

- Aihara, H., Watanabe, K., dan R. Nakamura, 1986. Characterization of Production of Cholesterol Oxidase in Three *Rhodococcus* strain. **J.Appl.Bac.**61:269-274.
- Arima K., Nagasawa M., Bae M., dan G. Tamura, 1969. Microbial Transformation of Sterol Part 1. Decomposition of Cholesterol by Microorganism. **J.Agr.Biol.Chem.**33:1636-1643.
- Bickerstaff, G.F., 1968. **Enzymes in Industrial and Medicine.** Edward Arnold, New York.
- Buckland, B.C., Lily M.D., dan P. Dunhill, 1976. The Enzymatic Transformation of Water Insoluble Reactants in Aqueous Solvent. Conversion of Cholesterol to Cholest-4-3-one by *Nocardia sp.* **J.Biotechnol. and Bioeng.** 17:815-826.
- Buckland, B.C., Lily M.D., dan P. Dunhill, 1976. The Kinetic of Cholesterol Oxidase Synthesis by *Nocardia rhodocrous.* **J.Biotechnol. and Bioeng.,** vol.xviii:601-621.
- Budiarso, R., 1970. **Laporan Survey Kesehatan Rumah Tangga.** Balitbang Departemen Kesehatan RI, Jakarta.
- Budiarso, R., 1986. **Laporan Survey Kesehatan Rumah Tangga.** Balitbang Departemen Kesehatan RI, Jakarta.
- Cheetam P.S.J., Dunill, P. dan M.D. Lily, 1982. The Characterization and Interconversion of Three Forms of Cholesterol Oxidase extracted from *Nocardia rhodocrous.* **J.Biochem.**201:515-521.
- Cheillan F., Lafont H., Termine E., Fernandez F., dan G.Lesgard, 1989. Molecular Characteristic of Cholesterol Oxidase and Factor Influencing Its Activity. **Biochim. Biophys. Acta** 99:233-238.
- Cremonesi P., Carrea., Sportoletty G., dan E. Antonini, 1973. Enzymatic Dehydrogenation of Steroid by Hydrosteroid Dehydrogenase in Two Phase System. **J.Agr.Biol. Biochem.** 159:7-10.
- Crueger, W. dan A. Crueger, 1989. **Biotechnology; A Textbook of Industrial Microbiology.** Sinauer Asc. Inc., Sunderland.



UNIVERSITAS
GADJAH MADA

**PENGARUH KADAR KOLESTEROL TERHADAP PRODUKSI KOLESTEROL OKSIDASE OLEH
Pseudomonas putida DALAM
FERMENTOR BERSKALA 5L**

YUDI PRANOTO, Dr. Ir. Eni Harmayani, M.Sc.; Dr. Ir. Tyas Utami; Dr. Ir. Endang Sutriswati R.,MS.

Fardiaz, S., 1988. **Fisiologi Fermentasi**. Pusat Antar Universitas IPB-Lembaga
Sumber Daya Informasi IPB, Bogor.

- Halpern, M.G., 1981. **Industrial Enzymes from Microbial Source**. Chem. Tech. Review 186:3-22.
- Harmayani, E., 1993. **Reduction of Cholesterol Levels in Fat with Biological System**. Ph.D. Dissertation, Colorado State Univ., Fort Collins, Colorado.
- Harmayani, E., Elemas, Utami, T., dan R. Indrati, 1996. Effect of Dissolve Oxygen Tension on Cholesterol Oxidase Production by *Pseudomonas putida*. **J. Ind. Food and Nutrition Progress**. vol.3, No.1:13-19.
- Indrati, R., Utami, T., dan E. Harmayani, 1995. **Effect of Medium Compositions on Cholesterol Oxidase by *Pseudomonas putida***. Paper Presented on 12th Annual Meeting of Indonesian Association of Biochemist and Molecular Biologist. Denpasar, 17-18 November 1995.
- Inouye, Y., Taguchi, K., Fujii, A., Ishimaru, K., Nakamura, S., dan R. Nomi, 1982. Purification and Characterization of Extracellular 3 β -Hydroxysteroid Oxidase Produced by *Streptoverticillium cholesterolicum*. **Chem.Pharm. Bull.** 50 (3):951-958.
- Johnson, T.L. dan G.A. Somkuti, 1990. Properties of Cholesterol Dissimilation by *Rhodococcus equi*. **Journal of Food Protection** vol.53, No.4:332-335.
- Johnson, T.L. dan G.A. Somkuti, 1991. Isolation of Cholesterol Oxidase from *Rhodococcus equi* ATCC 37706. **Biotech. and Appl. Biochem.** 13:196-204.
- Kreit, J., Germain, P., dan G. Lefebvre, 1992. Extracellular Cholesterol Oxidase from *Rhodococcus sp.* **Cells. Journal of Biotech.** 24:177-188.
- Lee, K.M., dan J.F. Biellmann, 1986. Cholesterol Oxidase in Microemulsion: Anzymatic Activity on a Substrate of Low Water Solubility and Inactivation by Hydrogen Peroxide. **Bioorganic Chemistry** 14:262-273.
- Lee, S.Y., Rhee, H.I., dan W.C. Tae, 1989. Purification and Characterization of Cholesterol Oxidase from *Pseudomonas sp.* and Taxonomic Study of Strain. **J.Appl.Microb. Biotechnol.** 31:542-546.
- Lily, M.D., Cheetam, P.S.J, dan P. Dunnill, 1979. Extraction of Cholesterol Oxidase from *Nocardia rhodocrous* Enzymes. **J.Micr. Tech.** 2:201-205.



UNIVERSITAS
GADJAH MADA

PENGARUH KADAR KOLESTEROL TERHADAP PRODUKSI KOLESTEROL OKSIDASE OLEH
Pseudomonas putida DALAM
FERMENTOR BERSKALA 5L

YUDI PRANOTO, Dr. Ir. Eni Harmayani, M.Sc.; Dr. Ir. Tyas Utami; Dr. Ir. Endang Sutriswati R, MS.

Liu, W., Meng, M., dan K. Chen, 1988. dalam Cheillan, F., Lafont, H., Termine, E., Fernandez, F., dan G. Lesgard, 1989. Molecular Characteristic of Cholesterol Oxidase and Factor Influencing Its Activity. **Biochim. Biophys. Acta** 99:233-238.

Lowry, O.H., 1951, dalam Ikezawa, H., Mizuro, M., Nakabayoshi, T., Shindo M., dan F. Matsunaga, 1981. Effect of Derivates of Hidroxypruvaldehyde Phenyllazone on Bovine Erythrocyt Membran. **Chem.Pharm. Bull.**3:959-965.

Luria, S.E., 1960. **The Bacteria Protoplasma: Composition and Organization in The Bacteria.** Academic Press, New York.

Machang'u, R.S., dan J.F. Prescott, 1991. Purification and Properties of Cholesterol Oxidase and Choline Phosphohydrolase from *Rhodococcus equi*. **Can.J.Vet. Res.**55:332-340.

Owen, R.W., Mason, A.N., dan Rodney F.Bilton, 1983. The Degradation of Cholesterol by *Pseudomonas putida* NCIB 10590 Under Aerobic Conditions. **J.of Lip.research.**24:1500-1511.

Rachman. A., 1988. **Pengantar Teknologi Fermentasi.** PAU Pangan dan Gizi IPB, Bogor.

Rahayu,K., 1990. **Enzim Mikrobial.** PAU Pangan dan Gizi Universitas Gadjah Mada, Yogyakarta.

Rahayu,K., 1990. **Teknologi Enzim.** PAU Pangan dan Gizi Universitas Gadjah Mada, Yogyakarta.

Rehm, H.J.(ed), 1987. **Biotechnology vol.7: Enzyme Technology.** VCH Verlagsgesellschaft, Weinheim.

Rhee, H.I., Jeong, K.I., Park, B.K., Choi, Y.S., dan S.Y. Lee, 1991. One Step Purification of Cholesterol Oxidase from Culture Broth of a *Pseudomonas sp.* Using a Novel Affinity Chromatography method. **Journal of General Microbiology**, 137:1213-1214.

Scope, R.K., 1982. **Protein Purification: Principles and Practices.** Springer Verlag New York Inc., New York.

Smith, A.G., dan C.J.W. Brooks, 1974. Application of Cholesterol Oxidase in The Analisis of Steroid. **J.Chrom.**79:903-915.



UNIVERSITAS
GADJAH MADA

**PENGARUH KADAR KOLESTEROL TERHADAP PRODUKSI KOLESTEROL OKSIDASE OLEH
Pseudomonas putida DALAM
FERMENTOR BERSKALA 5L**

YUDI PRANOTO, Dr. Ir. Eni Harmayani, M.Sc.; Dr. Ir. Tyas Utami; Dr. Ir. Endang Sutriswati R.,MS.

Universitas Gadjah Mada 1997. <http://std.repository.ugm.ac.id/>
**Sragg, A., 1988. Biotechnology for Engineers: Biological Systems in
Technology Processes. John Wiley & Sons, New York.**

**Stadman, T.C., Cherkes, A., dan C.B. Anfinsen, 1953. Studies Microbiological
Degradation of Cholesterol. J.Biol. Chem.206:511-523.**

**Stanbury, P.F., dan Whitaker, A., 1984. Principles of Fermentation
Technology. Pergamon Press, New York.**

**Suharsono, 1990. Enzimologi. PAU Pangan dan Gizi Universitas Gadjah Mada,
Yogyakarta.**

**Sumantri, S., 1992. Survey Kesehatan Rumah Tangga: Pendekatan, Prospek
dan Hasil Sementara. Balitbang Departemen Kesehatan RI, Jakarta.**

**Tomioka, H., Kagawa, M., dan S. Nakamura, 1976. Some Enzymatic Properties
of 3 β -Hidroxy steroid Oxidase Produced by *Streptomyces violascens*.
J.Biochem., 79:903-915.**

**Turfitt, G.E., 1944. Microbial Agencies in The Degradation of Steroids Part I, The
Cholesterol Decomposing Organism of Soils. J.Bacteriol.47:487-493.**

**Utami, T., Husodo, D., Indrati, R., dan E. Harmayani, 1996. Optimization of
Fermentation Conditions for Production of Cholesterol Oxidase by
Pseudomonas putida. J. Ind. Food and Nutrition Progress. vol.3,
No.1:20-24.**

**Uwajima, T., Yogi, H., Nakamura, S., dan O. Terada, 1973. Isolation and
Chrystalization of Extraceluller 3 beta Hidroxy steroid Oxidase of
Brevibacterium sterolicum nov. sp. Agr.Biol.Chem.37:2345-2350.**

**Watanabe, K., Aihara, H., Nakagawa, Y., Nakamura, R., dan T. Sasaki, 1989.
Properties of The Purified Extracelluler Cholesterol Oxidase from
Rhodococcus equi No.23. J.Agr.Food.Chem.37:1178-1182.**

**Watanabe, K., Aihara, H., dan R. Nakamura, 1989. Degradation of Cholesterol in
Lard by The Extracelluler and Cell-Bound Enzymes from *Rhodococcus
equi* No.23. Lebens-Wiss.U.-Technol,22:98-99.**

**Wibowo, D., 1988. Teknologi Fermentasi. PAU Pangan dan Gizi, UGM,
Yogyakarta.**

Winarno, F.G., 1989. Enzim Pangan. PT. Gramedia, Jakarta.