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Victoria Blake, English

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Folklore and Mythology of Shakespeare's *A Midsummer Night's Dream*

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Biology and Biochemistry

Clonal Analysis of Pancreatic Cancer Stem Cell Subtypes Using Ascites

Natalie Linde, Biomedical Engineering

Mentors: Marzia Cescon and Daniel Joseph DeSalvo
Mechanical and Aerospace Engineering; Baylor College of Medicine, Pediatrics

Evaluating Glycemic Outcomes in Youth With Type 1 Diabetes Using Omnipod 5 AID System

Folklore and Mythology of Shakespeare's *A Midsummer Night's Dream*

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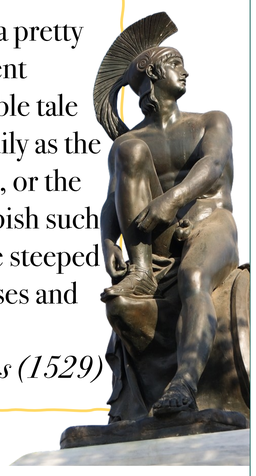
UNIVERSITY OF HOUSTON

Background

The setting of *A Midsummer Night's Dream* is split across two locations: a legendary Athens and the forest that surrounds it. While the city draws inspiration from classical literature and mythology, the forest is inspired by folklore, populated by fairies and English folk heroes like Robin Goodfellow.

"A boy [may] learn a pretty story from the ancient poets, or a memorable tale from history as readily as the stupid vulgar ballad, or the old wives' fairy rubbish such as most children are steeped in nowadays by nurses and serving women."
Desiderius Erasmus (1529)



Due to early modern perceptions of these traditions, this hybridization struck me as unusual. Familiarity with classical tradition was a class signifier, the mark of a proper education. Folklore, on the other hand, was considered vulgar, relegated to the uneducated lower class (especially women).

Methodology

My goal for this project was to explore how these traditions related to each other in the play, and whether they reflected a clash, collaboration, or hierarchy between these two traditions. To accomplish this, I set out to investigate the lore and literary traditions Shakespeare was drawing from. I conducted a review of social history and literary criticism. I also engaged with some primary sources as well as close reading the play and engaging with its productions.

Findings

Different Perspectives

More favorable views of folklore begin to emerge when we expand our scope beyond the elites:

- The early modern period's growing middle class used fairies to reaffirm domestic virtues and criticize the consumerism of those above them.
- Rebellions appropriated/self identified with fairy iconography.
- Amongst the lower sort, fairies could also be used as a form of 'community assent' (Lamb), allowing for members of the in group to cover for and protect each other. This could be used in cases of theft, bribery, infant death, and sexually illicit affairs.

Conclusion & Continued Research

Though the hybrid setting initially struck me as odd, it seems it may be a more accurate reflection of the early modern period than any singular representation would be. In future research, I look forward to continue exploring the overlap of folklore and classical mythology, as well as expanding on their role within the play itself.

"[...] A neat solution is so satisfactory to our sense of logic. But too much neatness, however satisfactory, gives the lie to the complexity and intricacy of human life, and to the twisted strands of emotions, impulses, instincts, and submerged reason which govern our simplest action."
Katherine Briggs (1957)

Blurring Boundaries

The more you research, harder it is to support an elite/popular binary, or even a classical/folkloric one.

- Elite children grew up hearing these stories from servants, and changeling stories were popular with ladies of the court.
- Fairy lineage was used to legitimize the Tudor lineage.
- 'Elite' culture was disseminated to the rest of the population through clergy, ballads, art, rising literacy rates, etc.
- Much of what was considered standard fairy lore at the time was initially imported through medieval literature.
- As long as attempts to classify fairies have existed, a classical framework has been used to do so.

References

Acknowledgements

A sincere thanks to Dr. Ann Christensen for her wonderful mentorship and encouragement. I would also like to thank Dr. Carl Lindahl for his guidance and folklore expertise early in the project. A massive thank you to OURMA and the Mellon Scholars Program– especially Drs Bettinger and Long– for the opportunity, as well as Dr. Dawson for encouraging me to pursue it. And of course, thanks to the rest of my Mellon cohort for making me feel less alone when things didn't go as planned.

Clonal analysis of pancreatic cancer stem cell subtypes using ascites

Paul Daniel[1] Saeed Khan[1], Ferhad Mongal[1], Aisha Khan[1], Mustafa Alshahristani[1], Ashley Hoffman[1], Caycel Desales[1], Frank Mckeon[1*], Wa Xian[1*]
University of Houston Xian-Mckeon Lab[1], MD Anderson Cancer Center[2]

Introduction

The prognosis of pancreatic ductal adenocarcinomas (PDACs) is dismal, with a 5-year survival rate of less than 10%. PDAC shows significant heterogeneity that impacts tumor behavior and treatment response. Using stem cell cloning from patient ascites, we identified distinct clonal populations that, despite sharing driver mutations, differed in morphology, immune signaling, and stromal features. These findings suggest epigenetic divergence within the classical PDAC subtype and underscore the complexity of its stem cell hierarchy.

Methodology

Cloning of Patient-Derived Pancreatic Cancer Stem Cells

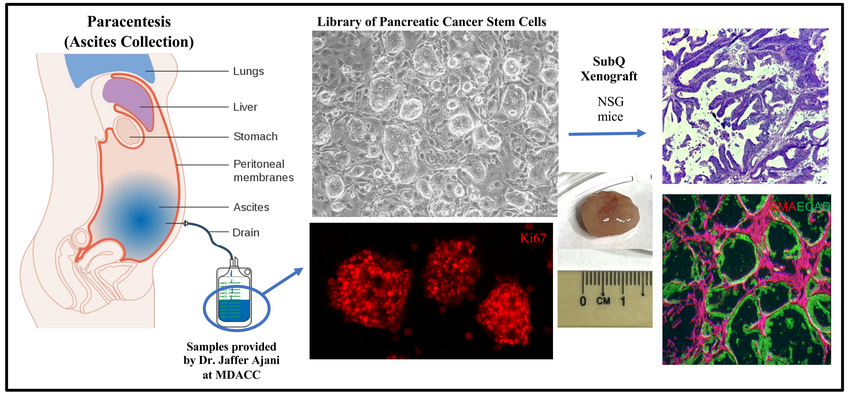


Figure 1. Cancer stem cells (CSCs) isolated from ascites samples of pancreatic cancer (PC) patients at MD Anderson Cancer Center were cultured using technology adapted from *Wang et al., 2015 (Nature)* for human gastrointestinal stem cells. Clones showed distinct morphologies, formed tumors in immunodeficient mice, and resembled clinical PDACs upon characterization.

Pancreatic Cancer Stem Cells Are Highly Clonogenic and Tumorigenic

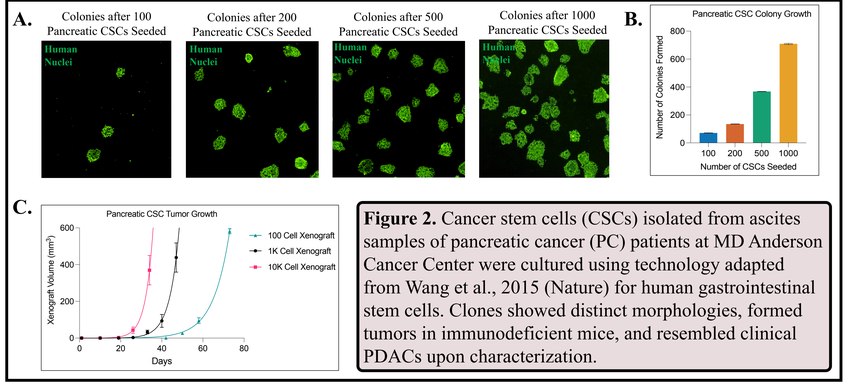


Figure 2. Cancer stem cells (CSCs) isolated from ascites samples of pancreatic cancer (PC) patients at MD Anderson Cancer Center were cultured using technology adapted from Wang et al., 2015 (Nature) for human gastrointestinal stem cells. Clones showed distinct morphologies, formed tumors in immunodeficient mice, and resembled clinical PDACs upon characterization.

Methodology (cont.)

Distinguishing Unique Subtypes From the Same Patient

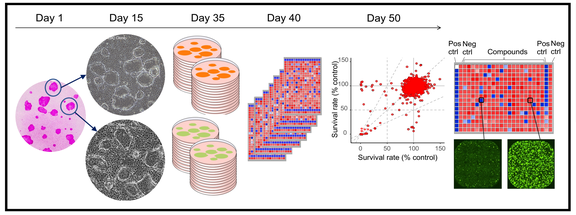


Figure 3. Clonal CSC populations derived from pooled pancreatic cancer cells were expanded and used for high-throughput drug screening. Survival responses were visualized via scatter plots and heatmaps to identify compounds that selectively target CSC viability.

Discussion and Results

Distinguishing Unique Subtypes From the Same Patient

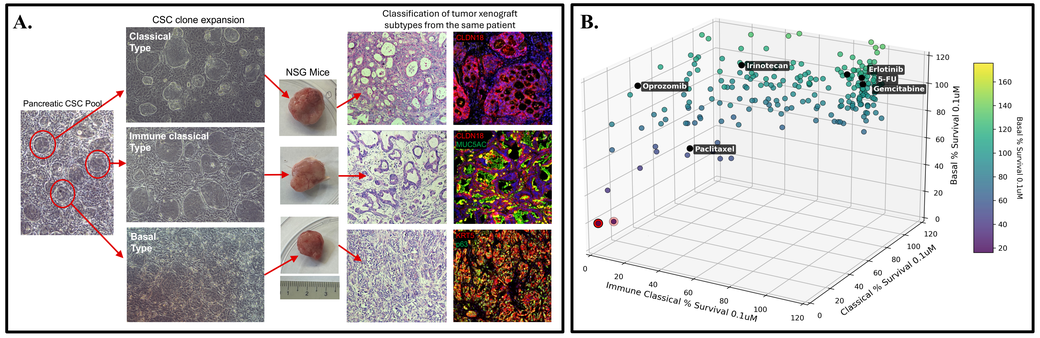


Figure 4. A. Clonal CSC lines derived from a single patient were expanded and injected into NSG mice, forming tumors with distinct histological subtypes. H&E and immunofluorescence revealed classical, immune classical, and basal features.
B. High-throughput drug screening across these subtypes showed that several standard-of-care therapies were largely ineffective, while a subset of compounds reduced survival in all three, highlighting candidates for broader therapeutic impact.

Pedigrees Exhibit A Wide Range of Sensitivity to the Standard of Care

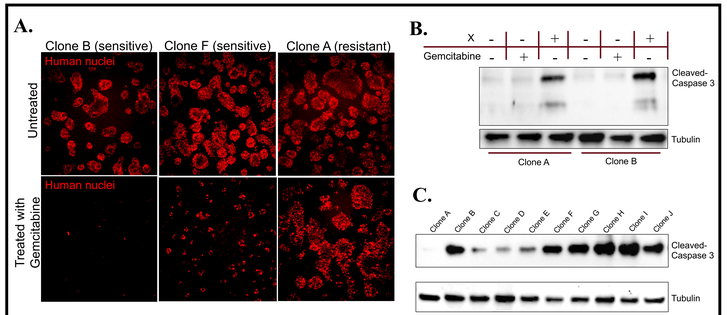


Figure 5. A. CSC clones from a single patient show variable sensitivity to gemcitabine. Viability is reduced in sensitive clones B and F, but not in resistant clone A.
B. Clone A shows minimal apoptosis with gemcitabine but responds strongly to drug "X" alone, indicating selective sensitivity.
C. Broader screening across clones reveals heterogeneous apoptotic responses to "X," emphasizing the need to profile CSC subtypes for targeted therapy.

Future Directions

Drug "X" Efficacy In PDAC Stem Cell Xenograft Model

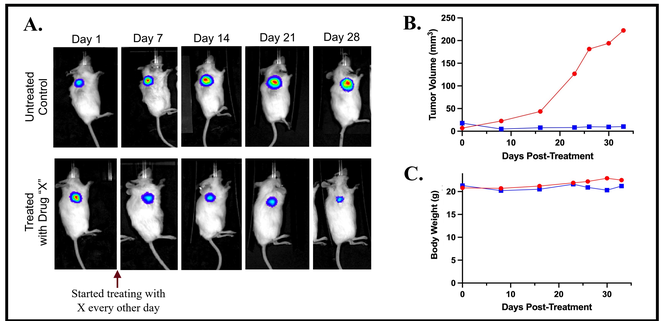


Figure 6. A. Bioluminescent imaging shows rapid tumor growth in untreated mice, while those treated with drug "X" every other day (starting Day 7) displayed significant tumor regression over 28 days.
B. Tumor volume measurements confirm sustained suppression in treated mice versus exponential growth in controls.
C. Stable body weight in both groups suggests drug "X" is not systemically toxic.

Conclusion

Using ascites-derived cancer stem, we established distinct classical PDAC subtypes from a single patient and characterized their histology, tumor behavior, and drug responses. High-throughput screening revealed subtype-specific vulnerabilities and identified drug "X" as a promising, non-toxic candidate. These findings support a precision approach to PDAC treatment through individualized subtype analysis and targeted therapy development.

References

Questions?

Acknowledgements

Special thanks to Dr. Wa Xian, Dr. Frank McKeon, and the whole Xian-McKeon Lab for their support in this project. Additional thanks to Dr. Ajani Jaffer for providing ascites samples from MDACC and the UH OURMA for their support through the SURF and PURS programs.

TRACT BIO

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center
Making Cancer History®

Evaluating Glycemic Outcomes in Youth With New-Onset Type 1 Diabetes Using Omnipod 5 Artificial Insulin Delivery System

Natalie Linde | Dr. Marzia Cescon, UH Mechanical and Aerospace Engineering and Dr. Daniel DeSalvo, Baylor College of Medicine

Introduction

The Omnipod 5 is one of the latest engineering advancements towards a true Automated Insulin Delivery (AID) system, increasing quality of life for those affected with Type 1 Diabetes (T1D).

Omnipod's 'Automated Mode' receives glucose data from a sensor and increases, decreases or suspends insulin basal rate under the guidance of settings determined by the user. This study aims to evaluate its effect on newly-diagnosed adolescents, who may have poor glucose control as they adjust to T1D diagnosis (1).

Methods

Clinical and demographic data were collected from youth with Type 1 Diabetes at the Texas Children's Diabetes Center who initiated Omnipod 5 AID system within the first 3 months after diagnosis (N = 73).

Inclusion Criteria

- Diagnosed between 10/2021 and 10/2023
- CGM Active > 80%
- Initiated Omnipod 5 within 3 months
- Use of Automated Mode > 70%

Clinical Outcomes Measured

Baseline data were obtained from Dexcom Clarity. A Continuous Glucose Monitor (CGM) collected sensor glucose (mg/dL) every five minutes. Glooko, a cloud-based software, provided information about CGM and Omnipod 5 usage as well as percent time in ranges, insulin use, and Glucose Management Indicator (GMI), an estimation of HbA1c that indicates glucose control. Demographic and clinical data obtained from Electronic Medical Record.

Age at T1D Diagnosis [years]	9.48 ± 4.0
Aggregate GMI [%]	7.08 ± .55
Users meeting ISPAD GMI/A1c target <7%, N (%)	34 (46.5%)
Total Daily Insulin [U/d]	17.89 ± 14.15

Results

Figure 1. GMI By Month.

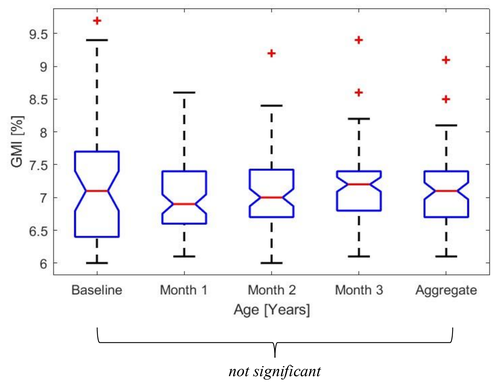


Figure 2. GMI By Age Group.

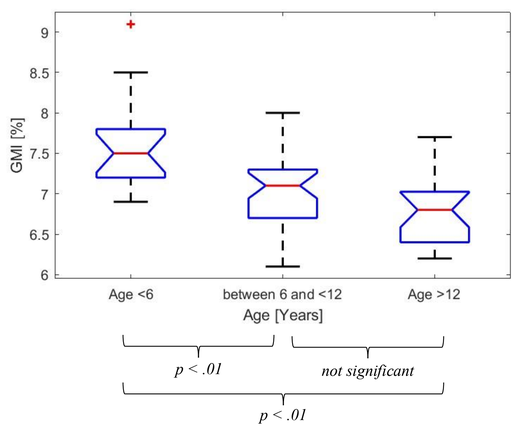


Figure 3. Visual Representation of Percent Time in Ranges.

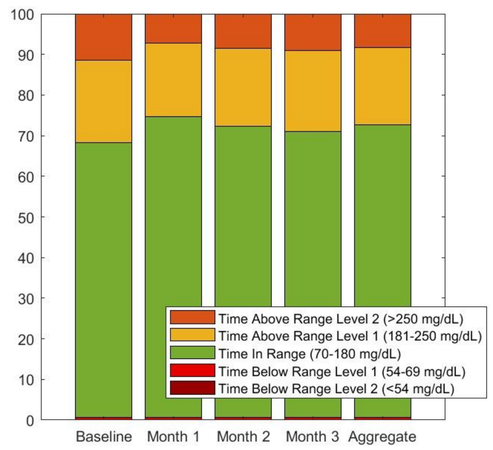


Figure 4. Glucose Target Settings Stratified by Age Group.

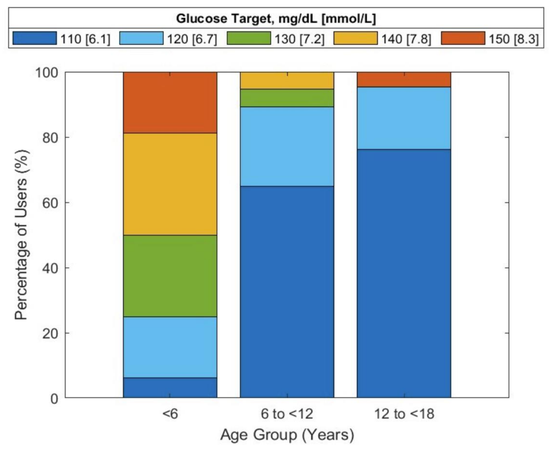


Figure 1 shows the trend in GMI for all participants by month. An Analysis of Variance test (ANOVA) indicated no statistically significant change in GMI over the three months (p = .39).

Figure 2 shows the trend in GMI by age group (<6 years, 6 to <12 years, and 12 to <18 years). The difference in GMI between age groups indicates age of diagnosis and glucose control are positively correlated (p < 0.01), as visible in *Fig. 4.* as well.

Participants experienced minimal hypoglycemia (Time Below Range Level 1 of 0.6 ± 0.6% and TBR Level 2 of 0.0 ± 0.2%), seen in *Fig.3*.

Figure 4 shows the variability in user-chosen glucose targets across age groups. Younger participants (<6 years) used higher targets (130–150 mg/dL) to minimize hypoglycemia risk, while older groups commonly used the lowest target (110 mg/dL). Notably, over 60% of users with the lowest target met the GMI goal (≤7%) compared to 47.3% overall, with minimal hypoglycemia: median 1.0% Level 1 TBR and 0.0% Level 2 TBR.

Conclusion

In this study, the Omnipod 5 AID system demonstrated safe and effective control, supporting use directly after T1D diagnosis. All 73 participants on the Omnipod 5 AID System reported no episodes of DKA or severe hypoglycemia and achieved minimal time below range (*Fig. 3)* during the first 3 months post-diagnosis. Customizable glucose targets proved effective and safe even at the lowest level *(Fig. 4)*.

While the GMI improvement over three months was not significant, 47.3% of participants met the ISPAD GMI target of less than 7%, and GMI outliers were reduced after the baseline time period. In the future, a larger sample size and longer data collection post-diagnosis could show significant long-term trends in both youth patients and low-needs youth patients.

Acknowledgments

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