# Diffusion Chamber Culture

Hemopoiesis, Cloning of Tumors, Cytogenetic and Carcinogenic Assays

Edited by
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With 89 Figures

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# Preface

Even though diffusion chamber culture was commenced long before orthodox tissue culture by Metchnikoff (1887) there have been only sporadic attempts to use this methodology to study cell proliferation (review by Carsten, Chap. 1). Not so long ago diffusion chamber culture was nicknamed "confusion chamber" culture. I believe this conference has removed the confusion and will truly point out the intrinsic value of the system. It is not a substitute for established in vitro culture nor for in vivo studies. It complements both.

Dr. Arne Bøyum introduced diffusion chamber culture at Brookhaven National Laboratory. After some modest success in showing that one could culture human bone marrow and with appropriate stimuli induce erythropoiesis in diffusion chambers, several of the participants at this conference visited Brookhaven to learn firsthand this simple technology and to apply it in their own laboratories. However, the technique did not spread widely and controversy arose in which the same question was repeatedly asked: Can the diffusion chamber technique provide information that is not obtainable more rapidly and easily, and at less expense by the in vitro techniques? As a result of our deep interest in and involvement with diffusion chamber culture Dr. A.L. Carsten and I organized this conference. A major objective of this conference was to seek answers to the above question. Another objective was to seek some basis for standardization of methodology as one could better compare results among laboratories and with in vitro assays. Several definitive answers emerged in response to the first question. A consensus was not reached in respect to standardization. We did, however, become familiarized with each other's technology, and in due course it is to be expected that more standardization will emerge as certain procedures become less desirable and others more desirable.

Since there was no formal presentation on erythropoiesis in diffusion culture, I wrote a review of this after the conference.

The conference was held 25-26 June 1979. Much of the editing of the discussion, the manuscripts, and the writing of review on erythropoiesis was done at the Institute for Medicine, Kernforschungsanlage Jülich, West Germany, where I was a United States Senior Scientist Awardee of the Alexander von Humboldt Foundation, 1 September 1979 through 29 February 1980.

Spring 1980 Eugene P. Cronkite

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Spring 1980

Eugene P. Cronkite
Arland L. Carsten

# Contents

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34. J. Herion
35. T.M. Paulus
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# Definitions

CFC-S: the cell which has the capacity to form a colony in the spleen of the fatally irradiated mouse – a pluripotent stem cell.

CFU-S: the CFC-S which lodges in the spleen of the fatally irradiated mouse and produces a colony – a pluripotent stem cell.

F-fraction: the fraction of CFC-S that actually lodges in the spleen and produces colonies.

CFC-G: the cell which may produce a granulocyte or macrophage colony in vitro.

CFU-C: the cell which produces granulocyte or macrophage colonies in vitro upon stimulation by CSA. A fraction of the CFC-C and varies with the stimuli and culture technique. In reality a spectrum of cells varying in mitotic capacity and steps in differentiation from the pluripotent stem cell. Sometimes further defined as CFU-C 7 or 14 day denoting the duration of the culture. The 14-day colonies are larger than the 7-day colonies; hence, the former are closer to the stem cell.

CFU-D: the cell which produces granulocytic macrophage colonies in diffusion chambers. It can also be subdivided on basis of time in culture. It is probably the CFU-C.

GM-CFC: the cell which upon appropriate stimulus may produce either a macrophage, a granulocytic, or a mixed granulo-macrophage colony in in vitro culture.

BFU-E: the cell which produces erythrocytic bursts in vitro or in PCDC culture. It can be further subdivided into different classes depending upon days in culture, e.g., commonly 3- or 8-day BFU-E, but other days are also used by different investigators.

CFU-E: the cell which produces erythroid colonies of 6-64 cells in 2 days of culture and which is absolutely dependent upon erythropoietin for proliferation.

BFU-D-E and CFU-D-E may be used to describe the cell-producing colonies in PCDC.