1. Phylogeny  
   Serine/threonine‐protein kinase BRSK2 is a member of the AMPK‐related kinase family, a group that includes 14 kinases such as BRSK1, NUAK1, NUAK2, and others, all of which share a conserved serine/threonine kinase catalytic domain (bendzunas2025redoxregulationand pages 2-3). BRSK2 exhibits a brain‐selective expression pattern that distinguishes it from many other family members, and its close paralog, BRSK1, has over 95% sequence identity in the kinase domain, underscoring their shared evolutionary origin in vertebrates (bendzunas2025redoxregulationand pages 2-3, jha2025deeplearningcoupledproximity pages 12-14). Phylogenetic analyses indicate that BRSK2 and its orthologs can be traced back to early AMPK‐related kinase precursors present in the common ancestor of vertebrates, and its evolutionary conservation is highlighted by the persistence of functionally critical cysteine residues that mediate redox regulation (bendzunas2025redoxregulationand pages 2-3, bendzunas2024redoxregulationof pages 15-18). These conserved features, including the unique ‘CPE’ motif found in BRSK2, reflect an evolutionary adaptation that likely supports specialized roles in neuronal signaling and metabolic control.
2. Reaction Catalyzed  
   BRSK2 catalyzes the ATP-dependent phosphorylation of serine and threonine residues on its substrate proteins. The reaction can be summarized as: ATP + [protein]-(L-serine/threonine) → ADP + [protein]-(L-serine/threonine)-phosphate + H⁺ (bendzunas2025redoxregulationand pages 2-3). This reaction is typical of serine/threonine kinases and is critical for modulating the activity of downstream signaling proteins involved in cell cycle regulation, neuronal polarity, and metabolic processes.
3. Cofactor Requirements  
   The kinase activity of BRSK2 is dependent on the presence of ATP as the phosphate donor, and like many serine/threonine kinases, it requires divalent metal ions—most commonly Mg²⁺—as essential cofactors to facilitate the proper binding and orientation of ATP in the active site (timm2008structureandregulation pages 2-4, bendzunas2025redoxregulationand pages 2-3). The dependence on these cofactors is critical for the catalytic mechanism that governs phosphate transfer and substrate modification.
4. Substrate Specificity  
   BRSK2 phosphorylates a variety of substrates, thereby modulating diverse cellular processes. Notably, it phosphorylates microtubule-associated proteins such as MAPT/TAU at specific residues (for example, phosphorylation at Ser262 has been demonstrated), as well as regulatory proteins involved in cell cycle progression and insulin secretion such as CDC25C, CDK16, PAK1, and WEE1 (Information section; bendzunas2025redoxregulationand pages 3-5). Although a definitive consensus motif for substrate recognition by BRSK2 has not been fully delineated as it has for some other serine/threonine kinases, the available data indicate that its activity modulates proteins involved in neuronal polarity and cytoskeletal reorganization, consistent with its prominent expression in brain tissue (Information section, jha2025deeplearningcoupledproximity pages 12-14). The phosphorylation events mediated by BRSK2 are essential in the fine-tuning of downstream signaling pathways, especially those linked to microtubule dynamics and cell cycle checkpoint control.
5. Structure  
   BRSK2 contains a central serine/threonine kinase catalytic domain that exhibits the typical bi-lobal architecture observed in eukaryotic protein kinases. This core is flanked by regulatory modules, including an N-terminal ubiquitin-associated (UBA) domain and a C-terminal spacer that, in some family members, is extended to include kinase-associated (KA1) domains (bendzunas2025redoxregulationand pages 2-3, bendzunas2025redoxregulationand pages 3-5). The kinase domain itself is characterized by an activation loop (T-loop) whose phosphorylation status—particularly at Thr174—is critical for full activation by the upstream kinase LKB1 (Information section; bendzunas2025redoxregulationand pages 2-3, bendzunas2025redoxregulationand pages 5-7). Unique features of BRSK2 include the presence of highly conserved cysteine residues within the catalytic domain; one such residue is located at the T-loop +2 position while other critical residues form a distinct ‘CPE’ motif that replaces the conventional APE motif found in many kinases (bendzunas2025redoxregulationand pages 15-17, bendzunas2025redoxregulationand pages 7-9). Structural studies using AlphaFold predictions as well as molecular dynamics simulations have provided insight into how these cysteine residues contribute to redox regulation, suggesting they may form reversible disulfide bonds that modulate the kinase’s conformation and catalytic efficiency (bendzunas2025redoxregulationand pages 14-15, jha2025deeplearningcoupledproximity pages 24-26). In solution, BRSK2 is predominantly monomeric; however, redox-sensitive intermolecular disulfide bond formation can lead to transient dimerization under oxidative conditions (bendzunas2025redoxregulationand pages 7-9). The overall 3D organization—comprising the conserved catalytic domain, regulatory UBA domain, and flexible C-terminal sequences—correlates with its ability to integrate multiple regulatory inputs, including phosphorylation and redox stimuli, to achieve fine control over kinase activity.
6. Regulation  
   BRSK2 activity is tightly regulated by both phosphorylation and reversible redox modifications. A critical regulatory mechanism involves phosphorylation of the activation loop by the upstream kinase LKB1, which phosphorylates a threonine residue (Thr174) in the T-loop, thus promoting the active conformation of BRSK2 (Information section; bendzunas2025redoxregulationand pages 2-3, katajisto2007thelkb1tumor pages 4-5). In addition to this phosphorylation event, BRSK2 is subject to further regulation by other kinases including CAMKII, PAK1, and PKA (Information section). A distinguishing regulatory feature of BRSK2 is its modulation by redox mechanisms; conserved cysteine residues within the kinase domain undergo reversible oxidation—for example, oxidation to sulfenic acid states or the formation of intramolecular disulfide bonds—thereby altering the enzyme’s catalytic activity (bendzunas2025redoxregulationand pages 12-14, tamir2020pkisdeepdive pages 1-3). Mutational analyses have shown that substitution of these redox-sensitive cysteines (including those at the T-loop +2 and within the CPE motif) can either reduce basal activity or lead to increased activity in the absence of redox regulation, underscoring their functional importance (bendzunas2025redoxregulationand pages 15-17, banerjee2013phosphorylationubiquitylationand pages 35-39). Furthermore, cellular exposure to oxidative agents such as hydrogen peroxide results in inhibition of kinase activity, while treatment with reducing agents like DTT or glutathione restores activity, thereby highlighting the dynamic regulation of BRSK2 by intracellular redox states (tamir2020pkisdeepdive pages 3-5, bendzunas2024redoxregulationof pages 20-23). This dual regulation by phosphorylation and reversible redox modifications allows BRSK2 to integrate diverse signals and adjust its activity in response to both metabolic and oxidative changes in the cellular environment.
7. Function  
   BRSK2 plays essential roles in multiple cellular processes that are critical for proper neuronal function and cellular homeostasis. It is predominantly expressed in the brain and central nervous system, where it has been shown to act as a key regulator of neuronal polarization and axonogenesis. Through phosphorylation of substrates such as MAPT/TAU—at residues including Ser262—and likely other microtubule-associated proteins, BRSK2 contributes to the regulation of cytoskeletal dynamics and neuronal polarity (Information section; bendzunas2025redoxregulationand pages 2-3, bendzunas2025redoxregulationand pages 3-5). In postmitotic neurons, BRSK2 mediates the phosphorylation of WEE1 at Ser642, leading to down-regulation of WEE1 activity, which is critical for establishing and maintaining neuronal polarity (Information section). Additionally, BRSK2 influences the cell cycle by phosphorylating regulators such as CDC25C, thereby playing a role in the progression and onset of mitosis (Information section). Beyond its functions in neuronal differentiation and cell cycle regulation, BRSK2 is implicated in the regulation of insulin secretion. Differential phosphorylation states of BRSK2—such as phosphorylated Thr174, which can inhibit insulin secretion, versus phosphorylated Thr260, which can promote insulin secretion—demonstrate its involvement in glucose-stimulated insulin release, likely through modification of substrates including CDK16 and PAK1 (Information section; bendzunas2025redoxregulationand pages 2-3). Moreover, BRSK2 has been associated with the reorganization of the actin cytoskeleton and may play a role in the apoptotic response triggered by endoplasmic reticulum stress, highlighting its broader influence on cellular survival and stress responses (Information section). The functions of BRSK2, therefore, encompass critical roles in neuronal development, cell cycle progression, metabolic regulation, and stress response, placing it at the intersection of signaling pathways vital for maintaining neuronal and systemic homeostasis.
8. Other Comments  
   Experimental inhibitors such as GW296115 have been identified as cell-active chemical probes targeting BRSK2, exhibiting potent inhibitory activity in biochemical and cellular assays; however, these inhibitors show moderate selectivity as they also inhibit other kinases, and no inhibitor has yet progressed to clinical development (tamir2020pkisdeepdive pages 16-18, tamir2020pkisdeepdive pages 9-11, nguyen2008targetingrskan pages 5-6). Genetic and biochemical studies have linked BRSK2 to neurodevelopmental disorders including autism spectrum disorder and intellectual disability, based primarily on its essential role in regulating neuronal polarity and cytoskeletal dynamics (Information section; bendzunas2025redoxregulationand pages 2-3). In addition, dysregulation of BRSK2 activity—either through aberrant phosphorylation or altered redox modification—may contribute to neurodegenerative conditions given its role in Tau phosphorylation, a process implicated in Alzheimer’s disease and related tauopathies (Information section; bendzunas2025redoxregulationand pages 26-26). There is also evidence that BRSK2 impacts insulin secretion; its differential phosphorylation states modulate the secretory response to glucose, suggesting potential relevance in metabolic disorders. Although several chemical probes have been described for related kinases, the development of highly selective inhibitors for BRSK2 remains an active area of research, and these tools continue to be refined using advanced assay platforms such as NanoBRET and kinome-wide profiling (tamir2020pkisdeepdive pages 1-3, tamir2020pkisdeepdive pages 3-5).
9. References
10. bendzunas2025redoxregulationand pages 2-3
11. bendzunas2025redoxregulationand pages 25-26
12. gomez2024illuminatingfunctionof pages 6-7
13. jha2025deeplearningcoupledproximity pages 12-14
14. jha2025deeplearningcoupledproximity pages 24-26
15. nguyen2008targetingrskan pages 5-6
16. nguyen2008targetingrskan pages 6-6
17. tamir2020pkisdeepdive pages 1-3
18. tamir2020pkisdeepdive pages 11-14
19. tamir2020pkisdeepdive pages 14-16
20. tamir2020pkisdeepdive pages 3-5
21. tamir2020pkisdeepdive pages 5-6
22. tamir2020pkisdeepdive pages 6-9
23. walkinshaw2011histonedeacetylaseregulation pages 47-52
24. bain2007theselectivityof pages 11-12
25. bain2007theselectivityof pages 4-5
26. banerjee2013phosphorylationubiquitylationand pages 210-213
27. banerjee2013phosphorylationubiquitylationand pages 35-39
28. bendzunas2024redoxregulationof pages 1-3
29. bendzunas2024redoxregulationof pages 12-15
30. bendzunas2024redoxregulationof pages 15-18
31. bendzunas2024redoxregulationof pages 18-20
32. bendzunas2024redoxregulationof pages 20-23
33. bendzunas2024redoxregulationof pages 23-26
34. bendzunas2024redoxregulationof pages 26-30
35. bendzunas2024redoxregulationof pages 3-7
36. bendzunas2024redoxregulationof pages 37-45
37. bendzunas2025redoxregulationand pages 12-14
38. bendzunas2025redoxregulationand pages 14-15
39. bendzunas2025redoxregulationand pages 15-17
40. bendzunas2025redoxregulationand pages 18-19
41. bendzunas2025redoxregulationand pages 19-21
42. bendzunas2025redoxregulationand pages 26-26
43. bendzunas2025redoxregulationand pages 3-5
44. bendzunas2025redoxregulationand pages 5-7
45. bendzunas2025redoxregulationand pages 7-9
46. bull2013investigatingtherole pages 35-38
47. gomez2024illuminatingfunctionof pages 4-6
48. goodfellow2013discoverysynthesisand pages 9-11
49. jain2015discoveryofpotent pages 1-2
50. katajisto2007thelkb1tumor pages 4-5
51. moret2020aresourcefor pages 20-23
52. nguyen2008targetingrskan pages 1-2
53. nguyen2008targetingrskan pages 2-3
54. tamir2020pkisdeepdive pages 16-18
55. tamir2020pkisdeepdive pages 9-11
56. timm2008structureandregulation pages 2-4
57. OpenTargets Search: -BRSK2
58. bendzunas2024redoxregulationof pages 7-9
59. bendzunas2024redoxregulationof pages 9-12

References

1. (bendzunas2025redoxregulationand pages 2-3): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
2. (bendzunas2025redoxregulationand pages 25-26): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
3. (gomez2024illuminatingfunctionof pages 6-7): Shawn M. Gomez, Alison D. Axtman, Timothy M. Willson, Michael B. Major, Reid R. Townsend, Peter K. Sorger, and Gary L. Johnson. Illuminating function of the understudied druggable kinome. Drug Discovery Today, 29:103881, Mar 2024. URL: https://doi.org/10.1016/j.drudis.2024.103881, doi:10.1016/j.drudis.2024.103881. This article has 4 citations and is from a domain leading peer-reviewed journal.
4. (jha2025deeplearningcoupledproximity pages 12-14): Kanchan Jha, Daichi Shonai, Aditya Parekh, Akiyoshi Uezu, Tomoyuki Fujiyama, Hikari Yamamoto, Pooja Parameswaran, Masashi Yanagisawa, Rohit Singh, and Scott H. Soderling. Deep learning-coupled proximity proteomics to deconvolve kinase signaling in vivo. BioRxiv, Apr 2025. URL: https://doi.org/10.1101/2025.04.27.650849, doi:10.1101/2025.04.27.650849. This article has 0 citations.
5. (jha2025deeplearningcoupledproximity pages 24-26): Kanchan Jha, Daichi Shonai, Aditya Parekh, Akiyoshi Uezu, Tomoyuki Fujiyama, Hikari Yamamoto, Pooja Parameswaran, Masashi Yanagisawa, Rohit Singh, and Scott H. Soderling. Deep learning-coupled proximity proteomics to deconvolve kinase signaling in vivo. BioRxiv, Apr 2025. URL: https://doi.org/10.1101/2025.04.27.650849, doi:10.1101/2025.04.27.650849. This article has 0 citations.
6. (nguyen2008targetingrskan pages 5-6): TL Nguyen. Targeting rsk: an overview of small molecule inhibitors. Anti-Cancer Agents in Medicinal Chemistry, 8:710-716, Oct 2008. URL: https://doi.org/10.2174/187152008785914770, doi:10.2174/187152008785914770. This article has 101 citations and is from a peer-reviewed journal.
7. (nguyen2008targetingrskan pages 6-6): TL Nguyen. Targeting rsk: an overview of small molecule inhibitors. Anti-Cancer Agents in Medicinal Chemistry, 8:710-716, Oct 2008. URL: https://doi.org/10.2174/187152008785914770, doi:10.2174/187152008785914770. This article has 101 citations and is from a peer-reviewed journal.
8. (tamir2020pkisdeepdive pages 1-3): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
9. (tamir2020pkisdeepdive pages 11-14): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
10. (tamir2020pkisdeepdive pages 14-16): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
11. (tamir2020pkisdeepdive pages 3-5): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
12. (tamir2020pkisdeepdive pages 5-6): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
13. (tamir2020pkisdeepdive pages 6-9): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
14. (walkinshaw2011histonedeacetylaseregulation pages 47-52): DR Walkinshaw. Histone deacetylase regulation by lkb1 and pka signaling pathways. Unknown journal, 2011.
15. (bain2007theselectivityof pages 11-12): Jenny Bain, Lorna Plater, Matt Elliott, Natalia Shpiro, C. James Hastie, Hilary Mclauchlan, Iva Klevernic, J. Simon C. Arthur, Dario R. Alessi, and Philip Cohen. The selectivity of protein kinase inhibitors: a further update. Biochemical Journal, 408:297-315, Nov 2007. URL: https://doi.org/10.1042/bj20070797, doi:10.1042/bj20070797. This article has 3110 citations and is from a domain leading peer-reviewed journal.
16. (bain2007theselectivityof pages 4-5): Jenny Bain, Lorna Plater, Matt Elliott, Natalia Shpiro, C. James Hastie, Hilary Mclauchlan, Iva Klevernic, J. Simon C. Arthur, Dario R. Alessi, and Philip Cohen. The selectivity of protein kinase inhibitors: a further update. Biochemical Journal, 408:297-315, Nov 2007. URL: https://doi.org/10.1042/bj20070797, doi:10.1042/bj20070797. This article has 3110 citations and is from a domain leading peer-reviewed journal.
17. (banerjee2013phosphorylationubiquitylationand pages 210-213): S Banerjee. Phosphorylation, ubiquitylation and characterisation of specific inhibitors of ampk-related kinase nuak1/ark5. Unknown journal, 2013.
18. (banerjee2013phosphorylationubiquitylationand pages 35-39): S Banerjee. Phosphorylation, ubiquitylation and characterisation of specific inhibitors of ampk-related kinase nuak1/ark5. Unknown journal, 2013.
19. (bendzunas2024redoxregulationof pages 1-3): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
20. (bendzunas2024redoxregulationof pages 12-15): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
21. (bendzunas2024redoxregulationof pages 15-18): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
22. (bendzunas2024redoxregulationof pages 18-20): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
23. (bendzunas2024redoxregulationof pages 20-23): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
24. (bendzunas2024redoxregulationof pages 23-26): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
25. (bendzunas2024redoxregulationof pages 26-30): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
26. (bendzunas2024redoxregulationof pages 3-7): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
27. (bendzunas2024redoxregulationof pages 37-45): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
28. (bendzunas2025redoxregulationand pages 12-14): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
29. (bendzunas2025redoxregulationand pages 14-15): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
30. (bendzunas2025redoxregulationand pages 15-17): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
31. (bendzunas2025redoxregulationand pages 18-19): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
32. (bendzunas2025redoxregulationand pages 19-21): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
33. (bendzunas2025redoxregulationand pages 26-26): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
34. (bendzunas2025redoxregulationand pages 3-5): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
35. (bendzunas2025redoxregulationand pages 5-7): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
36. (bendzunas2025redoxregulationand pages 7-9): George N Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation and dynamic control of brain-selective kinases brsk1/2 in the ampk family through cysteine-based mechanisms. eLife, Apr 2025. URL: https://doi.org/10.7554/elife.92536.4, doi:10.7554/elife.92536.4. This article has 0 citations and is from a domain leading peer-reviewed journal.
37. (bull2013investigatingtherole pages 35-38): D Bull. Investigating the role and regulation of the ampk-related kinase nuak1. Unknown journal, 2013.
38. (gomez2024illuminatingfunctionof pages 4-6): Shawn M. Gomez, Alison D. Axtman, Timothy M. Willson, Michael B. Major, Reid R. Townsend, Peter K. Sorger, and Gary L. Johnson. Illuminating function of the understudied druggable kinome. Drug Discovery Today, 29:103881, Mar 2024. URL: https://doi.org/10.1016/j.drudis.2024.103881, doi:10.1016/j.drudis.2024.103881. This article has 4 citations and is from a domain leading peer-reviewed journal.
39. (goodfellow2013discoverysynthesisand pages 9-11): Val S. Goodfellow, Colin J. Loweth, Satheesh B. Ravula, Torsten Wiemann, Thong Nguyen, Yang Xu, Daniel E. Todd, David Sheppard, Scott Pollack, Oksana Polesskaya, Daniel F. Marker, Stephen Dewhurst, and Harris A. Gelbard. Discovery, synthesis, and characterization of an orally bioavailable, brain penetrant inhibitor of mixed lineage kinase 3. Journal of Medicinal Chemistry, 56:8032-8048, Oct 2013. URL: https://doi.org/10.1021/jm401094t, doi:10.1021/jm401094t. This article has 95 citations and is from a highest quality peer-reviewed journal.
40. (jain2015discoveryofpotent pages 1-2): Rama Jain, Michelle Mathur, Jiong Lan, Abran Costales, Gordana Atallah, Savithri Ramurthy, Sharadha Subramanian, Lina Setti, Paul Feucht, Bob Warne, Laura Doyle, Stephen Basham, Anne B. Jefferson, Mika Lindvall, Brent A. Appleton, and Cynthia M. Shafer. Discovery of potent and selective rsk inhibitors as biological probes. Journal of Medicinal Chemistry, 58:6766-6783, Aug 2015. URL: https://doi.org/10.1021/acs.jmedchem.5b00450, doi:10.1021/acs.jmedchem.5b00450. This article has 64 citations and is from a highest quality peer-reviewed journal.
41. (katajisto2007thelkb1tumor pages 4-5): Pekka Katajisto, Tea Vallenius, Kari Vaahtomeri, Niklas Ekman, Lina Udd, Marianne Tiainen, and Tomi P. Mäkelä. The lkb1 tumor suppressor kinase in human disease. Biochimica et Biophysica Acta (BBA) - Reviews on Cancer, 1775:63-75, Jan 2007. URL: https://doi.org/10.1016/j.bbcan.2006.08.003, doi:10.1016/j.bbcan.2006.08.003. This article has 145 citations.
42. (moret2020aresourcefor pages 20-23): Nienke Moret, Changchang Liu, Benjamin M. Gyori, John A. Bachman, Albert Steppi, Clemens Hug, Rahil Taujale, Liang-Chin Huang, Matthew E. Berginski, Shawn M. Gomez, Natarajan Kannan, and Peter K. Sorger. A resource for exploring the understudied human kinome for research and therapeutic opportunities. BioRxiv, Apr 2020. URL: https://doi.org/10.1101/2020.04.02.022277, doi:10.1101/2020.04.02.022277. This article has 28 citations.
43. (nguyen2008targetingrskan pages 1-2): TL Nguyen. Targeting rsk: an overview of small molecule inhibitors. Anti-Cancer Agents in Medicinal Chemistry, 8:710-716, Oct 2008. URL: https://doi.org/10.2174/187152008785914770, doi:10.2174/187152008785914770. This article has 101 citations and is from a peer-reviewed journal.
44. (nguyen2008targetingrskan pages 2-3): TL Nguyen. Targeting rsk: an overview of small molecule inhibitors. Anti-Cancer Agents in Medicinal Chemistry, 8:710-716, Oct 2008. URL: https://doi.org/10.2174/187152008785914770, doi:10.2174/187152008785914770. This article has 101 citations and is from a peer-reviewed journal.
45. (tamir2020pkisdeepdive pages 16-18): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
46. (tamir2020pkisdeepdive pages 9-11): Tigist Y. Tamir, David H. Drewry, Carrow Wells, M. Ben Major, and Alison D. Axtman. Pkis deep dive yields a chemical starting point for dark kinases and a cell active brsk2 inhibitor. BioRxiv, Jun 2020. URL: https://doi.org/10.1101/2020.06.15.153072, doi:10.1101/2020.06.15.153072. This article has 12 citations.
47. (timm2008structureandregulation pages 2-4): Thomas Timm, Alexander Marx, Saravanan Panneerselvam, Eckhard Mandelkow, and Eva-Maria Mandelkow. Structure and regulation of mark, a kinase involved in abnormal phosphorylation of tau protein. BMC Neuroscience, Dec 2008. URL: https://doi.org/10.1186/1471-2202-9-s2-s9, doi:10.1186/1471-2202-9-s2-s9. This article has 82 citations and is from a peer-reviewed journal.
48. (OpenTargets Search: -BRSK2): Open Targets Query (-BRSK2, 7 results). Ochoa, D. et al. (2023). The next-generation Open Targets Platform: reimagined, redesigned, rebuilt. Nucleic Acids Research.
49. (bendzunas2024redoxregulationof pages 7-9): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.
50. (bendzunas2024redoxregulationof pages 9-12): George N. Bendzunas, Dominic P Byrne, Safal Shrestha, Leonard A Daly, Sally O. Oswald, Samiksha Katiyar, Aarya Venkat, Wayland Yeung, Claire E Eyers, Patrick A Eyers, and Natarajan Kannan. Redox regulation of brain selective kinases brsk1/2: implications for dynamic control of the eukaryotic ampk family through cys-based mechanisms. bioRxiv, Apr 2024. URL: https://doi.org/10.7554/elife.92536.2, doi:10.7554/elife.92536.2. This article has 6 citations.