tenance of the ketosis at a more or less constant level after this period is probably due to the availability for catabolism of a limited but relatively constant source of carbohydrate from tissue protein and the glycerol from the fat which is burned.

Summary. During the first 2-4 days of fasting the degree of ketosis in the human and the rat as measured by the blood acetone body concentration gradually increased to a level of 15-20 mg % (acetone) which then tended to be maintained during the rest of the 10-day fasting period.

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Development of Influenzal Complement-Fixing Antigen and Antibody in Mice.*

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The lungs of mice infected with the virus of epidemic influenza contain a soluble complement-fixing antigen which is separable from the virus.[1, 2] The purpose of the work here reported was to investigate the conditions under which this antigen and its corresponding antibody are formed.

Mice were inoculated with the mouse passage strain PR8 of epidemic influenza virus in dilutions from 10^{-2} to 10^{-8} of lung. At different intervals of time from 1 to 10 days, 6 to 8 mice receiving each of the dilutions were killed by bleeding from the heart under chloroform anesthesia. The complement-fixing antigen was measured by titration of a saline suspension of the ground lung material against a constant dilution of 1:20 of a pool of human convalescent serum according to the complement-fixation method previously described.[3]

The results are recorded in the accompanying table. One day after inoculation none of the mice showed macroscopically visible

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1 Smith, W., *Lancet*, 1936, **2**, 1256.

2 Hoyle, L., and Fairbrother, R. W., *J. Hygiene*, 1937, **37**, 512.

3 Eaton, M. D., and Rickard, E. R., *Am. J. Hygiene*, 1940, in press.

TABLE I.

Lesions and Complement-Fixing Antigen in Lungs of Mice at Various Times After Inoculation with the PR8 Strain of Epidemic Influenza Virus.

Day killed	Gross lung lesions: % tissue involved*	†Titer of complement-fixing antigen in lungs of mice inoculated with dilution of			
		10^{-3}	10^{-4}	10^{-5}	10^{-6}
1	0	480	320	240	80
2	20-3	640	640	480	240
3	30-6	1280	960	480	480
4	50-20	640	960	640	480
5	70-20	—	640	640	480
6	90-30	—	—	640	480
7-8	70-50	—	—	40	40
9-10	50	—	—	—	less than 20

*This column shows the range of lung lesions in living mice which had received the dilutions 10^{-3} to 10^{-6}, the degree of lung involvement depending upon the amount of virus inoculated.

†Titer given as dilution of whole wet mouse lung.

— Titration not done because mice had died.

lung lesions, but the complement-fixing antigen was already present in relatively high titer except in the group receiving a dilution of 10^{-6}. Between the second and fifth days the appearance of antigen at a maximum titer preceded by 2 to 3 days the maximum development of lung lesions. This suggests that the formation of the antigen is associated with a rapid multiplication of the virus before the appearance of the red pulmonary consolidation. With virus dilutions of 10^{-3} or above, the maximum titer of antigen seemed to be related to the amount of virus inoculated. In the lungs of mice inoculated with dilutions of 10^{-7} and 10^{-8} and killed after 4 days, the antigen titered 1:40 and 1:20 respectively and no macroscopic lesions were found.

At no time during the course of the infection was influenzal antigen detected in the serum of the mice receiving the various dilutions of virus.

The serum of mice inoculated with a dilution of 10^{-5} and bled 6 days later showed barely detectable neutralizing antibodies against 10 M.L.D. of virus. At 7 to 8 days the serum neutralized 10 to 100 M.L.D. of virus. The disappearance of antigen from the lungs at 7 to 8 days corresponded closely to the appearance of neutralizing antibodies in the serum. Virus was detectable in the lungs of mice by subinoculation for as long as 21 days, but the titer diminished progressively after 7 or 8 days.

Even though the serum of mice inoculated with a dilution of 10^{-6} showed strong neutralizing properties at 10 days, no complement-fixing antibodies were detectable until 14 days after inoculation, and then only at serum dilutions of 1:2 to 1:4. Mice receiving 1/100

to 1/1,000 M.L.D. of virus (dilutions of 10^{-7} and 10^{-8}) failed to develop complement-fixing antibodies, although some neutralizing antibodies were detectable. One intraperitoneal inoculation with 100,000 intranasal M.L.D. of virus caused the production of only small amounts of complement-fixing antibodies.

In contrast to results following one inoculation, a second or third inoculation by the intranasal or intraperitoneal routes stimulated the production of complement-fixing antibodies up to titers of 1:64 to 1:128. This marked secondary response occurred in actively immune mice where there was little multiplication of virus or formation of complement-fixing antigen.

In human beings, except the very young, the formation of influenzal complement-fixing antibodies following infection is probably a secondary immune response conditioned by previous exposure to the virus. The results with mice suggest that after the first infection with small amounts of the virus of epidemic influenza, complement-fixing antibodies may not appear in the serum in significant titer.

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Whole Blood and Plasma Ascorbic Acid Concentrations in Patients with Pellagra and Associated Deficiency Diseases.*

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The great majority of patients who attend the Nutrition Clinic of the Hillman Hospital have existed for most of their lives on grossly inadequate diets. Practically all have, or have had, clinical pellagra, beriberi, ariboflavinosis, or other deficiency diseases. Many have clinically recognizable manifestations of several deficiency states. An occasional patient is found to have spongy, bleeding gums which suggest an associated hypovitaminosis C, but advanced cases of scurvy are infrequently seen despite the fact that foods rich in ascorbic acid are available to these people only during the

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