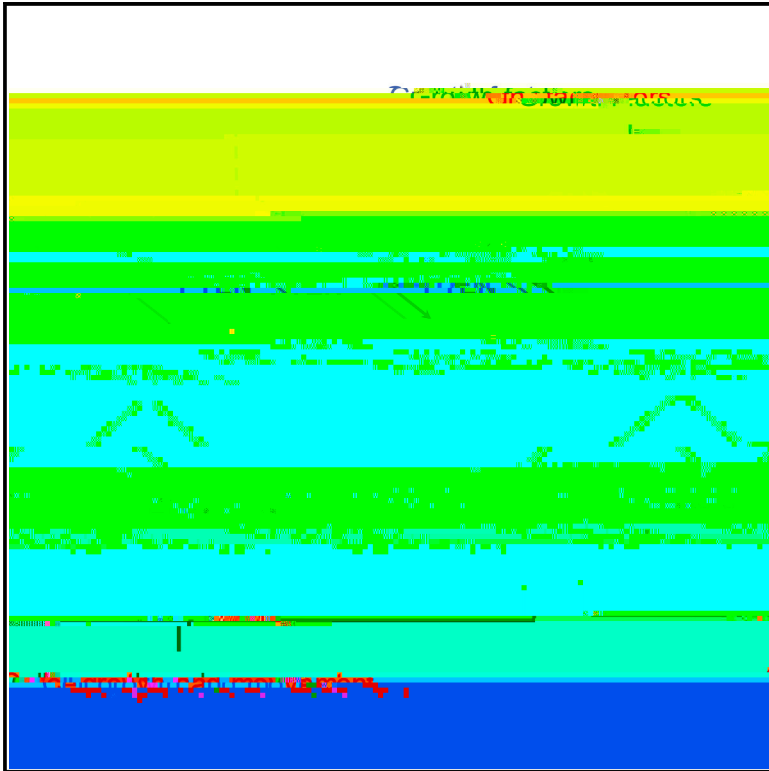


Molecular Cell

PTEN Regulates PI(3,4)P₂ Signaling and Invasiveness of Cancer Cells via PI3K

Graphical Abstract



Highlights

- PTEN is a PI(3,4)P₂ 3-phosphatase
- PTEN and INPP4B function of PTEN

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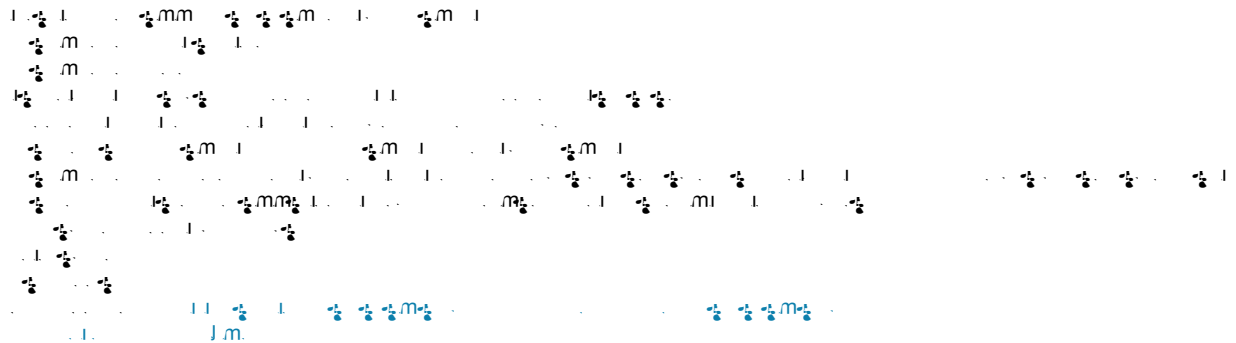
In Brief

Malek et al. show that the tumor suppressor PTEN acts as a PI(3,4)P₂ 3-phosphatase within the growth factor-stimulated PI3K signaling network, in addition to its accepted role as a PI(3,4,5)P₃ 3-phosphatase. This suggests that specific PI(3,4)P₂ effector functions, such as invadopodia formation, play a role in the PTEN-loss-of-function phenotype.

Patrizia Chessa, ..., Jonathan Clark,

PTEN Regulates PI(3,4)P₂ Signaling Downstream of Class I PI3K

Mouhannad Malek,^{1,8} Anna Kielkowska,^{1,8} Tamara Chessa,¹ Karen E. Anderson,¹ David Barneda,^{1,5} Pinar Pir,¹ Hiroki Nakanishi,² Satoshi Eguchi,² Atsushi Koizumi,³ Junko Sasaki,² Véronique Juvin,¹ Vladimir Y. Kiselev,¹ Izabella Niewczas,¹ Alexander Gray,⁴ Alexandre Valayer,¹ Dominik Spensberger,¹ Marine Imbert,¹ Sergio Felisbino,⁶ Tomonori Habuchi,³ Soren Beinke,⁷ Sabina Cosulich,⁵ Nicolas Le Novère,¹ Takehiko Sasaki,² Jonathan Clark,¹ Phillip T. Hawkins,^{1,9,10,*} and Len R. Stephens^{1,9,*}



SUMMARY

The PI3K signaling pathway regulates cell growth

$\text{PI}(3,4,5)\text{P}_3$ → $\text{PI}(3,4)\text{P}_2$ → $\text{PI}(3)\text{P}$ → PI
 EGF-S_{15} → M_{10a} → C_{10}

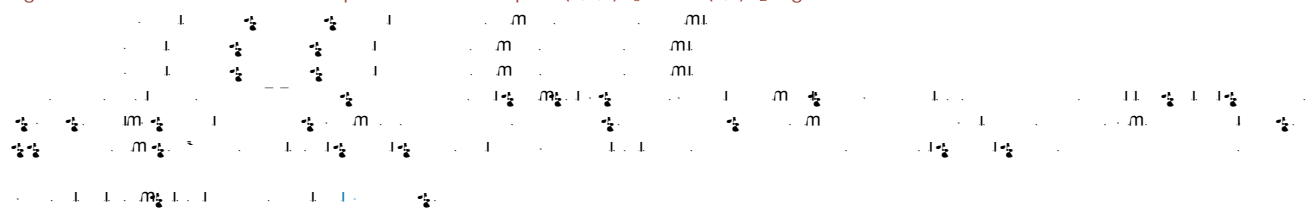
PI(3,4,5)P₃ → **PI(3,4)P₂** → **PI(3)P** → **PI**
EGF-S₁₅ → **M_{10a}** → **C₁₀**

The diagram illustrates the signaling pathway involving PI(3,4,5)P₃, PI(3,4)P₂, PI(3)P, and PI, leading to the activation of EGF-S₁₅, M_{10a}, and C₁₀. The pathway starts with PI(3,4,5)P₃ and PI(3,4)P₂, which are converted to PI(3)P and PI, respectively. PI(3)P and PI then activate EGF-S₁₅, M_{10a}, and C₁₀.

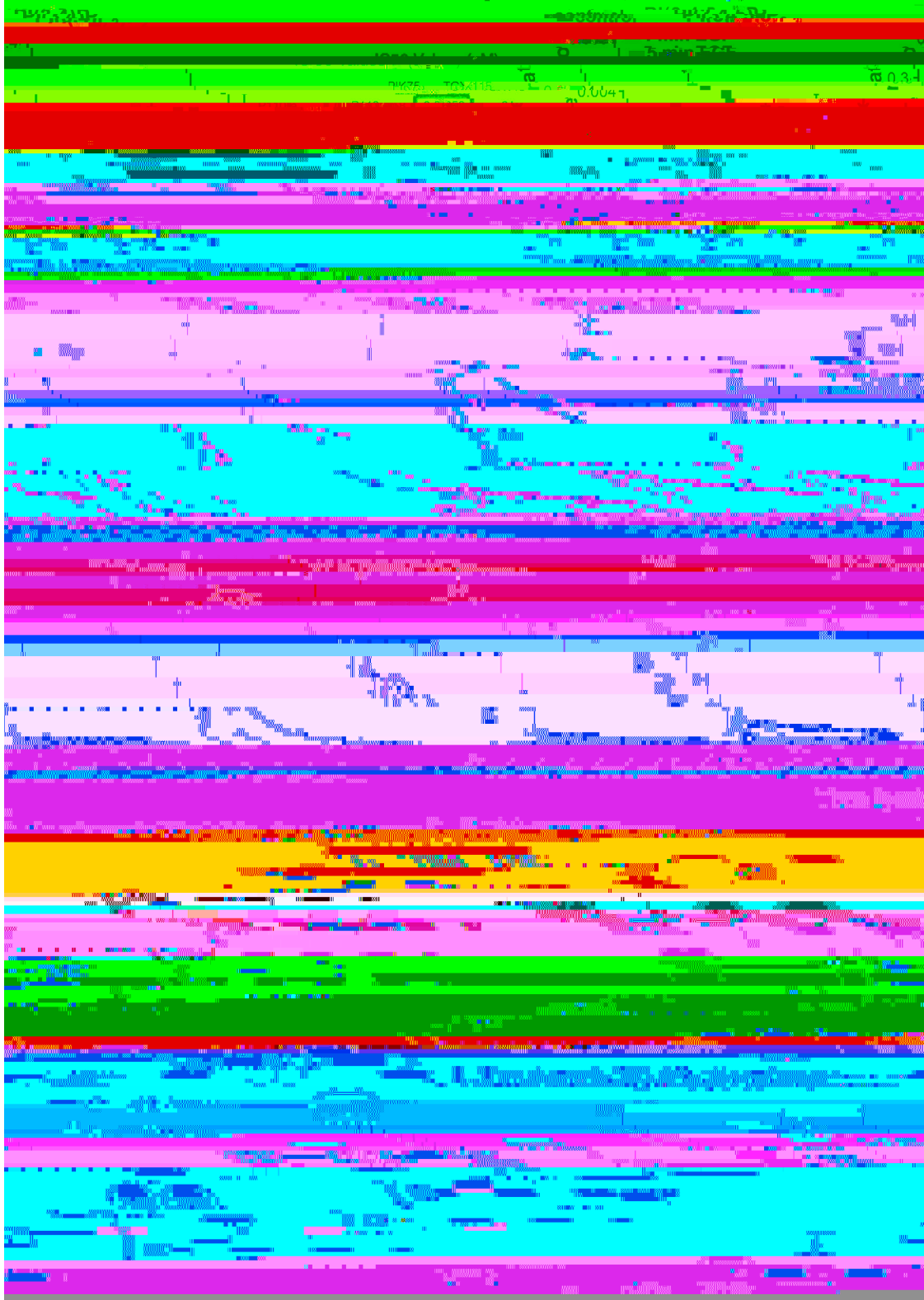
PI(3,4,5)P_3 → PI(3,4)P_2 → PI(3)P → PI



Figure 2. The Identification of Phosphatases that Shape PI(3,4,5)P₃ and PI(3,4)P₂ Signals in EGF-Stimulated Mcf10a Cells



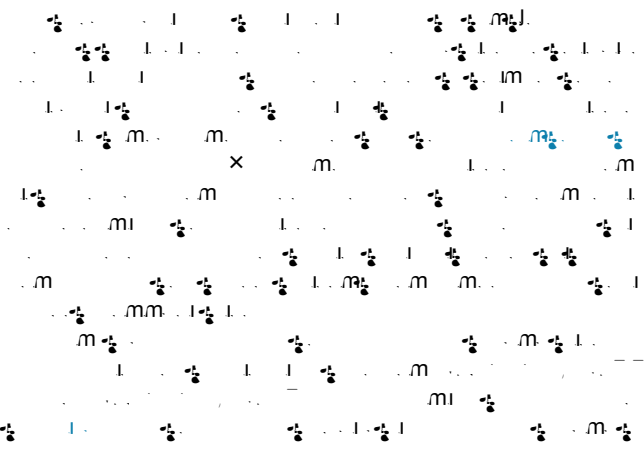
A Inhibition of 3AGS-Like Signaling by TSC2 in PCa Cells



Im \mathbb{C}^n is a real vector space of dimension $2n$.
The inner product on \mathbb{C}^n is defined by $\langle z, w \rangle = \sum_{i=1}^n z_i \bar{w}_i$.
This makes \mathbb{C}^n a complex Hilbert space.
The real inner product on \mathbb{C}^n is defined by $\langle z, w \rangle_{\mathbb{R}} = \operatorname{Re} \langle z, w \rangle$.
The imaginary part of the complex inner product is defined by $\langle z, w \rangle_{\mathbb{I}} = \operatorname{Im} \langle z, w \rangle$.
The real and imaginary parts of the complex inner product are related by $\langle z, w \rangle_{\mathbb{R}} = \operatorname{Re} \langle z, w \rangle$ and $\langle z, w \rangle_{\mathbb{I}} = \operatorname{Im} \langle z, w \rangle$.
The real inner product is symmetric and the imaginary part is skew-symmetric.
The real and imaginary parts of the complex inner product are orthogonal with respect to each other.
The real and imaginary parts of the complex inner product are related by $\langle z, w \rangle_{\mathbb{R}}^2 + \langle z, w \rangle_{\mathbb{I}}^2 = |\langle z, w \rangle|^2$.
The real and imaginary parts of the complex inner product are related by $\langle z, w \rangle_{\mathbb{R}} = \operatorname{Re} \langle z, w \rangle$ and $\langle z, w \rangle_{\mathbb{I}} = \operatorname{Im} \langle z, w \rangle$.

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PTEN Regula PI(3,4)P₂ Através da sua interação com MDM2



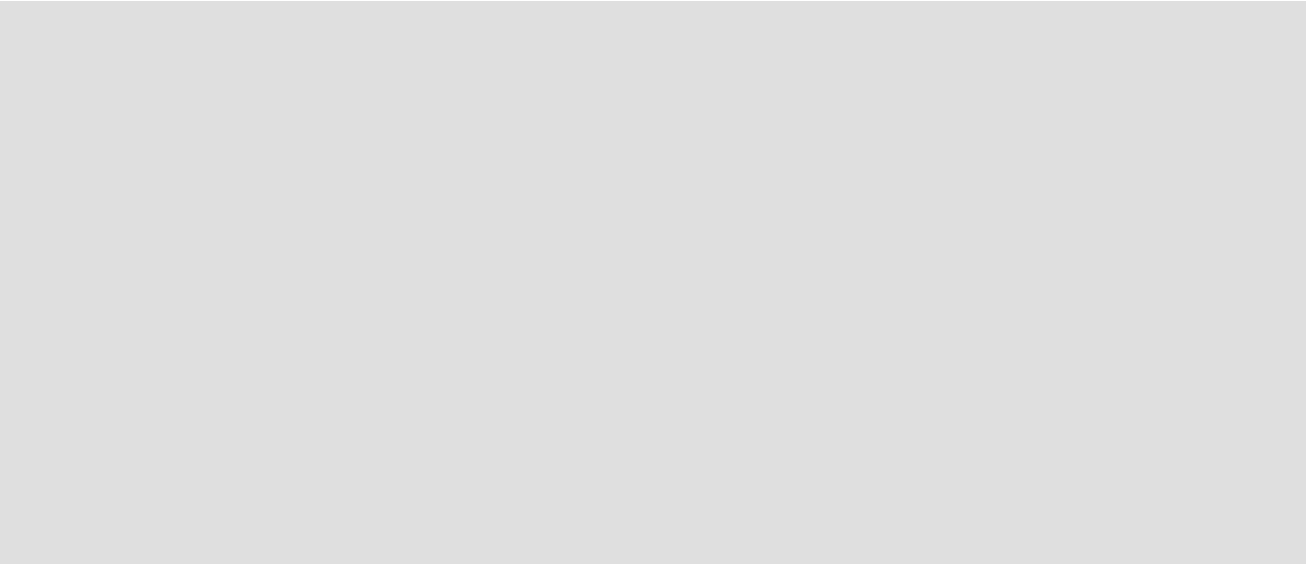


1. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

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STAR★METHODS

KEY RESOURCES TABLE

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CONTACT FOR REAGENT AND RESOURCE SHARING

For reagent and resource sharing, please contact the corresponding author of the article. The contact information for the corresponding author is provided in the article text and the article metadata.

The first part of the document discusses the importance of maintaining accurate records and the role of the management team in ensuring that all activities are properly documented and reported. It emphasizes the need for transparency and accountability in all financial transactions and the importance of regular audits to identify and address any potential issues or discrepancies.

The second part of the document provides a detailed overview of the company's financial performance over the past year, including key metrics such as revenue, profit margins, and operating expenses. It highlights the company's strong growth and the successful implementation of various strategic initiatives that have contributed to its overall success.

The final part of the document outlines the company's future outlook and the key challenges it faces as it continues to expand its operations and explore new market opportunities. It also discusses the company's commitment to sustainability and social responsibility, and the steps it is taking to address these important issues.

H a T (P a r t)

The following table provides a summary of the company's financial performance over the past year, including key metrics such as revenue, profit margins, and operating expenses.

Metric	Year 1	Year 2
Revenue	\$10.5M	\$12.8M
Profit Margin	15%	18%
Operating Expenses	\$8.5M	\$9.5M

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