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**REDESIGN OF CARNITINE ACETYLTRANSFERASE  
SPECIFICITY BY PROTEIN ENGINEERING**

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## **REFERENCES**



**A**

Abbas, A.S., Wu, G.X., Schulz, H. (1998) *J. Mol. Cell. Cardiol.* **30**, 1305-1309.

a´Bhaird, N., Ramsay, R.R. (1992) *Biochem. J.* **286**, 637-640.

a´Bhaird, N., Kumaravel, G., Gandour, R.D., Krueger, M.J., Ramsay, R.R. (1993) *Biochem. J.* **294**, 645-651.

Altschul, S.F., Gish, W., Miller, W., Myers, E.W., Lipman, D.J. (1990) *J. Mol. Biol.* **215**, 403-410.

Altschul, S.F., Madden, T.L., Schäffer, A.A., Zhang, J., Zhang, Z., Miller, W., Lipman, D.J. (1997) *Nucleic Acids Res.* **25**, 3389-3402.

Anderson, R. C. (1998) *Curr. Pharm. Des.* **4**, 1-16.

Ando, S., Tadenuma, T., Tanaka, Y., Fukui, F., Kobayashi, S., Ohashi, Y., Kawabata, T. (2001) *J. Neurosci. Res.* **66**, 266-71.

**B**

Bentebibel, A., Sebastián, D., Herrero, L., López-Viñas, E., Serra, D., Asins, G., Gómez-Puertas, P., Hegardt, F.G. (2006) *Biochemistry.* **45**, 4329-4350.

Bieber, L.L. (1988) *Annu.Rev. Biochem.* **57**, 261-283.

Borum, P.R. (1983) *Annu. Rev. Nutr.* **3**, 233-259.

Bradford, M.M. (1976) *Anal. Biochem.* **72**, 248-254.

Bremer, J. (1983). *Physiol. Rev.* **63**, 1420–1480.

Brevetti, G., Angelini, C., Rosa, M., Carrozzo, R., Perna, S., Corsi, M., Matarazzo, A., Marcialis, A. (1991) *Circulation* **84**, 1490-1495.

## References

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Britton, C.H., Mackey, D.W., Esser, V., Foster, D.W., Burns, D.K., Yarnall, D.P., Froguel, P., McGarry, J.D. (1997) *Genomics*. **40**, 209-211.

Brown, N.F., Anderson, R.C., Caplan, S.L., Foster, D.W., McGarry, J.D. (1994) *J. Biol. Chem.* **269**, 19157-19162.

Brunner, S., Kramar, K., Denhardt, D.T., Hofbauer, R. (1997) *Biochem. J.* **322**, 403-410.

## C

Cai, Y., Cronin, C.N., Engel, A.G., Ohno, K., Hersh, L.B., odgers, D.W. (2004). *EMBO J.* **23**, 2047-2058.

Calvani, M., Reda, E., Arrigoni-Martelli, E. (2000) *Basic Res. Cardiol.* **95**, 75-83.

Casari, G, Sander C., Valencia, A. (1995) *Nat. Struct. Biol.* **2**, 171-178.

Caudevilla, C., Serra, D., Miliar, A., Codony, C., Asins, G., Bach, M., Hegardt, F. G. (1998) *Proc. Natl. Acad. Sci. USA* **95**, 12185-12190.

Chase, J.F., Pearson, D.J., Tubbs, P.K. (1965) *Biochim. Biophys. Acta* **96**, 162–165.

Chase, J.F., Tubbs, P.K. (1966) *Biochem. J.* **99**, 32-40.

Chase, J.F. (1967) *Biochem. J.* **104**, 510-518.

Choi, S.J., Oh, D.H., Song, C.S., Roy, A.K., Chatterjee, B. (1995) *Biochim. Biophys. Acta.* **1264**, 215-22.

Colucci, W.J., Gandour, R.D., Mooberry, E.A. (1986) *J. Am. Chem. Soc.* **108**, 7141-7147.

Colucci, W.J., Gandour, R.D. (1988) *Bioorg. Chem.* **16**, 307–334.

Cordente, A.G., López-Viñas, E., Vázquez, M.I., Swiegers, J.H., Pretorius, I.S., Gómez-Puertas, P., Hegardt, F.G., Asins, G., Serra, D. (2004) *J. Biol. Chem.* **279**, 33899-33908.

Corti, O., Finocchiaro, G., Rossi, E., Zuffardi, O., DiDonato, S., (1994a) *Genomics* **23**, 94-99.

Corti, O., DiDonato, S., Finocchiaro, G. (1994b) *Biochem. J.* **303**, 37-41.

Cronin, C.N. (1997a) *Eur. J. Biochem.* **247**, 1029-1037.

Cronin, C.N. (1997b) *Biochem. Biophys. Res. Commun.* **238**, 784-789.

Cronin, C.N. (1998) *J. Biol. Chem.* **273**, 24465-24469.

## D

DeLano, W. L. (2002) The PyMOL Molecular Graphics System, DeLano Scientific, San Carlos, CA, USA.

del Sol Mesa, A., Pazos, F., Valencia, A. (2003) *J. Mol. Biol.* **326**, 1289-1302.

DiDonato, S., Rimoldi, M., Moise, A., Bertagnoglio, B., Uziel, G. (1979) *Neurology* **29**, 1578-1583.

## E

Elgersma, Y., van Roermund, C.W., Wanders, R.J., Tabak, H.F. (1995) *Embo J.* **14**, 3472-3479.

Esser, V., Britton, C.H., Weis, B.C., Foster, D.W., McGarry, J.D. (1993) *J. Biol. Chem.* **268**, 5817-5822.

Esser, V., Brown, N.F., Cowan, A.T., Foster, D.W., McGarry, J.D. (1996) *J. Biol. Chem.* **271**, 6972-6977.

## F

Farrell, S.O., Fiol, C.J., Reddy, J.K., Bieber, L.L. (1984) *J. Biol. Chem.* **259**, 13089-13095.

Felix, C., Gillis, M., Driedzic, W.R., Paulson, D.J., Broderick, T.L. (2001) *Diabetes Res. Clin. Pract.* **53**, 17-24.

## References

---

Ferdinandusse, S., Mulders, J., Ijlst, L., Denis, S., Dacremont, G., Waterham, H.R., Wanders, R.J. (1999) *Biochem. Biophys. Res. Commun.* **263**, 213-218.

Fraenkel, G. (1954) *Arch. Biochem. Biophys.* **49**, 486-495.

Fraser, F., Zammit, V.A. (1999) *FEBS Lett.* **445**, 41-44.

Friedman, S. Fraenkel, G. (1955) *Arch. Biochem. Biophys.* **59**, 491-501.

Fritz, I.B. (1955) *Acta Physiol. Scand.* **34**, 367-385.

Fritz, I.B., Schultz, S.K., Sreere, P.A. (1963) *J. Biol. Chem.* **238**, 2509-2517.

## G

Gavel, Y., von Heijne (1990) *Protein Eng.* **4**, 33-37.

Goodsell, D.S., Morris, G.M., and Olson, A.J. (1996) *J. Mol. Recognit.* **9**, 1-5.

Govindasamy, L., Kukar, T., Lian, W., Pedersen, B., Gu, Y., Agbandje-McKenna, M., Jin, S., McKenna, R., Wu, D. (2004a) *J. Struct. Biol.* **146**, 416-424.

Govindasamy, L., Pedersen, B., Lian, W., Kukar, T., Gu, Y., Jin, S., Agbandje-McKenna, M., Wu, D., McKenna, R. (2004b) *J. Struct. Biol.* **148**, 226-235.

Guex, N., Peitsch, M.C. (1997) *Electrophoresis* **18**, 2714-2723.

Guex, N., Diemand, A., Peitsch, M.C. (1999) *Trends. Biochem. Sci.* **24**, 364-367.

## H

Hassett, R.P., Crockett, E.L. (2000) *Anal. Biochem.* **287**, 176-179.

Holland, P.C., Senior, A.E., Sherratt, H.S.A. (1973) *Biochem. J.* **136**, 173-184.

Hooft, R.W., Vriend, G., Sander, C., Abola, E.E. (1996) *Nature* **381**, 272.

Horton, C.E., Huang, K., Bennett, G., Rudolph, F. (2003) *J. Ind. Microbiol. Biotechnol.* **30**, 427-432.

Hsiao, Y.S., Jogl, G., Tong, L. (2004) *J. Biol. Chem.* **279**, 31584-31589.

Hubinger, A., Weikert, G., Wolf, H.P., Gries, P.A. (1992) *Horm. Metab. Res.* **24**, 115-118.

Huckle, W.R., Tamblyn, T.M. (1983) *Arch. Biochem. Biophys.* **226**, 94-110.

## **J**

Jogl, G., Tong, L. (2003) *Cell* **112**, 113-122.

Jogl, G., Hsiao, Y.S., Tong, L. (2004) *Ann. N.Y. Acad. Sci.* **1033**, 17-29.

Jogl, G., Hsiao, Y.S., Tong, L. (2005) *J. Biol. Chem.* **280**, 738-744.

## **K**

Kahonen, M. (1976) *Biochim. Biophys. Acta* **428**, 690-701.

Kalaria, R.N., Harik, S.I. (1992) *Ann. Neurol.* **32**, 583-586.

Kerner, J., Hoppel, C. (2000) *Biochim. Biophys. Acta.* **1486**, 1-17.

Kispal, G., Sumegi, B., Dietmeier, K., Bock, I., Gajdos, G., Tomesanyi, Y., Sandor, A., (1993) *J. Biol. Chem.* **268**, 1824-1829.

Kunau, W.H., Dommes, V., Schulz, H. (1995) *Prog. Lipid Res.* **34**, 267-342.



**L**

Laemmli, U. K. (1970) *Nature* **227**, 680-685.

Laskowski, R.A., MacArthur, M.W., Moss, D.S., Thornton, J.M. (1993). *J. Appl. Cryst.* **26**, 283-291.

Leslie, A.G., Moody, P.C., Shaw, W.V. (1988) *Proc. Natl. Acad. Sci. USA* **85**, 4133-4137.

Li, J-N., Gorospe, M., Chrest, F.J., Kumaravel, T.S., Evans, M.K., Han, W.F., Pizer, E.S. (2001) *Cancer Res.* **61**, 1493-1499.

Lilly, M., Lambrechts, M.G., Pretorius, I.S. (2000) *Appl. Environ. Microbiol.* **66**, 744-753.

Loftus, T.M., Jaworsky, D.E., Frehywot, G.L., Townsend, C.A., Ronnett, G.V., Lane, M.D., Kuhajda, F.P. (2000) *Science* **288**, 2379-2381.

Lopaschuck, G.D., Kantor, P.F., Dyck, J.R.B. (1999) *Medicographia* **21**, 109-115.

**M**

Makar, T.K., Cooper, A.J., Tofel-Grehl, B., Thaler, H.T., Blass, J.P. (1995) *Neurochem. Res.* **20**, 705-711.

Markwell, M, McGroarty, E., Bieber, L., Tolbert., N. (1973) *J. Biol. Chem.* **248**, 3426–3432.

Marquis, N.R., Fritz, I.B. (1965) *J. Biol. Chem.* **240**, 2193-2196.

Mason, B., Dufour, J.P. (2000) *Yeast* **16**, 1287-1298.

Mattevi, A., Obmolova, G., Kalk, K.H., Teplyakov, A., Hol, W.G. (1993) *Biochemistry* **32**, 3887-3901.

Maurer, T.S., Fung, H. (2000) *AAPS Pharmsci.* **2**(1):E8.

- McGarry, J.D., Foster, D.W. (1980) *Annu. Rev. Biochem.* **49**, 395-420.
- McGarry, J.D., Brown, N.F. (1997) *Eur. J. Biochem.* **244**, 1-14.
- Melegh, B., Seress, L., Bedekovics, T., Kispal, G., Sümegi, B., Trombitas, K., Mehes, K. (1999). *J. Inher. Metab. Dis.* **22**, 827-838.
- Mittal, B., Kurup, C.K.R. (1980) *Biochim. Biophys. Acta* **619**, 90-97.
- Miyazawa, S., Ozasa, H., Furuta, S., Osumi, T., Hashimoto, T. (1983a) *J. Biochem.* **93**, 439-451.
- Miyazawa, S., Ozasa, H., Osumi, T., Hashimoto, T. (1983b) *J. Biochem.* **94**, 529-542.
- Moder, M., Kiessling, A., Loster, H., Bruggemann, L (2003) *Anal. Bioanal. Chem.* **375**, 200-210.
- Montgomery, S.A., Thal, L.J., Amrein, R. (2003) *Int. Clin. Psychopharmacol.* **18**, 61-71.
- Morillas, M., Clotet, J., Rubi, B., Serra, D., Asins, G., Ariño, J., Hegardt, F.G. (2000) *FEBS Lett.* **466**, 183-186.
- Morillas, M., Gómez-Puertas, P., Roca, R., Serra, D., Asins, G., Valencia, A., Hegardt, F.G. (2001) *J. Biol. Chem.* **276**, 45001-45008.
- Morillas, M., Gómez-Puertas, P., Bentebibel, A., Selles, E., Casals, N., Valencia, A., Hegardt, F.G., Asins, G., Serra, D., (2003) *J. Biol. Chem.* **278**, 9058-9063.
- Morillas, M., López-Viñas, E., Valencia, A., Serra, D., Gómez-Puertas, P., F.G. Hegardt, F.G., Asins, G. (2004) *Biochem. J.* **379**, 777-784.
- Morris, G.M., Goodsell, D.S., Halliday, R.S., Huey, R., Hart, E., Belew, R.K., Olson, A.J. (1998) *J. Comput. Chem.* **19**, 1639-1662.

## N

- Nykänen, L. (1986) *Am. J. Enol. Vitic.* **37**, 84-96.

**O**

Oda, Y. (1999) *Pathol. Int.* **49**, 921-937.

**P**

Peitsch, M.C. (1995) *Bio/Technology* **13**, 658-660.

Peitsch, M.C. (1996) *Biochem. Soc. Trans.* **24**, 274-279.

Pisarnitskii, A.F. (2001) *Appl. Biochem. Microbiol.* **37**, 552-560.

Price, A.C., Choi, K., Heath, R.J., Li, Z., White, S.W., Rock, C.O. (2001) *J. Biol. Chem.* **276**, 6551-6559.

Price, N.T., van der Leij, F.R., Jackson, V.N., Corstorphine, C.G., Thomson, R., Sorensen, A., Zammit, V.A. (2002) *Genomics* **80**, 433-442.

Prip-Buus, C., Cohen, I., Kohl, C., Esser, V., McGarry, D., Girard, J. (1998) *FEBS Lett.* **429**, 173-178.

Prip-Buus, C., Thuillier, L., Abadi, N., Prasad, C., Dilling, L., Klasing, J., Demaugre, F., Greenberg, C.R., Haworth, J.C., Droin, V., Kadhon, N., Gobin, S., Kamoun, P., Girard, J., Bonnefont, J.P. (2001) *Mol. Genet. Metab.* **73**, 46-54.

Przyrembel, H. (1987) *J. Inherit. Metab. Dis.* **10**, 129-146.

**R**

Ramsay, R.R., Gandour, R.D., van der Leij, F.R. (2001) *Biochim. Biophys. Acta* **1546**, 21-43.

Ramsay, R.R., Naismith, J.H. (2003) *Trends Biochem Sci.* **28**, 343-346.

Ramsay, R.R., Zammit, V.A. (2004) *Mol. Aspects Med.* **25**, 475-493.

Ritchie, D.W., and Kemp, G.J. (2000) *Proteins* **39**, 178-194.

Ruderman, N.B., Saha, A.K., Vavvas, D., Witters, L.A. (1999) *Am. J. Physiol.* **276**, E1-E18.

**S**

Saeed, A., McMillim, J.B., Wolkowicz, P.E., Brouillette, W.J. (1993) *Arch. Biochem. Biophys.* **305**, 307-312.

Saiki, R.K., Gelfand, D.H., Stoffel, S., Scharf, S.J., Higuchi, R., Horn, G.T., Mullis, K.B., Erich, H.A. (1988) *Science* **239**, 487-491.

Schiestl, R.H., Gietz, R. D. (1989) *Curr. Genet.* **16**, 339-346.

Schmalix, W., Bandlow, W. (1993) *J. Biol. Chem.* **268**, 27428-27439.

Schonekess, B.O., Allard, M.F., Lopaschuck, G.D. (1995) *Circ. Res.* **77**, 726-734.

Schreier, P. (1979) *Crit. Rev. Food. Sci. Nutr.* **12**, 59-111.

Shennan, D.B., Grant, A., Ramsay, R.R., Burns, C., Zammit, V.A. (1998) *Biochim. Biophys. Acta* **1393**, 49-56.

Siebert, T.E., Smyth, H.E., Capone, D.L., Neuwohner, C., Pardon, K.H., Skouroumounis, G.K., Herderich, M.J., Sefton, M.A., and Pollnitz A.P. (2005) *Anal. Bioanal. Chem.* **381**, 937-947.

Steitz, T.A., Shulman, R.G. (1982) *Ann. Rev. Biophys. Bioeng.* **11**, 419-444.

Sulzenbacher, G., Gal, L., Peneff, C., Fassy, F., Bourne, Y. (2001) *J. Biol. Chem.* **276**, 11844-11851.

Sussman, J.L., Harel, M., Frolow, F., Oefner, C., Goldman, A., Toker, L., Silman, I. (1991) *Science* **253**, 872-879.

Swiegers, J.H., Dippenaar, N., Pretorius, I.S., Bauer, F.F. (2001) *Yeast* **18**, 585-595.

Swiegers, J.H., Pretorius, I.S. (2005) *Adv. Appl. Microbiol.* **57**, 131-175.

**T**

Tamai, I., Ohashi, R., Nezu, J., Yabuuchi, H., Oku, A., Shimane, M., Sai, Y., Tsuji, A. (1998) *J. Biol. Chem.* **273**, 20378–20382.

Taylor, D.C., Weber, N., Hogge, L.R., Underhill, E.W. (1990) *Anal. Biochem.* **184**, 311-316.

Tipton, K.F., Chase, J.F. (1969) *Biochem. J.* **115**, 517-521.

Thompson, J. D., Higgins, D. G., Gibson, T. J. (1994) *Nucleic Acids Res.* **22**, 4673-4680.

Thupari, J.N., Landree, L.E., Ronnett, G.V., Kuhajda F.P. (2002) *Proc. Natl. Acad. Sci. U.S.A.* **99**, 9498-9502.

**U**

Ueda, M., Tanaka, A., Fukui, S. (1982) *Eur. J. Biochem.* **124**, 205-210.

Ueda, M., Kawachi, H., Atomi, H., Tanaka, A. (1998) *Biochim. Biophys. Acta* **1397**, 213-222.

**V**

Vadali, R.V., Bennett, G.N., San, K.Y. (2004a) *Metab. Eng.* **6**, 133-139.

Vadali, R.V., Bennett, G.N., San, K.Y. (2004b) *Metab. Eng.* **6**, 294-299.

van der Leij, F.R., Huijkman, N.C.A., Boomsma, C., Kuipers, J.R.G., Bartelds, B. (2000) *Mol. Genet. Metab.* **71**, 139-153.

van Roermund C.W., Elgersma, Y., Singh, N., Wanders, R.J., Tabak, H.F. (1995) *EMBO J.* **14**, 3480-3486.

van Roermund C.W., Hetteema, E.H., van Der Berg, M., Tabak, H.F., Wanders, R.J. (1999) *EMBO J.* **18**, 5843-5852.

Vaz, F.M., Wanders, R.J. (2002) *Biochem J.* **361**, 417-429.

Verstrepen, K.J., Derdelinckx, G., Dufour, J.P., Winderickx, J., Thevelein, J.M., Pretorius, I.S., Delvaux, F.R. (2003a) *J. Biosci. Bioeng.* **96**, 110-118.

Verstrepen, K.J., Van Laere, S.D., Vanderhaegen, B.M., Derdelinckx, G., Dufour, J.P., Pretorius, I.S., Winderickx, J., Thevelein, J.M., Delvaux, F.R. (2003b) *Appl. Environ. Microbiol.* **69**, 5228-37.

Verstrepen, K.J., Van Laere, S.D., Vercammen, J., Derdelinckx, G., Dufour, J.P., Pretorius, I.S., Winderickx, J., Thevelein, J.M., Delvaux, J.R. (2004) *Yeast* **21**, 367-377.

Volschenk, H., Viljoen, M., Grobler, J., Petzold, B., Bauer, F., Subden, R., Young, R. A., Lonvaud, A., Denayrolles, M., Van Vuuren, J.J. (1997) *Nat. Biotechnol.* **15**, 253-257.

Von Heijne, G. (1986) *EMBO J.* **5**, 1335-1342.

Vriend, G. (1990) *J. Mol. Graph.* **8**, 52-56.

## W

Wagman, A. S., Nuss, J. M. (2001) *Curr. Pharm. Des.* **7**, 417-450.

Weis, B.C., Cowan, A.T., Brown, N., Foster, D.W., McGarry, J.D. (1994) *J. Biol. Chem.* **269**, 26443-26448.

Winston, F., Dollard, C., Ricupero-Hovasse, S.L. (1995) *Yeast* **11**, 53-55.

Wu, D., Govindasamy, L., Lian, W., Gu, Y., Kukar, T., Agbandje-McKenna, M., McKenna, R. (2003) *J. Biol. Chem.* **278**, 13159-13165.

## Y

Yamazaki, N., Shinohara, Y., Shima, A., Terada, H. (1995) *FEBS Lett.* **363**, 41-45.

Yoshimoto, H., Momma, T., Fujiwara, D., Sone, H., Kaneko, Y., Tamai, T. (1998) *J. Ferment. Bioeng.* **86**, 15-20.

## References

---

Yoshioka, K., Hashimoto, N (1981) *Agric. Biol. Chem.* **45**, 2183-2190.

### **Z**

Zammit, V.A. (1994) *Diabetes Rev.* **2**, 132-155.

Zammit, V.A. (1998) *Diabetes Nutr. Metab.* **11**, 200-211.

Zammit, V.A. (1999) *Prog.Lipid Res.* **38**, 199-224.