production to streptokinase and the possible loss of its therapeutic activity prevented us from administering it to humans.

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REPLY

We were happy to learn of Dr. Hale's great interest in labeling and testing ^{99m}Tc-streptokinase. At pH 12 we obtained a labeling yield of 0–10% using the gel chromatography method of analysis. None of the thin-layer and paper chromatography methods we have used could separate ^{99m}Tc-streptokinase from reduced hydrolyzed ^{99m}Tc. Therefore, we prefer to use gel chromatography with Sephadex as the analytic method. The enzyme activity of labeled streptokinase was analyzed both by means of thrombin coagulation and immunoelectrophoresis. The enzyme activity of streptokinase was decreased both at extremely high and at low pH values. Thus, the optimal pH value for preparation of ^{99m}Tc-streptokinase lies between 4 and 7. With very few exceptions streptokinase was not used simultaneously for therapy and diagnosis at the hospital in Ostersund. However, the small dose of streptokinase (15,000–50,000 IU) used for the diagnostic procedure is not believed to affect the therapy, especially if treatment is started immediately after the diagnostic procedure.

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PREPARATION OF ^{68}Ga RADIOPHARMACEUTICALS

The August 1975 issue of the *Journal of Nuclear Medicine* contained an article by Donald J. Hnatowich (*1*). I wish to congratulate the author for a job well done. However, I feel that something is missing in his publication. The article gives the impression that this is the first "practical way" to prepare ^{68}Ga-labeled compounds from the ^{68}Ge–^{68}Ga generator, which it is not. The separation of ^{68}Ga from its complexed form was achieved almost 7 years ago by a simple procedure (*2,3*) applied to prepare "in situ" labeled macroaggregates for lung tomoscintigraphy (*4*) and colloids for liver–spleen studies (*5*). Eight years ago, Anghileri presented a method to prepare a compound for liver studies (*6*). Also, a review of the preparation of ^{68}Ga compounds for tomographic studies was published in January 1971 (*7*). The procedures described in the abovementioned papers are quite simple and safe to carry out, and it is surprising to see that the author did not list any of these references. These procedures were used during the 1968 to 1970 period, in combination with a Pho/Gamma II camera with the positron detector attachment.

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REPLY

The procedure referred to by Professor Colombetti has been used to prepare such labeled particles as ^{68}Ga-ferric hydroxide macroaggregates for lung studies and ^{68}Ga-ferric oxide colloids for reticuloendothelial imaging. The method is interesting in that the GaEDTA complex is separated not by anion

exchange, but by the addition of excess Fe^{+3}. The relative affinities of EDTA for Ga^{+3} and Fe^{+3} and their relative concentrations are such that, upon neutralization of an acid solution containing these species, the EDTA will chelate Fe^{+3} preferentially. However, the method does not appear to apply to the preparation of gallium chelates. To label by chelation, the desired chelating agent must first be added to the acidic solution containing Fe^{+3}, Ga^{+3}, and EDTA. Following neutralization, in addition to the desired chelate, the solution will contain GaEDTA, mixed complexes containing both Ga^{+3} and Fe^{+3}, and colloidal forms of $Fe(OH)_3$ with coprecipitated gallium. Since my publication was intended to describe a method for the preparation of chelated rather than particulate forms of ^{68}Ga, I felt that specific reference to the work of Prof. Colombetti and his associates was inappropriate.

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LAMINAR FLOW

Karran et al in their paper on colloid uptake in rat liver (*1*) made a common error in using the term "laminar flow." Laminar flow has a rather specific meaning in fluid flow dynamics (*2,3*). The layer of fluid in contact with a stationary surface does not move and those above it flow with incrementally larger velocities. This is related to the viscosity of the fluid (Fig. 1A).

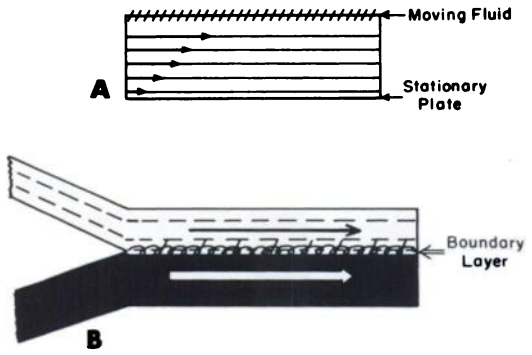

FIG. 1. (A) Laminar flow model: Contact plane is stationary and each infinitesimally small layer above moves at greater velocity. (B) Streaming model: Two streams only mix slightly at their interface (boundary layer).

The authors were really describing streaming effects. These phenomena of nonmixing are related to inertia and bulk flow. Streaming effects are common in biologic systems, as, for example, in the preferential flow of the inferior venacaval blood in the fetus across the foramen ovale. Some mixing takes place at the interface of the two streams, but this is not complete (Fig. 1B).

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