

## **Universitäts- und Landesbibliothek Tirol**

### **Epidermale Langerhanszellen als Initiatorzellen für antimikrobielle Immunantworten**

**Zanella, Monica**

**1995**

Literaturverzeichnis

[urn:nbn:at:at-ubi:2-12560](https://nbn-resolving.org/urn:nbn:at:at-ubi:2-12560)

# Literaturverzeichnis:

1. Langerhans, P. 1868. Über die Nerven der menschlichen Haut. *Virchows Arch. [A]* 44:325-337.
2. Falck, B., A. Andersson, and J. Bartosik. 1985. Some new ultrastructural aspects on human epidermis and its Langerhans cells. *Scand. J. Immunol.* 21:409-416.
3. Stingl, G., E. C. Wolff-Schreiner, W. J. Pichler, F. Gschnait, and W. Knapp. 1977. Epidermal Langerhans cells bear Fc and C3 receptors. *Nature* 268:245-246.
4. Rowden, G., M. G. Lewis, and A. K. Sullivan. 1977. Ia antigen expression on human epidermal Langerhans cells. *Nature* 268:247-248.
5. Tamaki, K., G. Stingl, M. Gullino, D. H. Sachs, and S. I. Katz. 1979. Ia antigens in mouse skin are predominantly expressed on Langerhans cells. *J. Immunol.* 123:784-787.
6. Stingl, G., S. I. Katz, L. Clements, I. Green, and E. M. Shevach. 1978. Immunologic functions of Ia-bearing epidermal Langerhans cells. *J. Immunol.* 121:2005-2013.
7. Katz, S. I., K. Tamaki, and D. H. Sachs. 1979. Epidermal Langerhans cells are derived from cells originating in bone marrow. *Nature* 282:324-326.
8. Schuler, G. and R. M. Steinman. 1985. Murine epidermal Langerhans cells mature into potent immunostimulatory dendritic cells in vitro. *J. Exp. Med.* 161:526-546.
9. Romani, N., M. Witmer-Pack, M. Crowley, S. Koide, G. Schuler, K. Inaba, and R. M. Steinman. 1991. Langerhans cells as immature dendritic cells. In *Epidermal Langerhans cells*. G. Schuler, editor. CRC Press, Inc. Boca Raton, FL. 191-216.
10. Schuler, G., N. Romani, H. Stössel, and K. Wolff. 1991. Structural organization and biological properties of Langerhans cells. In *Epidermal Langerhans cells*. G. Schuler, editor. CRC Press Inc. Boca Raton, FL. 87-137.
11. Steinman, R. M. 1991. The dendritic cell system and its role in immunogenicity. *Annu. Rev. Immunol.* 9:271-296.
12. Steinman, R. M. and Z. A. Cohn. 1973. Identification of a novel cell type in peripheral lymphoid organs of mice. I. Morphology, quantitation, tissue distribution. *J. Exp. Med.* 137:1142-1162.
13. Steinman, R. M., J. Metlay, N. Bhardwaj, P. Freudenthal, E. Langhoff, M. Crowley, L. Lau, M. Witmer-Pack, J. W. Young, E. Pure, N. Romani, and K. Inaba. 1990. Dendritic cells: nature's adjuvant. In *Immunogenicity*, Vol. 113. C. A. J. Janeway, J. Sprent, and E. Sercarz, editors. Alan R. Liss Inc. New York. 155-165.
14. Sallusto, F., M. Cella, C. Danieli, and A. Lanzavecchia. 1995. Dendritic cells use macropinocytosis and the mannose receptor to concentrate macromolecules in the major histocompatibility complex class II compartment: Downregulation by cytokines and bacterial products. *J. Exp. Med.* 182:389-400.
15. Reis e Sousa, C., P. D. Stahl, and J. M. Austyn. 1993. Phagocytosis of antigens by Langerhans cells in vitro. *J. Exp. Med.* 178:509-519.
16. Blank, C., H. Fuchs, K. Rappersberger, M. Rölinghoff, and H. Moll. 1993. Parasitism of epidermal Langerhans cells in experimental cutaneous Leishmaniasis with *Leishmania major*. *J. Infect. Dis.* 167:418-425.
17. Wolff, K. and E. Schreiner. 1970. Uptake, intracellular transport, and degradation of exogenous protein by Langerhans cells. *J. Invest. Dermatol.* 54:37-52.
18. Wolff, R., A. T. Healy, R. M. Crawford, and M. S. Meltzer. 1987. Detection of messenger RNA for fms in epidermal cell populations enriched for Langerhans cells. *Fed. Proc.* 46:1223 (Ab)
19. Takashima, A., D. Edelbaum, T. Kitajima, R. K. Shaddock, G. L. Gilmore, S. Xu, R. S. Taylor, P. R. Bergstresser, and K. Ariizumi. 1995. Colony-stimulating factor-1 secreted by fibroblasts promotes the growth of dendritic cell lines (XS series) derived from murine epidermis. *J. Immunol.* 154:5128-5135.
20. Romani, N., P. Fritsch, and G. Schuler. 1991. Identification and phenotype of epidermal Langerhans cells. In *Epidermal Langerhans Cells*. G. Schuler, editor. CRC Press, Boca Raton. 49-86.
21. Schriever, F. and L. M. Nadler. 1992. The central role of follicular dendritic cells in lymphoid tissues. *Adv. Immunol.* 51:243-284.
22. Witmer, M. D. and R. M. Steinman. 1984. The anatomy of peripheral lymphoid organs with emphasis on accessory cells: light microscopic, immunocytochemical studies of mouse spleen, lymph node and Peyer's patch. *Am. J. Anat.* 170:465-481.
23. Agger, R., M. Witmer-Pack, N. Romani, H. Stössel, W. J. Swiggard, J. P. Metlay, E. Storozynsky, P. Freimuth, and R. M. Steinman. 1992. Two populations of splenic dendritic cells

- detected with M342, a new monoclonal to an intracellular antigen of interdigitating dendritic cells and some B lymphocytes. *J. Leukocyte Biol.* 52:34-42.
24. Freudenthal, P. S. and R. M. Steinman. 1990. The distinct surface of human blood dendritic cells, as observed after an improved isolation method. *Proc. Natl. Acad. Sci. USA* 87:7698-7702.
  25. O'Doherty, U., M. Peng, S. Gezelter, W. J. Swiggard, M. Betjes, N. Bhardwaj, and R. M. Steinman. 1994. Human blood contains two subsets of dendritic cells, one immunologically mature and the other immature. *Immunology* 82:487-493.
  26. Larsen, C. P., P. J. Morris, and J. M. Austyn. 1990. Migration of dendritic leukocytes from cardiac allografts into host spleens. A novel pathway for initiation of rejection. *J. Exp. Med.* 171:307-314.
  27. Austyn, J. M. 1989. Migration patterns of dendritic leukocytes. *Res. Immunol.* 140:898-902.
  28. Tsuchida, T., M. Iijima, H. Fujiwara, H. Pehamberger, G. M. Shearer, and S. I. Katz. 1984. Epidermal Langerhans cells can function as stimulatory cells but not as accessory cells in CTL induction. *J. Immunol.* 132:1163-1168.
  29. Inaba, K., G. Schuler, M. D. Witmer, J. Valinski, B. Atassi, and R. M. Steinman. 1986. Immunologic properties of purified epidermal Langerhans cells. Distinct requirements for stimulation of unprimed and sensitized T lymphocytes. *J. Exp. Med.* 164:605-613.
  30. Romani, N., S. Koide, M. Crowley, M. Witmer-Pack, A. M. Livingstone, C. G. Fathman, K. Inaba, and R. M. Steinman. 1989. Presentation of exogenous protein antigens by dendritic cells to T cell clones: intact protein is presented best by immature epidermal Langerhans cells. *J. Exp. Med.* 169:1169-1178.
  31. Stössel, H., F. Koch, E. Kämpgen, P. Stöger, A. Lenz, C. Heufler, N. Romani, and G. Schuler. 1990. Disappearance of certain acidic organelles (endosomes and Langerhans cell granules) accompanies loss of antigen processing capacity upon culture of epidermal Langerhans cells. *J. Exp. Med.* 172:1471-1482.
  32. Germain, R. N. and D. H. Margulies. 1993. The biochemistry and cell biology of antigen processing and presentation. *Annu. Rev. Immunol.* 11:403-450.
  33. Brodsky, F. M. and L. E. Guagliardi. 1991. The cell biology of antigen processing and presentation. *Annu. Rev. Immunol.* 9:707-744.
  34. Kleijmeer, M. J., V. M. J. Oorschot, and H. J. Geuze. 1994. Human resident Langerhans cells display a lysosomal compartment enriched in MHC class II. *J. Invest. Dermatol.* 103:516-523.
  35. Kämpgen, E., N. Koch, F. Koch, P. Stöger, C. Heufler, G. Schuler, and N. Romani. 1991. Class II major histocompatibility complex molecules of murine dendritic cells: Synthesis, sialylation of invariant chain, and antigen processing capacity are down-regulated upon culture. *Proc. Natl. Acad. Sci. USA* 88:3014-3018.
  36. Puré, E., K. Inaba, M. T. Crowley, L. Tardelli, M. D. Witmer-Pack, G. Ruberti, G. Fathman, and R. M. Steinman. 1990. Antigen processing by epidermal Langerhans cells correlates with the level of biosynthesis of major histocompatibility complex class II molecules and expression of invariant chain. *J. Exp. Med.* 172:1459-1469.
  37. Becker, D., A. B. Reske-Kunz, J. Knop, and K. Reske. 1991. Biochemical properties of MHC class II molecules endogenously synthesized and expressed by mouse Langerhans cells. *Eur. J. Immunol.* 21:1213
  38. Inaba, K. and R. M. Steinman. 1986. Accessory cell-T lymphocyte interactions. Antigen-dependent and -independent clustering. *J. Exp. Med.* 163:247-261.
  39. Inaba, K., N. Romani, and R. M. Steinman. 1989. An antigen-independent contact mechanism as an early step in T cell-proliferative responses to dendritic cells. *J. Exp. Med.* 170:527-542.
  40. Romani, N., A. Lenz, H. Glassel, H. Stössel, U. Stanzl, O. Majdic, P. Fritsch, and G. Schuler. 1989. Cultured human Langerhans cells resemble lymphoid dendritic cells in phenotype and function. *J. Invest. Dermatol.* 93:600-609.
  41. Teunissen, M. B. M., J. Wormmeester, S. R. Krieg, P. J. Peters, I. M. C. Vogels, M. L. Kapsenberg, and J. D. Bos. 1990. Human epidermal Langerhans cells undergo profound morphological and phenotypical changes during in vitro culture. *J. Invest. Dermatol.* 94:166-173.
  42. Inaba, K., M. Witmer-Pack, M. Inaba, K. S. Hathcock, H. Sakuta, M. Azuma, H. Yagita, K. Okumura, P. S. Linsley, S. Ikehara, S. Muramatsu, R. J. Hodes, and R. M. Steinman. 1994. The tissue distribution of the B7-2 costimulator in mice: Abundant expression on dendritic cells in situ and during maturation in vitro. *J. Exp. Med.* 180:1849-1860.
  43. Caux, C., B. Vanbervliet, C. Massacrier, M. Azuma, K. Okumura, L. L. Lanier, and J. Banchereau. 1994. B70/B7-2 is identical to CD86 and is the major functional ligand for CD28 expressed on human dendritic cells. *J. Exp. Med.* 180:1841-1847.
  44. Heufler, C., F. Koch, and G. Schuler. 1988. Granulocyte-macrophage colony-stimulating factor and interleukin-1 mediate the maturation of murine epidermal Langerhans cells into potent immunostimulatory dendritic cells. *J. Exp. Med.* 167:700-705.

45. Witmer-Pack, M. D., W. Olivier, J. Valinsky, G. Schuler, and R. M. Steinman. 1987. Granulocyte/macrophage colony-stimulating factor is essential for the viability and function of cultured murine epidermal Langerhans cells. *J. Exp. Med.* 166:1484-1498.
46. Kupper, T. S., F. Lee, D. Coleman, J. Chodakewitz, P. Flood, and M. Horowitz. 1988. Keratinocyte derived T-cell growth factor (KTGF) is identical to granulocyte macrophage colony stimulating factor (GM-CSF). *J. Invest. Dermatol.* 91:185-188.
47. Luger, T. A. and T. Schwarz. 1991. Epidermal cell derived secretory regulins. In *Epidermal Langerhans Cells*. G. Schuler, editor. CRC Press, Boca Raton. 217-251.
48. Heufler, C., C. Humborg, R. M. Steinman, M. C. Nussenzweig, and G. Schuler. 1995. Molecular strategies to identify dendritic cell-specific molecules. In J. Banchereau, D. Schmitt, and L. Valette, editors. Plenum Press, New York.
49. Romani, N. and G. Schuler. 1992. The immunologic properties of epidermal Langerhans cells as a part of the dendritic cell system. *Springer Semin. Immunopathol.* 13:265-279.
50. Macatonia, S. E., S. C. Knight, A. J. Edwards, S. Griffiths, and P. Fryer. 1987. Localization of antigen on lymph node dendritic cells after exposure to the contact sensitizer fluorescein isothiocyanate. *J. Exp. Med.* 166:1654-1667.
51. Kripke, M. L., C. G. Munn, A. Jeevan, J.-M. Tang, and C. Bucana. 1990. Evidence that cutaneous antigen-presenting cells migrate to regional lymph nodes during contact sensitization. *J. Immunol.* 145:2833-2838.
52. Larsen, C. P., R. M. Steinman, M. Witmer-Pack, D. F. Hankins, P. J. Morris, and J. M. Austyn. 1990. Migration and maturation of Langerhans cells in skin transplants and explants. *J. Exp. Med.* 172:1483-1493.
53. Steinman, R. M. and J. W. Young. 1991. Signals arising from antigen-presenting cells. *Current Opinion in Immunology* 3:361-372.
54. Abbas, A. K., A. H. Lichtman and J. S. Pober. 1994. Chapter: cytokines. In *cellular and molecular immunology*, W. B. Saunders Company. 2nd edition:239-260
55. Kaplan, G., A. Nusrat, M. D. Witmer, I. Nath, and Z. A. Cohn. 1987. Distribution and turnover of Langerhans cells during delayed immune responses in human skin. *J. Exp. Med.* 165:763-776.
56. Kilgus, O., E. Payer, S. Schreiber, A. Elbe, R. Strohal, and G. Stingl. 1993. *In vivo* cytokine expression in normal and perturbed murine skin--Analysis by competitive quantitative polymerase chain reaction. *J. Invest. Dermatol.* 100:674-680.
57. Gearing, A. J., N. J. Fincham, C. R. Bird, M. Wadhwa, A. Meager, J. E. Cartwright and R. D. Camp. 1990. Cytokines in skin lesions of psoriasis. *Cytokine* 2:68-70.
58. Enk, A. H. and S. I. Katz. 1992. Early molecular events in the induction phase of contact sensitivity. *Proc. Natl. Acad. Sci. USA* 89:1398-1402.
59. Matsue, H., P. D. Cruz, Jr., P. R. Bergstresser, and A. Takashima. 1992. Langerhans cells are the major source of mRNA for IL-1 $\beta$  and MIP-1 $\alpha$  among unstimulated mouse epidermal cells. *J. Invest. Dermatol.* 99:537-541.
60. Heufler, C., G. Topar, F. Koch, B. Trockenbacher, E. Kämpgen, N. Romani, and G. Schuler. 1992. Cytokine gene expression in murine epidermal cell suspensions: Interleukin 1 $\beta$  and macrophage inflammatory protein 1 $\alpha$  are selectively expressed in Langerhans cells but are differentially regulated in culture. *J. Exp. Med.* 176:1221-1226.
61. Kupper, T. S., D. W. Ballard, A. O. Chua, J. S. McGuire, P. M. Flood, M. C. Horowitz, R. Langdon, L. Lightfoot, and U. Gubler. 1986. Human keratinocytes contain mRNA indistinguishable from monocyte interleukin 1 $\alpha$  and beta mRNA. Keratinocyte epidermal cell-derived thymocyte-activating factor is identical to interleukin 1. *J. Exp. Med.* 164:2095-2100.
62. Mizutani, H., R. Black and T. Kupper. 1989. *Cytokine* 1: 78
63. McGuire, J., R. Langdon, N. Birchall, and T. Kupper. 1988. Interleukin-1  $\alpha$  mRNA induced by cycloheximide, PMA, and retinoic acid is reduced by dexamethasone in PAM-212 keratinocytes. *Ann. NY Acad. Sci.* 548:283-290.
64. Chodakewitz, J. A., J. Lacy, S. E. Edwards, N. Birchall, and D. L. Coleman. 1990. Macrophage colony-stimulating factor production by murine and human keratinocytes: Enhancement by bacterial lipopolysaccharide. *J. Immunol.* 144:2190-2196.
65. Kawasaki, E. S., S. S. Clark, M. Y. Coyne, S. D. Smith, R. Champlin, O. N. Witte, and F. P. McCormick. 1988. Diagnosis of chronic myeloid and acute lymphocytic leukemias by detection of leukemia-specific mRNA sequences amplified *in vitro*. *Proc. Natl. Acad. Sci. USA* 85:5698-5702.
66. Köck, A., T. Schwarz, R. Kirnbauer, A. Urbanski, P. Perry, J. C. Ansel, and T. A. Luger. 1990. Human keratinocytes are a source for tumor necrosis factor  $\alpha$ : evidence for synthesis and release upon stimulation with endotoxin or ultraviolet light. *J. Exp. Med.* 172:1609

67. Kupper, T. S. 1990. The activated keratinocyte: A model for inducible cytokine production by non-bone marrow-derived cells in cutaneous inflammatory and immune responses. *J. Invest. Dermatol.* 94 Suppl.146S-150S.
68. Kirnbauer, R., A. Köck, T. Schwarz, A. Urbanski, J. Krutmann, W. Borth, D. Damm, G. Shipley, J. C. Ansel, and T. A. Luger. 1989. IFN- $\beta$ 2, B cell differentiation factor 2, or hybridoma growth factor (IL-6) is expressed and released by human epidermal cells and epidermoid carcinoma cell lines. *J. Immunol.* 142:1922-1928.
69. Heufler, C., G. Topar, A. Grasseger, U. Stanzl, F. Koch, N. Romani, A. E. Namen, and G. Schuler. 1993. Interleukin 7 is produced by murine and human keratinocytes. *J. Exp. Med.* 178:1109-1114.
70. Enk, A. H. and S. I. Katz. 1992. Identification and induction of keratinocyte-derived IL-10. *J. Immunol.* 149:92-95.
71. Aragane, Y., H. Riemann, R. S. Bhardwaj, A. Schwarz, Y. Sawada, H. Yamada, T. A. Luger, M. Kubin, G. Trinchieri, and T. Schwarz. 1994. IL-12 is expressed and released by human keratinocytes and epidermoid carcinoma cell lines. *J. Immunol.* 153:5366-5372.
72. Müller, G., J. Saloga, T. Germann, I. Bellinghausen, M. Mohamadzaheh, J. Knop, and A. H. Enk. 1995. Identification and induction of human keratinocyte-derived IL-12. *J. Clin. Invest.* 94:1799-1805.
73. Koch, F., C. Heufler, U. Stanzl, G. Topar, M. Wysocka, G. Trinchieri, A. Enk, R. M. Steinman, N. Romani, and G. Schuler. 1995. Interleukin-12 is produced by dendritic cells and mediates TH1 development as well as interferon-gamma production by TH1 cells. *Eur. J. Immunol.* (In Press)
74. Mohamadzaheh, M., A. Takashima, I. Dougherty, J. Knop, P. R. Bergstresser, and P. D. Cruz, Jr. 1995. Ultraviolet B radiation up-regulates the expression of IL-15 in human skin. *J. Immunol.* 155:4492-4496.
75. Schreiber, S., O. Kilgus, E. Payer, R. Kutil, A. Elbe, C. Mueller, and G. Stingl. 1992. Cytokine pattern of Langerhans cells isolated from murine epidermal cell cultures. *J. Immunol.* 149:3525-3534.
76. Larrick, J. W., V. Morhenn, Y. L. Chiang, and T. Shi. 1989. Activated Langerhans cells release tumor necrosis factor. *J. Leukocyte Biol.* 45:429-433.
77. Sims, J. E., M. A. Gayle, J. L. Slack, M. R. Alderson, T. A. Bird, J. G. Giri, F. Colotta, F. Re, A. Mantovani, K. Shanebeck, K. H. Grabstein, and S. K. Dower. 1993. Interleukin 1 signaling occurs exclusively via the type I receptor. *Proc. Natl. Acad. Sci. USA* 90:6155-6159.
78. Ding, A., S. D. Wright, and C. Nathan. 1987. Activation of macrophages by monoclonal antibodies to MAC-1 (complement receptor type 3). *J. Exp. Med.* 165:733-750.
79. Kämpgen, E., F. Koch, C. Heufler, A. Eggert, L. L. Gill, S. Gillis, S. K. Dower, N. Romani, and G. Schuler. 1994. Understanding the dendritic cell lineage through a study of cytokine receptors. *J. Exp. Med.* 179:1767-1776.
80. Watanabe, Y., T. Kitamura, K. Hayashida, and A. Miyajima. 1992. Monoclonal antibody against the common  $\beta$  subunit ( $\beta_c$ ) of the human interleukin-3 (IL-3), IL-5, and granulocyte-macrophage colony-stimulating factor receptors shows upregulation of  $\beta_c$  by IL-1 and tumor necrosis factor- $\alpha$ . *Blood* 80:2215-2220.
81. Williams, D. E., D. C. Bicknell, L. S. Park, J. E. Straneva, S. Cooper, and H. E. Broxmeyer. 1988. Purified murine granulocyte/macrophage progenitor cells express a high-affinity receptor for recombinant murine granulocyte/macrophage colony-stimulating factor. *Proc. Natl. Acad. Sci. USA* 85:487-491.
82. Hercus, T. R., B. Cambareri, M. Dottore, J. Woodcock, C. J. Bagley, M. A. Vadas, M. F. Shannon, and A. F. Lopez. 1994. Identification of residues in the first and fourth helices of human granulocyte-macrophage colony-stimulating factor involved in biologic activity and in binding to the  $\alpha$ - and  $\beta$ -chains of its receptor. *Blood* 83:3500-3508.
83. Foy, T. M., D. M. Shepherd, F. H. Durie, A. Aruffo, J. A. Ledbetter, and R. J. Noelle. 1993. In vivo CD40-gp39 interactions are essential for thymus-dependent humoral immunity. II. Prolonged suppression of the humoral immune response by an antibody to the ligand for CD40, gp39. *J. Exp. Med.* 178:1567-1575.
84. Trefzer, U., M. Brockhaus, H. Lötscher, F. Parlow, A. Budnik, M. Grewe, H. Christoph, A. Kapp, E. Schöpf, T. A. Luger, and J. Krutmann. 1993. The 55-kD tumor necrosis factor receptor on human keratinocytes is regulated by tumor necrosis factor-alpha and by ultraviolet B radiation. *J. Clin. Invest.* 92:462-470.
85. Koch, F., E. Kämpgen, B. Trockenbacher, C. Heufler, P. Stöger, N. Romani, and G. Schuler. 1992. Tumor Necrosis Factor alpha (TNF alpha) induces loss of immunogenic peptides from

- MHC class II molecules and thus interrupts the antigen presenting function of epidermal Langerhans cells. *J. Invest. Dermatol.* 89:510(Abstr.)
86. Kurimoto, I. and J. W. Streilein. 1994. Characterization of the immunogenetic basis of ultraviolet-B light effects on contact hypersensitivity induction. *Immunology* 81:352-358.
  87. Shimizu, T. and J. W. Streilein. 1994. Evidence that ultraviolet B radiation induces tolerance and impairs induction of contact hypersensitivity by different mechanisms. *Immunology* 82:140-148.
  88. Koch, F., C. Heufler, E. Kämpgen, D. Schneeweiss, G. Böck, and G. Schuler. 1990. Tumor necrosis factor alpha maintains the viability of murine epidermal Langerhans cells in culture but in contrast to granulocyte/macrophage colony-stimulating factor without inducing their functional maturation. *J. Exp. Med.* 171:159-171.
  89. Koide, S. L., K. Inaba, and R. M. Steinman. 1987. Interleukin-1 enhances T-dependent immune responses by amplifying the function of dendritic cells. *J. Exp. Med.* 165:515-530.
  90. Cumberbatch, M. and I. Kimber. 1992. Dermal tumour necrosis factor- $\alpha$  induces dendritic cell migration to draining lymph nodes, and possibly provides one stimulus for Langerhans' cell migration. *Immunology* 75:257-263.
  91. Vermeer, M. and J. W. Streilein. 1990. Ultraviolet B light-induced alterations in epidermal Langerhans cells are mediated in part by tumor necrosis factor-alpha. *Photodermatol. Photoimmunol. Photomed.* 7:258-265.
  92. Nylander Lundqvist, E. and O. Bäck. 1990. Interleukin-1 decreases the number of Ia<sup>+</sup> epidermal dendritic cells but increases their expression of Ia antigen. *Acta Derm. Venereol.* 70:391-394.
  93. Enk, A. H., V. L. Angeloni, M. C. Udey, and S. I. Katz. 1993. An essential role for Langerhans cell-derived IL-1 $\beta$  in the initiation of primary immune responses in skin. *J. Immunol.* 150:3698-3704.
  94. Roake, J. A., A. S. Rao, P. J. Morris, C. P. Larsen, D. F. Hankins, and J. M. Austyn. 1995. Dendritic cell loss from nonlymphoid tissues after systemic administration of lipopolysaccharide, tumor necrosis factor, and interleukin 1. *J. Exp. Med.* 181:2237-2248.
  95. Mignatti, P., E. Robbins, and D. B. Rifkin. 1986. Tumor invasion through the human amniotic membrane: requirement for a proteinase cascade. *Cell* 47:487-498.
  96. Nakane, A., T. Minigawa and K. Kato. 1988. Endogenous tumor necrosis factor (cachectin) is essential to host resistance against *Listeria monocytogenes* infection. *Infect. Immun.* 56: 2563-2569.
  97. Cross, A. S., J. C. Sadoff, N. Kelly, E. Bernton, and P. Gernschi. 1989. Pretreatment with recombinant murine tumor necrosis factor  $\alpha$ /cachectin and murine interleukin 1  $\alpha$  protects mice from lethal bacterial infection. *J. Exp. Med.* 169:2021-2027.
  98. Engelmann, H., D. Novic and D. Wallach. 1990. Two tumor necrosis factor-binding proteins purified from human urine. *J. Biol. Chem.* 265:1531-1536.
  99. Livingston, D. H., M. A. Malangoni and G. Sonnenfeld. 1989. Immune enhancement by tumor necrosis factor-alpha improves antibiotic efficacy after hemorrhagic shock. *J. Trauma* 29:967-971.
  100. Tite, J. P., G. Dougan and S. N. Chatfield. 1991. The involvement of tumor necrosis factor in immunity to *Salmonella* infection. *J. Immunol.* 147:3161-3164.
  101. Ortner, U. 1994. Modulation und Migration von Langerhanszellen in vitro und in vivo / Modulation and migration of Langerhans cells in vitro and in vivo. 1 p.
  102. Jenkinson, E., L. Franchi, R. Kongstone and J. Owen. 1982. Effect of deoxyguanosine on lymphopoiesis in the developing thymus rudiment in vitro: application in the production of chimeric thymus rudiments. *Eur. J. Immunol.* 12:583.
  103. Heine, M. 1993. Studien zur Funktion kutaner antigenpräsentierender Zellen mit Hilfe eines neuen Organkulturmodells / Studies on the function of cutaneous antigen presenting cells by means of a novel organ culture model. 1 p.
  104. Lukas, M. 1995. Studien .... / Studies. 1 p.
  105. Chen, Y., Y. Obata, E. Stockert, and L. J. Old. 1985. Thymus-leukemia (TL) antigens of the mouse. Analysis of TL mRNA and TL cDNA from TL<sup>+</sup> and TL<sup>-</sup> strains. *J. Exp. Med.* 162:1134-1148.
  106. Beutler, B. and A. Cerami. 1989. The biology of cachectin/TNF--A primary mediator of the host response. *Ann. Rev. Immunol.* 7:625-655.
  107. Han, J., T. Brown, and B. Beutler. 1990. Endotoxin-responsive sequences control cachectin/tumor necrosis factor biosynthesis at the translational level. *J. Exp. Med.* 171:465-475.
  108. Warren, M. K. and P. Ralph. 1986. Macrophage growth factor CSF-1 stimulates human monocyte production of interferon, tumor necrosis factor, and colony stimulating activity. *J. Immunol.* 137:2281-2285.



109. Cannistra, S. A., E. Vellenga, P. Groshek, A. Rambaldi, and J. D. Griffin. 1988. Human granulocyte-monocyte colony stimulating factor and interleukin-3 stimulate monocyte cytotoxicity through a tumor necrosis factor dependent mechanism. *Blood* 71:672-676.
110. Oxholm, A., P. Oxholm, B. Staberg, and K. Bendtzen. 1988. Immunohistological detection of interleukin 1-like molecules and tumour necrosis factor in human epidermis before and after UVB-irradiation in vivo. *Br. J. Dermatol.* 118:369-376.
111. Austyn, J. M. and C. P. Larsen. 1990. Migration patterns of dendritic leukocytes: Implications for transplantation. *Transplantation* 49:1-7.
112. Tang, A., M. Amagai, L. G. Granger, J. R. Stanley, and M. C. Udey. 1993. Adhesion of epidermal Langerhans cells to keratinocytes mediated by E-cadherin. *Nature* 361:82-85.
113. Blauvelt, A., S. I. Katz, and M. C. Udey. 1995. Human Langerhans cells express E-cadherin. *J. Invest. Dermatol.* 104:293-296.
114. Varlet, B. L., M. J. Staquet, C. Dezutter-Dambuyant, P. Delorme, and D. Schmitt. 1992. In vitro adhesion of human epidermal Langerhans cells to laminin and fibronectin occurs through beta1 integrin receptors. *J. Leukocyte Biol.* 51:415-420.
115. Aiba, S., S. Nakagawa, H. Ozawa, K. Miyake, H. Yagita, and H. Tagami. 1993. Up-regulation of  $\alpha 4$  integrin on activated Langerhans cells: Analysis of adhesion molecules on Langerhans cells relating to their migration from skin to draining lymph nodes. *J. Invest. Dermatol.* 100:143-147.
116. Cumberbatch, M. and I. Kimber. 1995. Tumour necrosis factor-alpha is required for accumulation of dendritic cells in draining lymph nodes and for optimal contact sensitization. *Immunology* 84:31-35.
117. Bakouche, O., D. C. Brown, and L. B. Lachman. 1987. Subcellular localization of human monocyte interleukin 1: evidence for an inactive precursor molecule and a possible mechanism for IL 1 release. *J. Immunol.* 138:4249-4256.
118. Dinarello, C. A. 1994. The interleukin-1 family: 10 years of discovery. *FASEB J.* 8:1314-1325.
119. Hazuda, D. J., J. C. Lee, and P. R. Young. 1988. The kinetics of interleukin 1 secretion from activated monocytes. Differences between interleukin 1 $\alpha$  and interleukin 1 $\beta$ . *J. Biol. Chem.* 263:8473-8479.
120. Dower, S. K., E. E. Qwarnstrom, R. C. Page, R. A. Blanton, T. S. Kupper, E. Raines, R. Ross, and J. E. Sims. 1990. Biology of the interleukin-1 receptor. *J. Invest. Dermatol.* 94 Suppl.68S-73S.
121. Blanton, R. A., T. S. Kupper, J. K. McDougall, and S. Dower. 1989. Regulation of interleukin 1 and its receptor in human keratinocytes. *Proc. Natl. Acad. Sci. USA* 86:1273-1277.
122. Kupper, T. S. 1989. Mechanisms of cutaneous inflammation: Interactions between epidermal cytokines, adhesion molecules, and leukocytes. *Arch. Dermatol.* 125:1406-1412.
123. Banchereau, J., F. Bazan, D. Blanchard, F. Brière, J. P. Galizzi, C. Van Kooten, Y. J. Liu, F. Rousset, and S. Saeland. 1994. The CD40 antigen and its ligand. *Annu. Rev. Immunol.* 12:881-922.
124. Cayabyab, M., J. H. Phillips, and L. L. Lanier. 1994. CD40 preferentially costimulates activation of CD4<sup>+</sup> T lymphocytes. *J. Immunol.* 152:1523-1531.
125. Fanslow, W. C., K. N. Clifford, M. Seaman, M. R. Alderson, M. K. Spriggs, R. J. Armitage, and F. Ramsdell. 1994. Recombinant CD40 ligand exerts potent biologic effects on T cells. *J. Immunol.* 152:4262-4269.
126. Koulova, L., E. A. Clark, G. Shu, and B. Dupont. 1991. The CD28 ligand B7/BB1 provides costimulatory signal for alloactivation of CD4<sup>+</sup> T cells. *J. Exp. Med.* 173:759-762.
127. Clark, E. A. and P. J. L. Lane. 1991. Regulation of human B-cell activation and adhesion. *Annu. Rev. Immunol.* 9:97-127.
128. Young, J. W., L. Koulova, S. A. Soergel, E. A. Clark, R. M. Steinman, and B. Dupont. 1992. The B7/BB1 antigen provides one of several costimulatory signals for the activation of CD4<sup>+</sup> T lymphocytes by human blood dendritic cells in vitro. *J. Clin. Invest.* 90:229-237.
129. June, C. H., J. A. Bluestone, L. M. Nadler, and C. B. Thompson. 1994. The B7 and CD28 receptor families. *Immunol. Today* 15:321-331.
130. Larsen, C. P., S. C. Ritchie, R. Hendrix, P. S. Linsley, K. S. Hathcock, R. J. Hodes, R. P. Lowry, and T. C. Pearson. 1994. Regulation of immunostimulatory function and costimulatory molecule (B7-1 and B7-2) expression on murine dendritic cells. *J. Immunol.* 152:5208-5219.
131. Sallusto, F. and A. Lanzavecchia. 1994. Efficient presentation of soluble antigen by cultured human dendritic cells is maintained by granulocyte/macrophage colony-stimulating factor plus interleukin 4 and downregulated by tumor necrosis factor  $\alpha$ . *J. Exp. Med.* 179:1109-1118.
132. Karmann, K., C. C. W. Hughes, J. Schechner, W. C. Fanslow, and J. S. Pober. 1995. CD40 on human endothelial cells: Inducibility by cytokines and functional regulation of adhesion molecule expression. *Proc. Natl. Acad. Sci. USA* 92:4342-4346.

133. Inaba, K., M. Inaba, N. Romani, H. Aya, M. Deguchi, S. Ikehara, S. Muramatsu, and R. M. Steinman. 1992. Generation of large numbers of dendritic cells from mouse bone marrow cultures supplemented with granulocyte/macrophage colony-stimulating factor. *J. Exp. Med.* 176:1693-1702.
134. Lane, P., T. Brocker, S. Hubele, E. Padovan, A. Lanzavecchia, and F. McConnell. 1993. Soluble CD40 ligand can replace the normal T cell-derived CD40 ligand signal to B cells in T cell-dependent activation. *J. Exp. Med.* 177:1209-1213.
135. Hughes, D. A., I. P. Fraser, and S. Gordon. 1995. Murine macrophage scavenger receptor: *In vivo* expression and function as receptor for macrophage adhesion in lymphoid and non-lymphoid organs. *Eur. J. Immunol.* 25:466-473.
136. Juhlin, L. and W. B. Shelley. 1977. New staining techniques for the Langerhans cell. *Acta Derm. Venereol.* 57:289-296.
137. Kitano, Y. and N. Okado. 1983. Separation of the epidermal sheet by dispase. *Br. J. Dermatol.* 108:555-560.
138. Schuler, G. and F. Koch. 1991. Enrichment of epidermal Langerhans cells. In *Epidermal Langerhans Cells*. G. Schuler, editor. CRC Press Inc. Boca Raton. 139-157.
139. Echtenacher, B., W. Falk, D. N. Männel, and P. H. Krammer. 1993. Requirement of endogenous tumor necrosis factor/cachectin for recovery from experimental peritonitis. *J. Exp. Med.* 177:1391-1398.
140. Damle, N. K., K. Klussman, G. Leytze, H. D. Ochs, A. Aruffo, P. S. Linsley, and J. A. Ledbetter. 1993. Costimulation via vascular cell adhesion molecule-1 induces in T cells increased responsiveness to the CD28 counter-receptor B7. *Cell. Immunol.* 148:144-156.
141. Lenz, A., M. Heine, G. Schuler, and N. Romani. 1993. Human and murine dermis contain dendritic cells. *J. Clin. Invest.* 92:2587-2596.
142. Kikuchi, G. E., K. Roberts, E. M. Shevach, and J. E. Coligan. 1992. Gene transfer demonstrates that the Vgamma1.1Cgamma4Vdelta6CD8 T cell receptor is essential for autoreactivity. *J. Immunol.* 148:1302-1307.
143. Cumberbatch, M., I. Fielding, and I. Kimber. 1994. Modulation of epidermal Langerhans' cell frequency by tumour necrosis factor- $\alpha$ . *Immunology* 81:395-401.
144. Kupiec-Weglinski, J. W., J. M. Austyn, and P. J. Morris. 1988. Migration patterns of dendritic cells in the mouse. Traffic from the blood, and T cell-dependent and -independent entry to lymphoid tissues. *J. Exp. Med.* 167:632-645.
145. Senoo, A., N. Imazeki, and Y. Fuse. 1994. Ultrastructural and immunohistochemical studies on mice skin and lymph nodes after treatment of tumor necrosis factor alpha. *Dendritic Cells* 4:151-157.
146. Daeron, M., J. Yodoi, C. Neauport-Sautes, J. Moncuit, and W. H. Fridman. 1985. Receptors for immunoglobulin isotypes (FcR) on murine T cells. I. Multiple FcR expression on T lymphocytes and hybridoma T cell clones. *Eur. J. Immunol.* 15:662-667.
147. Fong, Y., K. J. Tracey, L. L. Moldawer, D. G. Hesse, K. B. Manogue, J. S. Kenney, A. T. Lee, G. C. Kuo, A. C. Allison, S. F. Lowry, and A. Cerami. 1989. Antibodies to cachectin/tumor necrosis factor reduce interleukin 1 $\beta$  and interleukin 6 appearance during lethal bacteremia. *J. Exp. Med.* 170:1627-1633.
148. Tracey, K. J., Y. Fong, D. G. Hesse, K. R. Manogue, A. T. Lee, G. C. Kuo, S. F. Lowry, and A. Cerami. 1987. Anti-cachectin/TNF monoclonal antibodies prevent septic shock during lethal bacteraemia. *Nature* 330:662-664.
149. Brouckaert, P., C. Libert, B. Everaerd, N. Takahashi, A. Cauwels, and W. Fiers. 1993. Tumor necrosis factor, its receptors and the connection with interleukin 1 and interleukin 6. *Immunobiology* 187:317-329.
150. Akira, S., T. Hirano, T. Taga, and T. Kishimoto. 1990. Biology of multifunctional cytokines: IL 6 and related molecules (IL 1 and TNF). *FASEB J.* 4:2860-2867.
151. Alexander, M. A., C. A. Damico, K. M. Wietes, T. H. Hansen, and J. M. Connolly. 1991. Correlation between CD8 dependency and determinant density using peptide-induced, L<sup>d</sup>-restricted cytotoxic T lymphocytes. *J. Exp. Med.* 173:849-858.
152. Ansel, J., T. A. Luger, A. Kock, D. Hochstein, and I. Green. 1984. The effect of in vitro UV irradiation on the production of IL1 by murine macrophages and P388D cells. *J. Immunol.* 133:1350-1355.
153. Nordlund, J. J., A. E. Ackles, and A. B. Lerner. 1981. The effects of ultraviolet light and certain drugs on Ia-bearing Langerhans cells in murine epidermis. *Cell. Immunol.* 60:50-63.
154. Aberer, W., G. Schuler, G. Stingl, H. Hönigsmann, and K. Wolff. 1981. Ultraviolet light depletes surface markers of Langerhans cells. *J. Invest. Dermatol.* 76:202-210.



155. Aberer, W., N. Romani, A. Elbe, and G. Stingl. 1986. Effects of physicochemical agents on murine epidermal Langerhans cells and Thy-1-positive dendritic epidermal cells. *J. Immunol.* 136:1210-1216.
156. Arend, W. P., M. F. Smith, Jr., R. W. Janson, and F. G. Joslin. 1991. IL-1 receptor antagonist and IL-1 $\beta$  production in human monocytes are regulated differently. *J. Immunol.* 147:1530-1536.
157. Bigler, C. F., D. A. Norris, W. L. Weston, and W. P. Arend. 1992. Interleukin-1 receptor antagonist production by human keratinocytes. *J. Invest. Dermatol.* 98:38-44.
158. Yurochko, A. D., D. Y. Liu, D. Eierman, and S. Haskill. 1992. Integrins as a primary signal transduction molecule regulating monocyte immediate-early gene induction. *Proc. Natl. Acad. Sci. USA* 89:9034-9038.
159. Schwarzenberger, K. and M. C. Udey. 1995. Modulation of Langerhans cell E-cadherin expression during the initiation phase of contact sensitivity reactions. *J. Cell. Biochem.* 21A:14(Abstr.)
160. Ioffreda, M. D., D. Whitaker, and G. F. Murphy. 1993. Mast cell degranulation upregulates  $\alpha 6$  integrins on epidermal Langerhans cells. *J. Invest. Dermatol.* 101:150-154.
161. Kobayashi, Y., M.-J. Staquet, C. Dezutter-Dambuyant, and D. Schmitt. 1994. Development of motility of Langerhans cell through extracellular matrix by *in vitro* hapten contact. *Eur. J. Immunol.* 24:2254-2257.
162. Staquet, M.-J., Y. Kobayashi, C. Dezutter-Dambuyant, and D. Schmitt. 1995. Role of specific successive contacts between extracellular matrix proteins and epidermal Langerhans cells in the control of their directed migration. *Eur. J. Cell Biol.* 66:342-348.

