leach, S.D. 2002. Epithelial stem cell in pancreatic regeneration and neoplasia. In Pancreatic Cancer. Springer-Verlag, New York. Pp. 63-72.

4. **Means, AL**. 2013. Pancreatic stellate cells: small cells with a big role in tissue homeostasis. Lab Invest. 93(1): 4-7. PMID 23269285.

5. **Means, AL**. 2014. Cell of origin and mouse models of pancreatic cancer. In Pathobiology of Human Disease. LM McManus and RN Mitchell, Editors. Elsevier Press: Oxford. Pp. 2274-2283.

6. **Means, AL** and Logsdon, CD. 2016. Acinar Ductal Metaplasia: Yap fill a gap. Gastroenterology 151:393-395.

PRESENTATIONS

December, 2004, "**Transgenic over-expression of HB-EGF induces ductal metaplasia.**" International Workshop on Mouse Models of Pancreatic Cancer. Philadelphia, PA. Invited talk.

September, 2006. "**Signaling through the epidermal growth factor receptor reprograms adult pancreatic cell fates**." Stem Cells in Gastrointestinal Development, Regeneration, and Neoplasia Symposium. Tyson's Corner, VA. Poster presentation.

October, 2006. "**Signaling through the epidermal growth factor receptor reprograms adult pancreatic cell fates"** Workshop on Programming pancreatic beta cells. El Perello, Spain. Invited talk.

May, 2008. "**Heparin-Binding Epidermal Growth Factor-Like Growth Factor (HB-EGF) regulates pancreatic disease via both its secreted and its transmembrane forms**." AACR annual meeting. San Francisco, CA. Poster presentation.

November, 2009. "**The growth factor HB-EGF synergizes with activated Kras to initiate pancreatic tumor formation**." American Pancreatic Association annual meeting. Honolulu, HI. Poster presentation.

April, 2010. "**The growth factor HB-EGF regulates islet function."** Islet Biology, Keystone meeting. Whistler, British Columbia. Poster presentation.

November, 2010. "**Pancreatic Metaplasia Involves Changes in Both Cell Identity and Architecture**." American Pancreatic Association annual meeting. Chicago, IL. Poster presentation.

January, 2012. **"Initiation and Promotion of Pancreatic Cancer: Synergy between Kras and HB-EGF."** MD Anderson Cancer Center. Houston, TX. Invited Talk.

June, 2012. "**Crosstalk between pancreatic stellate cells and tissue macrophages modify the tumor microenvironment in pancreatic cancer**." AACR Special Conference on Pancreatic Cancer: Progress and Challenges. Lake Tahoe, NV. Poster presentation.

June, 2015. **"Recent advances in pancreatic cancer research."** Pancreatic Cancer Action Network: Understanding Pancreatic Cancer Educational Lecture. Vanderbilt, TN. Invited talk.

September, 2016, "**Smad4 pathways modulate induction of the chemokine Ccl20 and repress inflammation-induced carcinogenesis in mouse colon.**" AACR: Colorectal Cancer: From Initiation to Outcomes. Tampa, FL. Poster presentation.

October, 2016. "**Kras mutation imparts neoplastic potential on duct cells but not acinar cells in a mouse model of obstructive chronic pancreatitis."** American Pancreatic Association annual meeting. Boston, MA. Poster of distinction award.

January, 2017. "**Smad4 pathways modulate innate epithelial immune responses and repress inflammation-induced carcinogenesis in the colon."** Keystone Symposium: TGF-ß in Immunity, Inflammation and Cancer. Taos, NM. Poster presentation.

March, 2017. **"Influence of the microenvironment on development of pancreatic cancer."** University of Wisconsin Carbone Cancer Center. Madison, WI. Invited talk.

October, 2017. "**The Fibrotic Microenvironment in Pancreatic Cancer and Chronic Pancreatitis."** Leaders in Biobanking Congress 2017. Nashville, TN. Invited talk.