

Towards an integrated microbiome-host protein biomarker panel for early detection of ovarian cancer in routinely collected clinical samples

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Masonic Cancer Center, University of Minnesota
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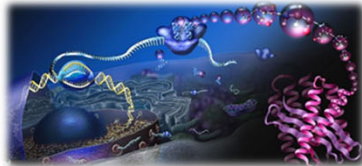
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Proteogenomics Core



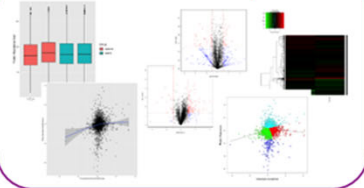
Masonic Cancer Center
UNIVERSITY OF MINNESOTA



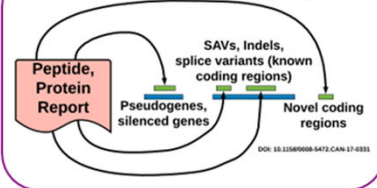
Proteogenomics: integrate RNA-Seq and MS-based proteomics data to identify expressed variants and mechanisms of functional regulation

- Identify functional drivers and biomarkers
- Pathway analysis of cancer development, progression and intervention
- Peptide neoantigen identification

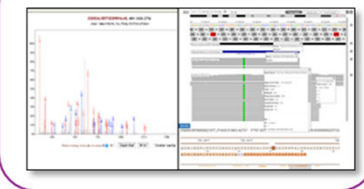
RNA – Protein Response



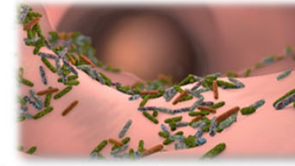
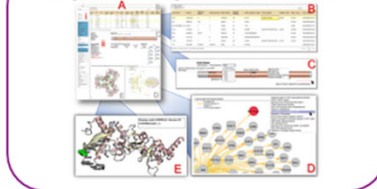
Novel Peptide Mapping



Results Visualization



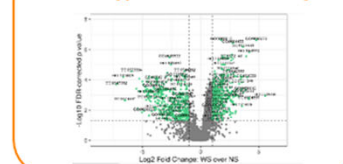
Impact analysis of variants



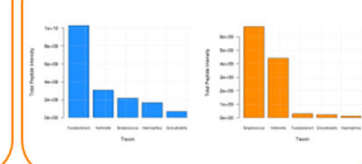
Meta-omics: integrate meta-genomics, transcriptomics and proteomics (and metabolomics) data to study dynamic host-microbiome interactions

- Identify functional markers expressed by microbes and host
- Functional versus taxonomy response under different conditions
- Functional-taxonomic interactions

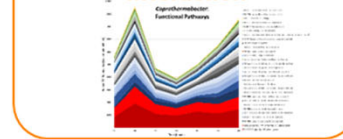
Pathway/functional analysis



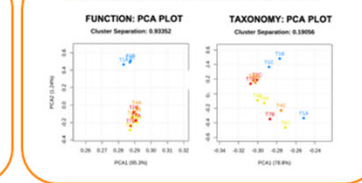
Taxonomic Abundance



Function-Taxonomy Interaction




Statistical classification



Pratik Jagtap



Significance and Rationale

- Ovarian cancer
- Dysbiosis in bacterial comm
- Microbiome-de metaproteome a key for early detecti
- Residual fluid from liq rich source of microbi collaborative work)
- ***We hypothesize that quantitative metaproteomic and proteomic analysis of MS-based data collected from Pap test fluid from non-cancer and high grade serous ovarian cancer (HGSOC) individuals will reveal bacterial-host protein signatures with promise for early detection of ovarian cancer in commonly collected samples***



Gene
Volume 811, 15 February 2022, 146083

Altered cervicovaginal microbiota in premenopausal ovarian cancer patients

Asuka Morikawa ^{a, b}, Ayako Kawabata ^a, Katsuhiko Shirahige ^b, Tetsu Akiyama ^b, Aikou Okamoto ^a, Takashi Sutani ^b  



PLOS ONE


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RESEARCH ARTICLE

Assessment of peritoneal microbial features and tumor marker levels as potential diagnostic tools for ovarian cancer

Ruizhong Miao, Taylor C. Badger, Kathleen Groesch, Paula L. Diaz-Sylvester, Teresa Wilson, Allen Ghareeb, Jongjin Anne Martin, Melissa Cregger, Michael Welge, Colleen Bushell, Loretta Auvil, Ruoqing Zhu, Laurent Brard, Andrea Braundmeier-Fleming 

Published: January 9, 2020 • <https://doi.org/10.1371/journal.pone.0227707>

The role of the microbiome in ovarian cancer: mechanistic insights into oncobiosis and to bacterial metabolite signaling

Adrienn Sipos, Gyula Ujlaki, Edit Mikó, Eszter Maka, Judit Szabó, Karen Uray, Zoárd Krasznai & Péter Bai 

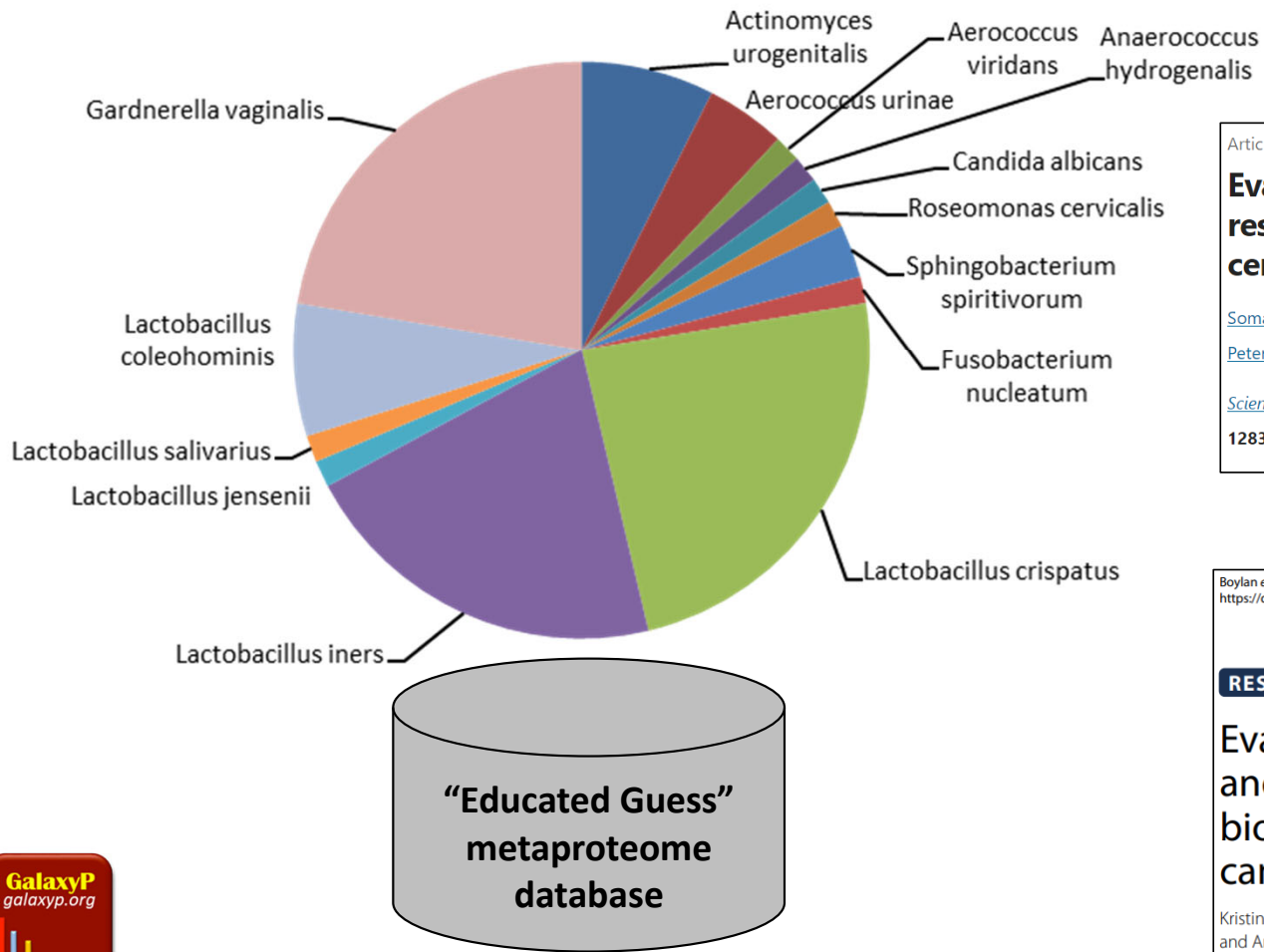
Molecular Medicine 27, Article number: 33 (2021) | [Cite this article](#)

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Bacterial proteins are detectable (along with host proteins) in Pap fluid samples using MS-based metaproteomics



Article | [Open Access](#) | [Published: 18 July 2018](#)

Evaluating the potential of residual Pap test fluid as a resource for the metaproteomic analysis of the cervical-vaginal microbiome

[Somaieh Afiuni-Zadeh](#), [Kristin L. M. Boylan](#), [Pratik D. Jagtap](#), [Timothy J. Griffin](#), [Joel D. Rudney](#), [Marnie L. Peterson](#) & [Amy P. N. Skubitz](#)

[Scientific Reports](#) **8**, Article number: 10868 (2018) | [Cite this article](#)

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Boylan et al. *Clin Proteom* (2021) 18:4
<https://doi.org/10.1186/s12014-020-09309-3>

Clinical Proteomics

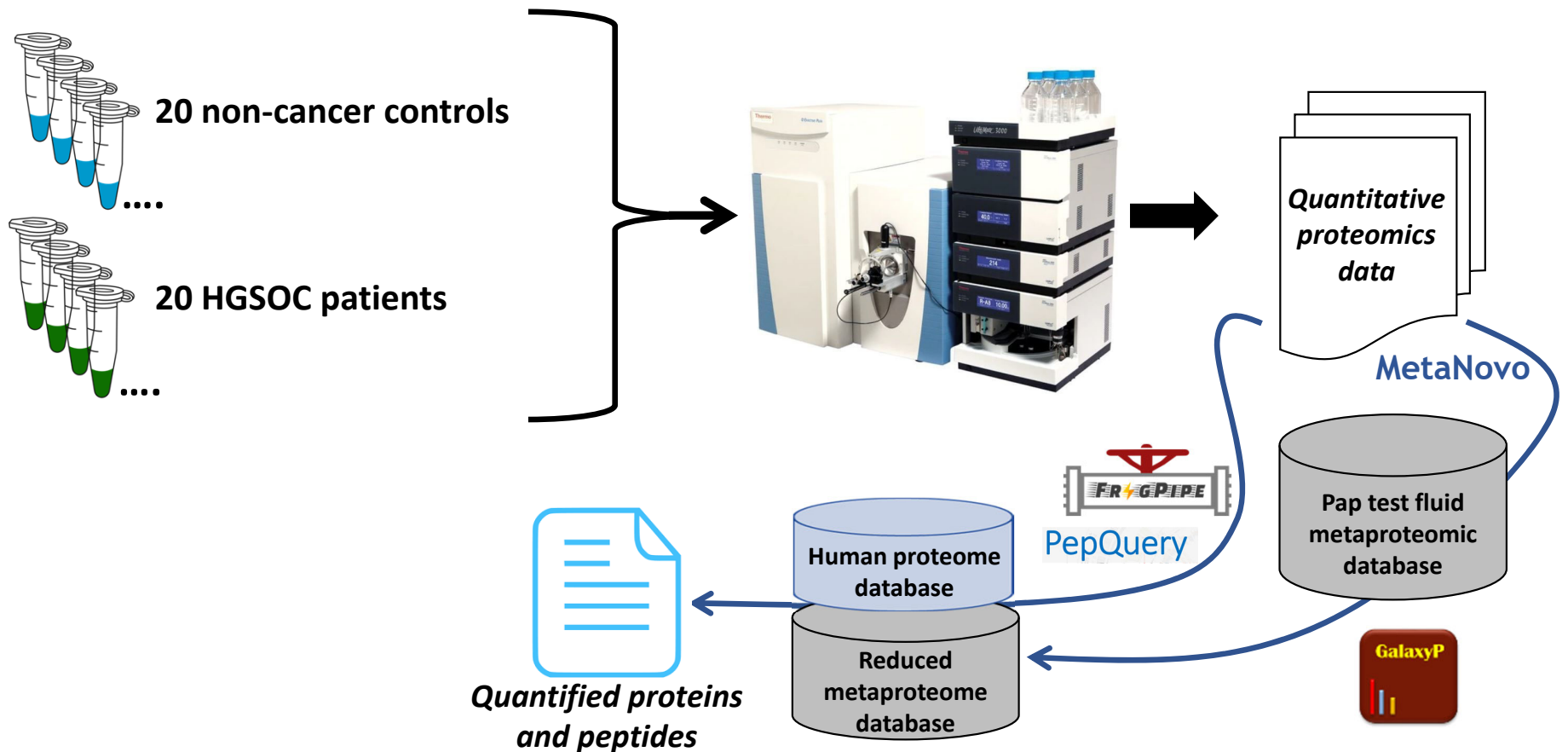
RESEARCH **Open Access**

Evaluation of the potential of Pap test fluid and cervical swabs to serve as clinical diagnostic biospecimens for the detection of ovarian cancer by mass spectrometry-based proteomics

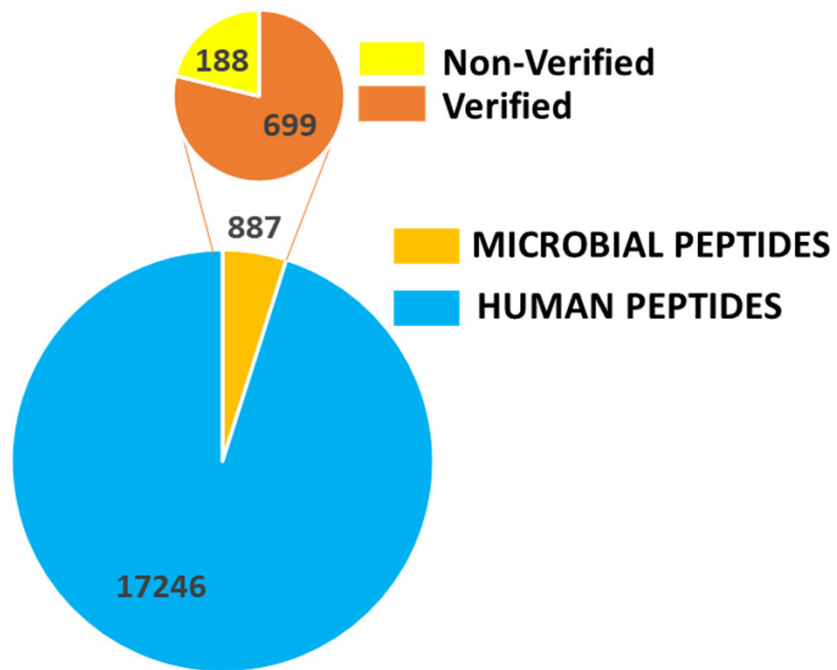
Kristin L. M. Boylan^{1,4}, Somaieh Afiuni-Zadeh^{1,5}, Melissa A. Geller², Peter A. Argenta², Timothy J. Griffin³ and Amy P. N. Skubitz^{1,2,4*}



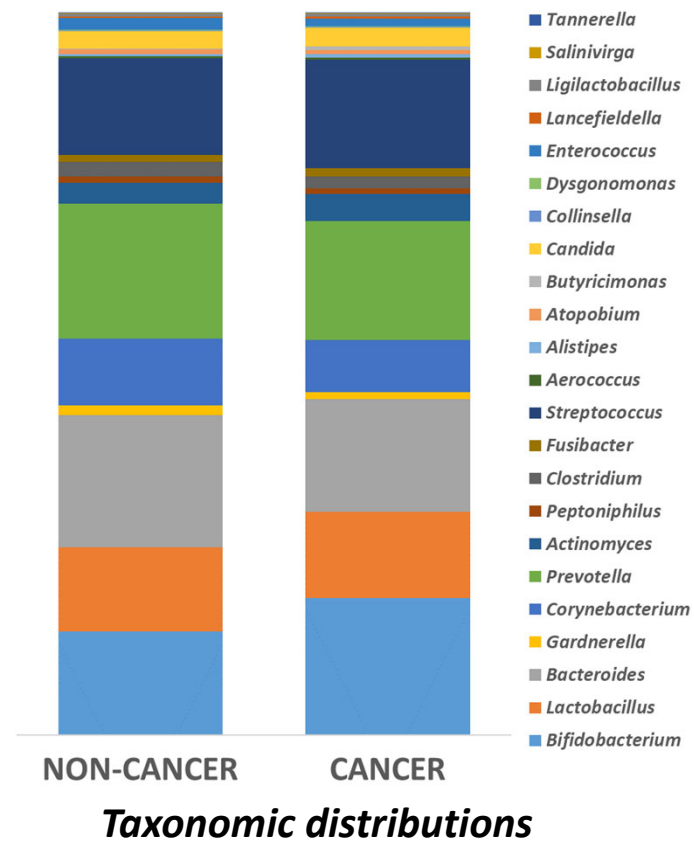
Re-analysis of a quantitative proteomics dataset in clinical Pap fluid samples: a metaproteomics perspective



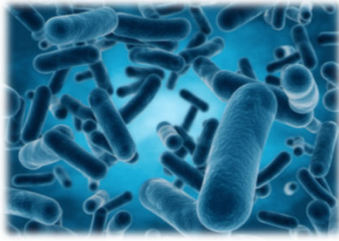
Preliminary results: Partial analysis of the full dataset



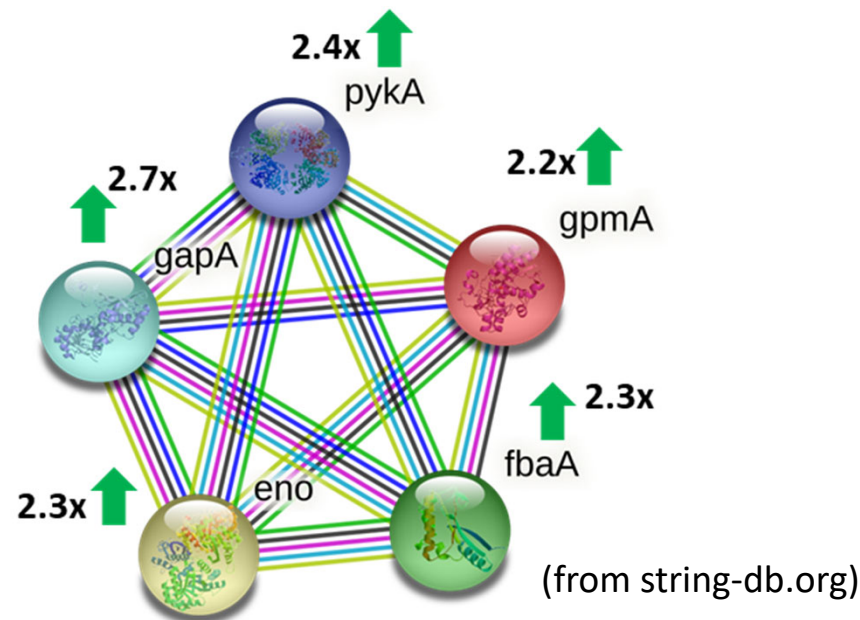
Relative amounts of bacterial and host proteins



Metaproteomics reveals unique taxonomic-functional relationships



Lactobacillus



*Glycolytic metabolic enzyme network
(fold-change cancer/non-cancer)*

Integrating bacterial-host protein signatures: diagnostic potential in Pap fluid samples

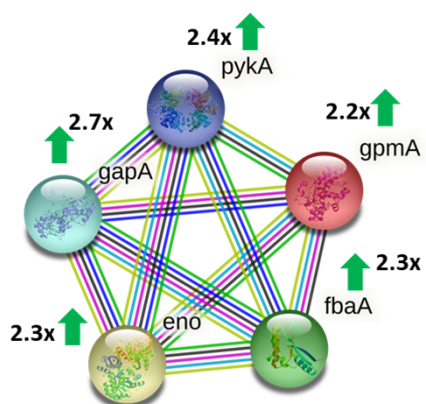
Glioma pathogenesis-related protein 1 performs dual functions in tumor cells

Junjie Wang, Zeyu Li, Fenfen Yin, Rui Zhang, Ying Zhang, Zhengxin Wang & Xiumei Sheng

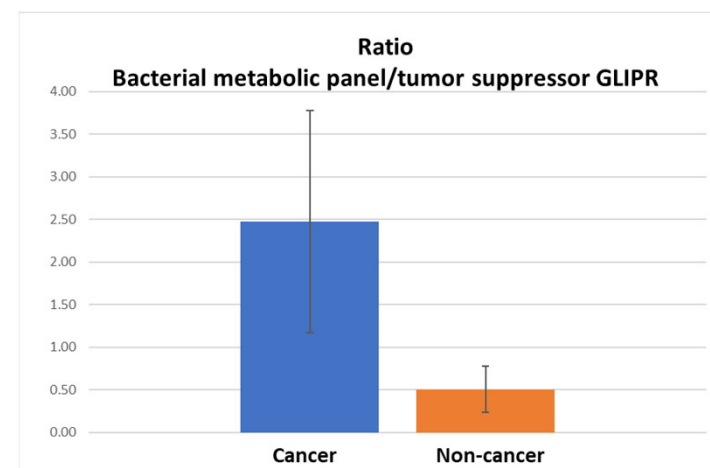
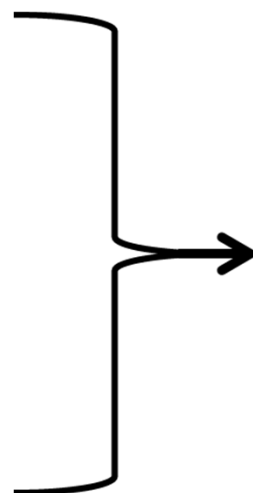
Cancer Gene Therapy 29, 253–263 (2022) | [Cite this article](#)

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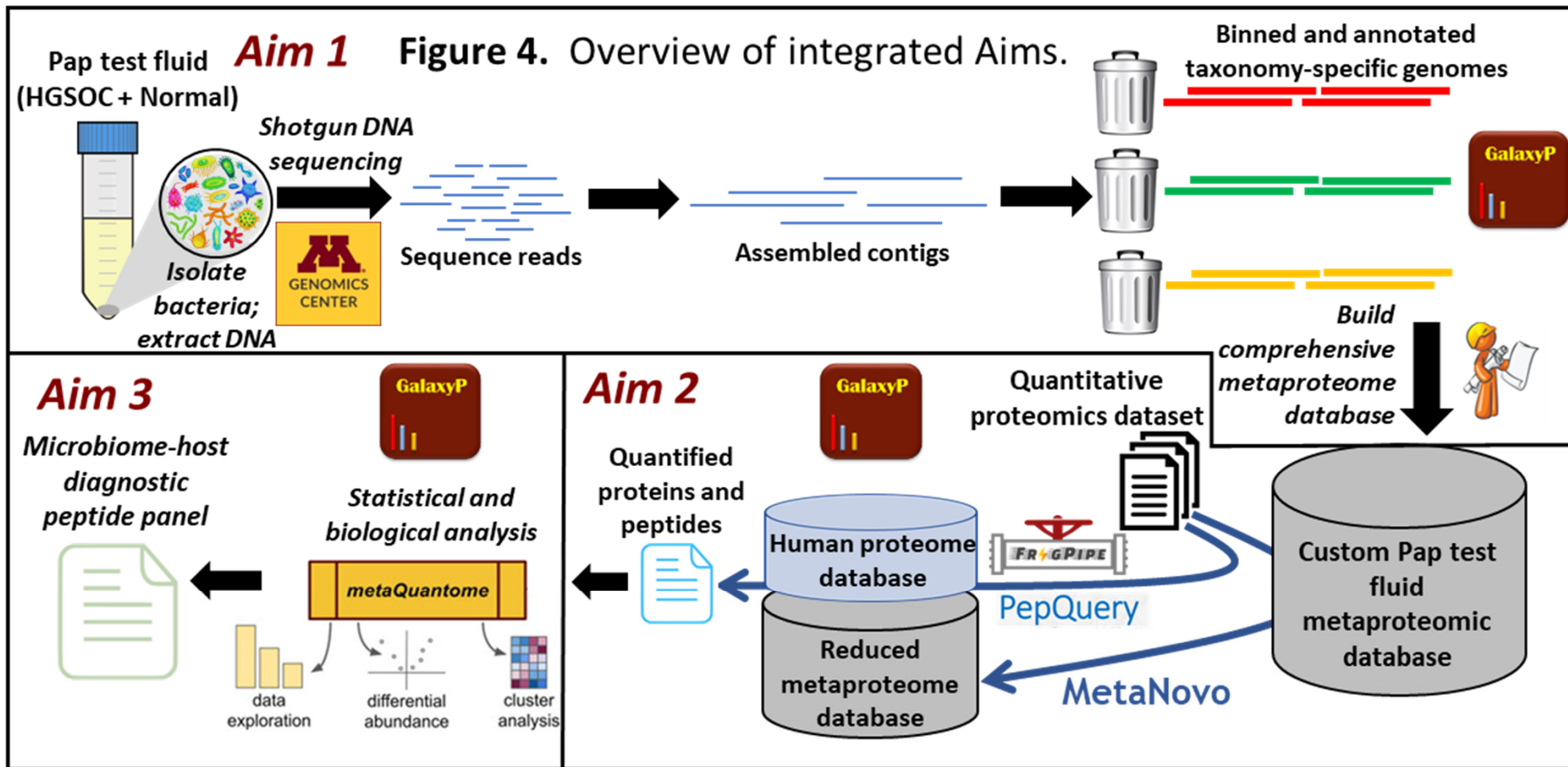
GLIPR
cancer/non-cancer



Bacterial
“Metabolic protein panel”



Next steps



Thank You!

Questions welcome!

