least one macrophage per 100 lymphocytes. The macrophages of our patients restored this response to PPD. In addition, a soluble factor (CMRF) collected from macrophage cultures of both patients, as described by Bach et al., also reconstituted the response of purified lymphocytes to PPD. These studies indicate that macrophages in severe combined immunodeficiency are capable of 1) restoring the response of purified lymphocytes to PPD and 2) synthesizing CMRF (conditioned medium reconstituting factor). They also confirm Bach et al.'s observation that CMRF can replace the macrophage in its interaction with purified lymphocytes.

Incompatible bone marrow transplantation in lymphopenic immunologic deficiency. REBECCA H. BUCKLEY, D. BERNARD AMOS, WILLIAM P. KREMER, and DELFORD L. STICKEL. *Duke Univ. Sch. of Med., Durham, N. C.*

Fatal graft-versus-host (G-V-H) disease has been an invariable accompaniment of incompatible bone marrow transplantation in infants with lymphopenic defects. This report describes an approach which permitted circumvention of this complication. Histocompatibility studies demonstrated no HL-A compatible donors for a female infant with lymphopenic agammaglobulinemia (very low IgG, absent IgA, IgM, and IgE). Serum from her mother (para 16) contained antibodies (1:64 titer) to paternal HL-A antigens inherited by the patient. Maternal lymphocytes were not stimulated by paternal or infant's leukocytes in mixed leukocyte culture in media containing maternal plasma. Immunologic enhancement was attempted at age 5 months by pretreating the infant with cell-free maternal plasma I.V. 24 hours before the I.V. infusion of 5×10^6 immature albumin-gradient-separated maternal marrow cells. Appetite and growth increased dramatically during the first 3 months, thrush and pneumonia cleared, and no overt signs of G-V-H were noted. Delayed cutaneous responsiveness to *C. albicans* was seen by the 13th day and persists. Lymph node biopsy at 90 days contained plasma cells which stained with fluoroscein-conjugated anti-IgG, IgA, IgM or IgE. A second maternal marrow transplant was given at age 11 months, again without overt G-V-H. This 19-month-old infant has gained 4 kg and grown 20 cm since the first transplant 14 months ago. A normal serum IgA concentration and somewhat low but constant levels of IgG and IgM are present now 5 months after the last plasma infusion. These findings suggest possible usefulness of immunologic enhancement in future attempts when compatible donors are unavailable.

Transfer factor in the treatment of chronic mucocutaneous candidiasis. MARTIN L. SCHULKIND, WILLIAM H. ADLER, III, WILLIAM A. ALTEMEIER, III, and ELIA M. AYOUB. *Univ. Fla. Coll. Med., Gainesville, Fla.*

The use of "transfer factor" to correct a partial defect in cellular immunity to *Candida albicans* was studied in an 8-year-old girl with chronic granulomatous mucocutaneous candidiasis.

The patient first presented at age 5 years with extensive deforming encrusted lesions on her face, head, trunk and extremities. No evidence of endocrinopathy or antibodies to endocrine tissue was found. Her general humoral immunity was intact. She had a normal complement of granulocytes and lymphocytes. Candida aggregation activity was present in her serum. Her skin test response to *C. albicans* extract was consistently negative. Her lymphocytes underwent blastogenesis to PHA, diphtheria toxoid and *C. albicans* extract. However, in the presence of exogenous transfer factor, blastogenesis to candida increased. Transfer factor extracted from her cells did not transfer immunity to non-sensitized cells.

Amphotericin B therapy cleared her skin lesions temporarily, but neither fresh frozen plasma injections nor 5-fluorocytosine was effective. Following 2 injections of transfer factor, she developed a positive skin test response to *C. albicans* extract, and her lymphocytes produced leukocyte inhibition factor (LIF) to candida. After a third injection there was appreciable clearing of the skin lesions.

These findings indicate that exogenous transfer factor can restore cellular immunity to candida in a patient with chronic mucocutaneous candidiasis and may be an effective treatment for this disease.

A primitive immunologic marker of intrauterine virus infection. JOSEPH W. ST. GEME, JR., CATHERINE W. C. DAVIS, and LLOYD F. VAN PELT. *UCLA Sch. of Med., Harbor Gen. Hosp., Torrance, Calif.*

Retrospective and prospective studies of the human have suggested that intrauterine mumps virus infection evokes an incomplete immunologic response of delayed hypersensitivity, without humoral antibody. Experimental infection of the subhuman primate during the first third of pregnancy also leads to the development of only cellular immunity in the infant offspring. The significance of delayed hypersensitivity as an immunologic marker of fetal infection is strengthened by the observation of an anamnestic neutralizing antibody response in 2 of 4 infant monkeys following a second skin test. Repeated skin testing of 5 seronegative adult monkeys failed to induce a primary antibody response.

Intrauterine mumps virus infection illustrates the phylogenic and ontogenic concept that cellular immunity is the most primitive immunologic response. Experimental infection of 9 monkeys between the 25th–40th day of gestation, with subsequent cesarean section after 1, 2 and 3 weeks, has demonstrated that virus multiplies in the young fetus for only 1 week. Fetal interferon response does not occur, so the termination of viral replication seems to result from transplacental distribution of abundant 7S maternal neutralizing antibody. This conclusion is supported by the restrictive effect of antibody on mumps virus replication in vitro.

Thus, the immature fetus confronts minimal antigenic mass and accrues immunopoietic instruction for only the more primitive response of delayed hypersensitivity.

Demonstration and replacement of a functional defect of the fifth component of complement in newborn serum. A major tool in the therapy of neonatal septicemia. MICHAEL E. MILLER. *Univ. of Pennsylvania, Philadelphia, Pa.*

Previous studies from this and other laboratories have shown a relative deficiency in the opsonic activity of neonatal serum. The nature of this deficiency has been incompletely understood. The studies now reported show that the impairment of opsonic activity in neonatal serum involves a *functional* deficiency of the fifth component of serum complement (C5). (1) Opsonic activity of neonatal sera towards baker's yeast phagocytosis (Miller, 1969) was restored to normal by the addition of sera from mice with normal amounts of C5 (B10D2 new line) but not by addition of sera from a co-isogenic strain lacking C5 (B10D2 old line); (2) Utilizing highly purified human C3 & C5, re-constitution of