1. Phylogeny  
   Inositol hexakisphosphate kinase 1 (IP6K1) is a member of the inositol phosphate kinase family, an evolutionarily conserved family present in all eukaryotic organisms. In lower eukaryotes such as yeast, a single ortholog – commonly referred to as Kcs1 – performs the analogous catalytic function, whereas mammals express three isoforms (IP6K1, IP6K2, and IP6K3) that have diverged to assume distinct regulatory roles despite retaining a conserved C‐terminal catalytic region (chakkour2024insightsintothe pages 1-2, chakraborty2011inositolpyrophosphatesas pages 1-2). Phylogenetic analyses indicate that the emergence of inositol phosphate kinases predates many other kinase families and that IP6Ks represent an ancient branch within the eukaryotic kinome. Their presence across diverse species – from yeast to mammals – underlines their fundamental role in cellular phosphate metabolism and signaling, a role that has been maintained over evolutionary time (minini2020thekeyrole pages 1-3, saiardi2012cellsignallingby pages 1-3).
2. Reaction Catalyzed  
   IP6K1 catalyzes the phosphorylation of inositol hexakisphosphate (IP6) by transferring a phosphate group from ATP, thereby producing diphosphoinositol pentakisphosphate (InsP7, also referred to as PP-InsP5) and ADP. In addition to this primary reaction, IP6K1 is also capable of phosphorylating 1,3,4,5,6-pentakisphosphate (InsP5) to generate diphosphoinositol tetrakisphosphate (PP-InsP4). The overall reactions can be summarized as follows:

  ATP + IP6 → ADP + 5-IP7  
  ATP + InsP5 → ADP + PP-InsP4

These reactions are essential for establishing the cellular pool of inositol pyrophosphates, which serve as high-energy signaling molecules with important regulatory roles (chakkour2024insightsintothe pages 1-2, tsui2010rolesofinositol pages 8-9).

1. Cofactor Requirements  
   The kinase activity of IP6K1 is dependent on the presence of ATP as the phosphate donor, which is mandatory for the transfer of the phosphate group onto its substrate. In addition, like most kinases, IP6K1 requires divalent metal ions for optimal catalytic function, with magnesium ions (Mg²⁺) serving as the principal cofactor. The presence of Mg²⁺ facilitates the binding of ATP and stabilizes the transition state during the reaction (chakkour2024insightsintothe pages 1-2, wormald2019discoverysynthesisand pages 126-130).
2. Substrate Specificity  
   IP6K1 exhibits specificity primarily toward inositol hexakisphosphate (IP6), the most abundant and stable inositol polyphosphate in cells. In its catalytic action, the enzyme selectively phosphorylates IP6 at the 5-position to produce the corresponding inositol pyrophosphate (5-IP7). Moreover, under certain conditions, IP6K1 can also utilize 1,3,4,5,6-pentakisphosphate (InsP5) as a substrate and convert it into diphosphoinositol tetrakisphosphate (PP-InsP4). Although the enzyme shows a higher catalytic efficiency with IP6, its ability to act on InsP5 demonstrates a degree of substrate flexibility; studies indicate that IP6K1 presents a fivefold higher Km for IP6 relative to InsP5, underscoring its preferential substrate specificity for IP6 (chakkour2024insightsintothe pages 1-2, minini2020thekeyrole pages 3-5).
3. Structure  
   The overall architecture of IP6K1 comprises a conserved central kinase domain that is responsible for binding both its substrate (IP6) and ATP. The catalytic region is contained within a highly conserved C-terminal segment, which is shared among all mammalian IP6K isoforms, whereas the N-terminal domain is variable and is thought to modulate protein–protein interactions and subcellular localization (chakkour2024insightsintothe pages 1-2). The conserved kinase domain includes motifs characteristic of the ATP-grasp fold, which is typical for kinases that catalyze phosphate transfer reactions. In particular, a conserved PxxxDxKxG motif has been identified in related kinases and is presumed to contribute to substrate binding and catalysis (fridy2007cloningandcharacterization pages 1-1, wormald2019discoverysynthesisand pages 126-130). Although crystal structures specific to IP6K1 are not broadly available in the literature, AlphaFold models and biochemical characterizations provide insight into a domain organization that includes a compact nucleotide-binding core and potential regulatory regions that could mediate interactions with other cellular proteins. These unique structural features, including a variable N-terminal segment, may underlie the differential regulation and diverse cellular functions observed for this enzyme (chakkour2024insightsintothe pages 1-2, wormald2019discoverysynthesisand pages 126-130).
4. Regulation  
   The regulation of IP6K1 activity occurs at several levels. Post-translational modifications, particularly phosphorylation events, play a crucial role in modulating its enzymatic activity. For instance, phosphorylation by protein kinases such as protein kinase A (PKA) and protein kinase C (PKC) at specific serine residues (notably, serines 118 and 121 as reported in related studies) has been shown to enhance its interaction with proteins like perilipin 1 (PLIN1), thereby linking it to the regulation of lipolysis and metabolic processes (chakraborty2018theinositolpyrophosphate pages 44-48, minini2020thekeyrole pages 5-7). In addition to these modifications, IP6K1 is regulated through its association with focal adhesion proteins such as α-actinin and focal adhesion kinase (FAK), which facilitate its phosphorylation and subsequent pyrophosphorylation of substrate proteins, ultimately impacting cell motility and adhesion (chakkour2024insightsintothe pages 1-2, chakkour2024insightsintothe pages 3-5). Furthermore, interactions with proteins such as DNA damage binding protein 1 (DDB1) have been reported to negatively regulate IP6K1 catalytic activity, particularly in the context of DNA damage responses (chakraborty2018theinositolpyrophosphate pages 44-48). The enzyme’s catalytic function is also sensitive to intracellular energy status; fluctuations in the ATP/ADP ratio can modulate its activity, further integrating its function into cellular metabolic networks (wormald2019discoverysynthesisand pages 126-130).
5. Function  
   IP6K1 is widely expressed across various mammalian tissues and plays a central role in the synthesis of inositol pyrophosphates, particularly 5-diphosphoinositol pentakisphosphate (5-IP7). The generation of 5-IP7 by IP6K1 is critical for several cellular processes. First, 5-IP7 functions as a high-energy signaling molecule that participates in protein pyrophosphorylation, a noncanonical post-translational modification in which a diphosphate group is transferred to pre-phosphorylated serine residues. This modification is resistant to most phosphatases and is implicated in the regulation of proteins involved in chromatin remodeling and gene expression (chakraborty2011inositolpyrophosphatesas pages 8-10, chakraborty2018theinositolpyrophosphate pages 8-9).

IP6K1-generated inositol pyrophosphates modulate key signaling pathways including Akt signaling. The product 5-IP7 is known to inhibit Akt translocation and activation by competing with phosphatidylinositol (3,4,5)-trisphosphate (PIP3) for binding to the pleckstrin homology (PH) domain, thereby influencing cell survival and metabolic regulation (chakraborty2011inositolpyrophosphatesas pages 8-10, minini2020thekeyrole pages 17-19). In addition, studies have demonstrated that genetic deletion or pharmacological inhibition of IP6K1 in mouse models leads to enhanced insulin sensitivity, reduced weight gain under high‐fat diet conditions, and altered energy expenditure, linking the enzyme directly to metabolic regulation (chatree2020roleofinositols pages 3-5, tsui2010rolesofinositol pages 8-9).

Beyond its metabolic roles, IP6K1 is implicated in the modulation of cytoskeletal dynamics and vesicle trafficking. Its interaction with focal adhesion proteins such as FAK and α-actinin is crucial for the regulation of cell migration and adhesion, processes that are essential during development and in various pathological conditions (chakkour2024insightsintothe pages 1-2, chakkour2024insightsintothe pages 3-5). Furthermore, IP6K1 has been associated with nuclear functions, including the regulation of chromatin remodeling and gene transcription. For example, 5-IP7 generated by IP6K1 has been shown to inhibit histone demethylase activity, thereby influencing the trimethylation of histone H3 lysine 9 (H3K9me3) and modulating gene expression patterns (chakraborty2011inositolpyrophosphatesas pages 8-10, chakraborty2018theinositolpyrophosphate pages 17-19).

The enzyme also participates in the regulation of spermatogenesis, with knockout studies in mice demonstrating that disruption of IP6K1 results in male sterility attributed to impaired chromatoid body formation and aberrant sperm nuclear maturation (tsui2010rolesofinositol pages 8-9). In addition, IP6K1 plays a role in immune cell function by modulating neutrophil activity and platelet polyphosphate levels, which are important in hemostasis and inflammation (wilson2019theinositolhexakisphosphate pages 1-2, lee2020inositolpyrophosphatessignaling pages 15-15). Overall, the broad spectrum of functions controlled by IP6K1 emphasizes its key role as an integrator of inositol phosphate metabolism and cellular signal transduction (chakkour2024insightsintothe pages 1-2, chakraborty2011inositolpyrophosphatesas pages 1-2, chatree2020roleofinositols pages 1-3).

1. Other Comments  
   Several small-molecule inhibitors have been developed that target the inositol phosphate kinase family, with TNP (N2-(m-Trifluorobenzyl), N6-(p-nitrobenzyl)purine) representing a widely used pan-IP6K inhibitor. Although TNP inhibits multiple IP6K isoforms, recent medicinal chemistry efforts have focused on synthesizing purine-based inhibitors that exhibit improved selectivity for IP6K1 over IP6K2 and IP6K3 (wormald2019discoverysynthesisand pages 117-121, minini2020thekeyrole pages 12-14). Pharmacological inhibition of IP6K1 has been shown to affect insulin signaling, energy metabolism, and cell migration, and this modulation has potential therapeutic implications for diseases such as type 2 diabetes, obesity, and certain forms of cancer (minini2020thekeyrole pages 17-19, tsui2010rolesofinositol pages 8-9). In addition, the loss of IP6K1 in knockout models results in altered cellular phosphate homeostasis, changes in Akt activation, and modifications to both emtotic and cytoskeletal processes, all of which contribute to its emerging role in diverse pathophysiological contexts (wilson2019theinositolhexakisphosphate pages 1-2, chatree2020roleofinositols pages 3-5). Disease associations also include defects in spermatogenesis and potential alterations in neuronal migration, further highlighting the clinical significance of precisely regulated IP6K1 activity (tsui2010rolesofinositol pages 8-9, heitmann2023theroleof pages 11-12). No novel or contradictory regulatory data have been reported in the current literature that conflict with these described properties (chakkour2024insightsintothe pages 1-2, chakraborty2018theinositolpyrophosphate pages 44-48).
2. References
3. Chakkour, M., & Greenberg, M. L. “Insights into the roles of inositol hexakisphosphate kinase 1 (IP6K1) in mammalian cellular processes.” Journal of Biological Chemistry, 300:107116, Apr 2024. (chakkour2024insightsintothe pages 1-2)
4. Chakkour, M., & Greenberg, M. L. “Insights into the roles of inositol hexakisphosphate kinase 1 (IP6K1) in mammalian cellular processes.” Journal of Biological Chemistry, 300:107116, Apr 2024. (chakkour2024insightsintothe pages 3-5)
5. Chakkour, M., & Greenberg, M. L. “Insights into the roles of inositol hexakisphosphate kinase 1 (IP6K1) in mammalian cellular processes.” Journal of Biological Chemistry, 300:107116, Apr 2024. (chakkour2024insightsintothe pages 8-9)
6. Chakraborty, A., Kim, S., & Snyder, S. H. “Inositol pyrophosphates as mammalian cell signals.” Science Signaling, 4:re1-re1, Aug 2011. (chakraborty2011inositolpyrophosphatesas pages 1-2)
7. Chakraborty, A., Kim, S., & Snyder, S. H. “Inositol pyrophosphates as mammalian cell signals.” Science Signaling, 4:re1-re1, Aug 2011. (chakraborty2011inositolpyrophosphatesas pages 8-10)
8. Chakraborty, A. “The inositol pyrophosphate pathway in health and diseases.” Biological Reviews, May 2018. (chakraborty2018theinositolpyrophosphate pages 13-14)
9. Chakraborty, A. “The inositol pyrophosphate pathway in health and diseases.” Biological Reviews, May 2018. (chakraborty2018theinositolpyrophosphate pages 17-19)
10. Chakraborty, A. “The inositol pyrophosphate pathway in health and diseases.” Biological Reviews, May 2018. (chakraborty2018theinositolpyrophosphate pages 3-4)
11. Chakraborty, A. “The inositol pyrophosphate pathway in health and diseases.” Biological Reviews, May 2018. (chakraborty2018theinositolpyrophosphate pages 39-44)
12. Chakraborty, A. “The inositol pyrophosphate pathway in health and diseases.” Biological Reviews, May 2018. (chakraborty2018theinositolpyrophosphate pages 44-48)
13. Lee, S., Kim, M.-G., Ahn, H., & Kim, S. “Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals.” Molecules, 25:2208, May 2020. (lee2020inositolpyrophosphatessignaling pages 13-15)
14. Lee, S., Kim, M.-G., Ahn, H., & Kim, S. “Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals.” Molecules, 25:2208, May 2020. (lee2020inositolpyrophosphatessignaling pages 7-9)
15. Lee, S., Kim, M.-G., Ahn, H., & Kim, S. “Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals.” Molecules, 25:2208, May 2020. (lee2020inositolpyrophosphatessignaling pages 9-9)
16. Minini, M., Senni, A., Unfer, V., & Bizzarri, M. “The key role of IP6K: a novel target for anticancer treatments?” Molecules, 25:4401, Sep 2020. (minini2020thekeyrole pages 1-3)
17. Minini, M., Senni, A., Unfer, V., & Bizzarri, M. “The key role of IP6K: a novel target for anticancer treatments?” Molecules, 25:4401, Sep 2020. (minini2020thekeyrole pages 14-16)
18. Minini, M., Senni, A., Unfer, V., & Bizzarri, M. “The key role of IP6K: a novel target for anticancer treatments?” Molecules, 25:4401, Sep 2020. (minini2020thekeyrole pages 3-5)
19. Minini, M., Senni, A., Unfer, V., & Bizzarri, M. “The key role of IP6K: a novel target for anticancer treatments?” Molecules, 25:4401, Sep 2020. (minini2020thekeyrole pages 5-7)
20. Tsui, M. M., & York, J. D. “Roles of inositol phosphates and inositol pyrophosphates in development, cell signaling and nuclear processes.” Advances in Enzyme Regulation, 50:324-337, Jan 2010. (tsui2010rolesofinositol pages 8-9)
21. Wormald, M., Liao, G., Kimos, M., Barrow, J., & Wei, H. “Development of a homogenous high-throughput assay for inositol hexakisphosphate kinase 1 activity.” PLOS ONE, 12:e0188852, Nov 2017. (wormald2017developmentofa pages 13-14)
22. Bennett, M., Onnebo, S., Azevedo, C., & Saiardi, A. “Inositol pyrophosphates: metabolism and signaling.” Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. (bennett2006inositolpyrophosphatesmetabolism pages 3-4)
23. Bennett, M., Onnebo, S., Azevedo, C., & Saiardi, A. “Inositol pyrophosphates: metabolism and signaling.” Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. (bennett2006inositolpyrophosphatesmetabolism pages 4-5)
24. Bennett, M., Onnebo, S., Azevedo, C., & Saiardi, A. “Inositol pyrophosphates: metabolism and signaling.” Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. (bennett2006inositolpyrophosphatesmetabolism pages 5-6)
25. Chatree, S., Thongmaen, N., Tantivejkul, K., Sitticharoon, C., & Vucenik, I. “Role of inositols and inositol phosphates in energy metabolism.” Molecules, 25:5079, Nov 2020. (chatree2020roleofinositols pages 1-3)
26. Chatree, S., Thongmaen, N., Tantivejkul, K., Sitticharoon, C., & Vucenik, I. “Role of inositols and inositol phosphates in energy metabolism.” Molecules, 25:5079, Nov 2020. (chatree2020roleofinositols pages 3-5)
27. Heitmann, T., & Barrow, J. C. “The role of inositol hexakisphosphate kinase in the central nervous system.” Biomolecules, 13:1317, Aug 2023. (heitmann2023theroleof pages 11-12)
28. Wilson, M. S., Jessen, H. J., & Saiardi, A. “The inositol hexakisphosphate kinases IP6K1 and -2 regulate human cellular phosphate homeostasis, including XPR1-mediated phosphate export.” Journal of Biological Chemistry, 294:11597-11608, Jul 2019. (wilson2019theinositolhexakisphosphate pages 1-2)
29. Fridy, P. C., Otto, J. C., Dollins, D. E., & York, J. D. “Cloning and characterization of two human VIP1-like inositol hexakisphosphate and diphosphoinositol pentakisphosphate kinases.” Journal of Biological Chemistry, 282:30754-30762, Oct 2007. (fridy2007cloningandcharacterization pages 1-1)

References

1. (chakkour2024insightsintothe pages 1-2): Mohamed Chakkour and Miriam L. Greenberg. Insights into the roles of inositol hexakisphosphate kinase 1 (ip6k1) in mammalian cellular processes. Journal of Biological Chemistry, 300:107116, Apr 2024. URL: https://doi.org/10.1016/j.jbc.2024.107116, doi:10.1016/j.jbc.2024.107116. This article has 5 citations and is from a domain leading peer-reviewed journal.
2. (chakkour2024insightsintothe pages 3-5): Mohamed Chakkour and Miriam L. Greenberg. Insights into the roles of inositol hexakisphosphate kinase 1 (ip6k1) in mammalian cellular processes. Journal of Biological Chemistry, 300:107116, Apr 2024. URL: https://doi.org/10.1016/j.jbc.2024.107116, doi:10.1016/j.jbc.2024.107116. This article has 5 citations and is from a domain leading peer-reviewed journal.
3. (chakkour2024insightsintothe pages 8-9): Mohamed Chakkour and Miriam L. Greenberg. Insights into the roles of inositol hexakisphosphate kinase 1 (ip6k1) in mammalian cellular processes. Journal of Biological Chemistry, 300:107116, Apr 2024. URL: https://doi.org/10.1016/j.jbc.2024.107116, doi:10.1016/j.jbc.2024.107116. This article has 5 citations and is from a domain leading peer-reviewed journal.
4. (chakraborty2011inositolpyrophosphatesas pages 1-2): Anutosh Chakraborty, Seyun Kim, and Solomon H. Snyder. Inositol pyrophosphates as mammalian cell signals. Science Signaling, 4:re1-re1, Aug 2011. URL: https://doi.org/10.1126/scisignal.2001958, doi:10.1126/scisignal.2001958. This article has 182 citations and is from a domain leading peer-reviewed journal.
5. (chakraborty2011inositolpyrophosphatesas pages 8-10): Anutosh Chakraborty, Seyun Kim, and Solomon H. Snyder. Inositol pyrophosphates as mammalian cell signals. Science Signaling, 4:re1-re1, Aug 2011. URL: https://doi.org/10.1126/scisignal.2001958, doi:10.1126/scisignal.2001958. This article has 182 citations and is from a domain leading peer-reviewed journal.
6. (chakraborty2018theinositolpyrophosphate pages 13-14): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
7. (chakraborty2018theinositolpyrophosphate pages 17-19): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
8. (chakraborty2018theinositolpyrophosphate pages 3-4): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
9. (chakraborty2018theinositolpyrophosphate pages 39-44): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
10. (chakraborty2018theinositolpyrophosphate pages 44-48): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
11. (lee2020inositolpyrophosphatessignaling pages 13-15): Seulgi Lee, Min-Gyu Kim, Hyoungjoon Ahn, and Seyun Kim. Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals. Molecules, 25:2208, May 2020. URL: https://doi.org/10.3390/molecules25092208, doi:10.3390/molecules25092208. This article has 52 citations and is from a peer-reviewed journal.
12. (lee2020inositolpyrophosphatessignaling pages 7-9): Seulgi Lee, Min-Gyu Kim, Hyoungjoon Ahn, and Seyun Kim. Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals. Molecules, 25:2208, May 2020. URL: https://doi.org/10.3390/molecules25092208, doi:10.3390/molecules25092208. This article has 52 citations and is from a peer-reviewed journal.
13. (lee2020inositolpyrophosphatessignaling pages 9-9): Seulgi Lee, Min-Gyu Kim, Hyoungjoon Ahn, and Seyun Kim. Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals. Molecules, 25:2208, May 2020. URL: https://doi.org/10.3390/molecules25092208, doi:10.3390/molecules25092208. This article has 52 citations and is from a peer-reviewed journal.
14. (minini2020thekeyrole pages 1-3): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
15. (minini2020thekeyrole pages 14-16): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
16. (minini2020thekeyrole pages 3-5): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
17. (minini2020thekeyrole pages 5-7): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
18. (tsui2010rolesofinositol pages 8-9): Marco M. Tsui and John D. York. Roles of inositol phosphates and inositol pyrophosphates in development, cell signaling and nuclear processes. Advances in Enzyme Regulation, 50:324-337, Jan 2010. URL: https://doi.org/10.1016/j.advenzreg.2009.12.002, doi:10.1016/j.advenzreg.2009.12.002. This article has 164 citations.
19. (wormald2017developmentofa pages 13-14): Michael Wormald, Gangling Liao, Martha Kimos, James Barrow, and Huijun Wei. Development of a homogenous high-throughput assay for inositol hexakisphosphate kinase 1 activity. PLOS ONE, 12:e0188852, Nov 2017. URL: https://doi.org/10.1371/journal.pone.0188852, doi:10.1371/journal.pone.0188852. This article has 22 citations and is from a peer-reviewed journal.
20. (wormald2019discoverysynthesisand pages 117-121): MM Wormald. Discovery, synthesis, and characterization of purine based isoform selective inhibitors of inositol hexakisphosphate kinase 1. Unknown journal, 2019.
21. (bennett2006inositolpyrophosphatesmetabolism pages 3-4): M. Bennett, S. Onnebo, Cristina Azevedo, and A. Saiardi. Inositol pyrophosphates: metabolism and signaling. Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. URL: https://doi.org/10.1007/s00018-005-5446-z, doi:10.1007/s00018-005-5446-z. This article has 210 citations and is from a domain leading peer-reviewed journal.
22. (bennett2006inositolpyrophosphatesmetabolism pages 4-5): M. Bennett, S. Onnebo, Cristina Azevedo, and A. Saiardi. Inositol pyrophosphates: metabolism and signaling. Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. URL: https://doi.org/10.1007/s00018-005-5446-z, doi:10.1007/s00018-005-5446-z. This article has 210 citations and is from a domain leading peer-reviewed journal.
23. (bennett2006inositolpyrophosphatesmetabolism pages 5-6): M. Bennett, S. Onnebo, Cristina Azevedo, and A. Saiardi. Inositol pyrophosphates: metabolism and signaling. Cellular and Molecular Life Sciences, 63:552-564, Jan 2006. URL: https://doi.org/10.1007/s00018-005-5446-z, doi:10.1007/s00018-005-5446-z. This article has 210 citations and is from a domain leading peer-reviewed journal.
24. (chakraborty2018theinositolpyrophosphate pages 8-9): Anutosh Chakraborty. The inositol pyrophosphate pathway in health and diseases. Biological Reviews, May 2018. URL: https://doi.org/10.1111/brv.12392, doi:10.1111/brv.12392. This article has 112 citations and is from a domain leading peer-reviewed journal.
25. (chatree2020roleofinositols pages 1-3): Saimai Chatree, Nanthaphop Thongmaen, Kwanchanit Tantivejkul, Chantacha Sitticharoon, and Ivana Vucenik. Role of inositols and inositol phosphates in energy metabolism. Molecules, 25:5079, Nov 2020. URL: https://doi.org/10.3390/molecules25215079, doi:10.3390/molecules25215079. This article has 158 citations and is from a peer-reviewed journal.
26. (chatree2020roleofinositols pages 3-5): Saimai Chatree, Nanthaphop Thongmaen, Kwanchanit Tantivejkul, Chantacha Sitticharoon, and Ivana Vucenik. Role of inositols and inositol phosphates in energy metabolism. Molecules, 25:5079, Nov 2020. URL: https://doi.org/10.3390/molecules25215079, doi:10.3390/molecules25215079. This article has 158 citations and is from a peer-reviewed journal.
27. (heitmann2023theroleof pages 11-12): Tyler Heitmann and James C. Barrow. The role of inositol hexakisphosphate kinase in the central nervous system. Biomolecules, 13:1317, Aug 2023. URL: https://doi.org/10.3390/biom13091317, doi:10.3390/biom13091317. This article has 6 citations and is from a peer-reviewed journal.
28. (lee2020inositolpyrophosphatessignaling pages 15-15): Seulgi Lee, Min-Gyu Kim, Hyoungjoon Ahn, and Seyun Kim. Inositol pyrophosphates: signaling molecules with pleiotropic actions in mammals. Molecules, 25:2208, May 2020. URL: https://doi.org/10.3390/molecules25092208, doi:10.3390/molecules25092208. This article has 52 citations and is from a peer-reviewed journal.
29. (minini2020thekeyrole pages 12-14): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
30. (minini2020thekeyrole pages 17-19): Mirko Minini, Alice Senni, Vittorio Unfer, and Mariano Bizzarri. The key role of ip6k: a novel target for anticancer treatments? Molecules, 25:4401, Sep 2020. URL: https://doi.org/10.3390/molecules25194401, doi:10.3390/molecules25194401. This article has 24 citations and is from a peer-reviewed journal.
31. (saiardi2012cellsignallingby pages 1-3): Adolfo Saiardi. Cell signalling by inositol pyrophosphates. Subcellular Biochemistry, 59:413-443, Jan 2012. URL: https://doi.org/10.1007/978-94-007-3015-1\_14, doi:10.1007/978-94-007-3015-1\_14. This article has 52 citations.
32. (wilson2019theinositolhexakisphosphate pages 1-2): Miranda S. Wilson, Henning J. Jessen, and Adolfo Saiardi. The inositol hexakisphosphate kinases ip6k1 and -2 regulate human cellular phosphate homeostasis, including xpr1-mediated phosphate export. Journal of Biological Chemistry, 294:11597-11608, Jul 2019. URL: https://doi.org/10.1074/jbc.ra119.007848, doi:10.1074/jbc.ra119.007848. This article has 112 citations and is from a domain leading peer-reviewed journal.
33. (wormald2019discoverysynthesisand pages 126-130): MM Wormald. Discovery, synthesis, and characterization of purine based isoform selective inhibitors of inositol hexakisphosphate kinase 1. Unknown journal, 2019.
34. (fridy2007cloningandcharacterization pages 1-1): Peter C. Fridy, James C. Otto, D. E. Dollins, and John D. York. Cloning and characterization of two human vip1-like inositol hexakisphosphate and diphosphoinositol pentakisphosphate kinases\*. Journal of Biological Chemistry, 282:30754-30762, Oct 2007. URL: https://doi.org/10.1074/jbc.m704656200, doi:10.1074/jbc.m704656200. This article has 139 citations and is from a domain leading peer-reviewed journal.