

# Report From the National Opinion Research Center

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WORKPLACE SURVEY :

BIOCHEMICAL GENETIC OR CYTOGENETIC  
TESTING IN THE WORKPLACE --  
PAST, PRESENT AND FUTURE

DRAFT REPORT

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SUMMARY

The National Opinion Research Center has conducted a mail survey of the 500 largest U.S. Corporations, 11 unions, and 50 utilities to determine how many organizations have ever engaged in or might be considering the use of biochemical genetic or cytogenetic testing of employees or potential employees. Ultimately, respondents from 373 organizations replied to the questionnaire, either by mail or telephone, yielding a response rate of 64.5%. Twenty-six organizations declined to complete the questionnaire, generally citing reasons of time or survey relevance. Six organizations report that they are presently testing. Two of them are chemical companies, two are utilities and two are in the electronics industry. Seventeen organizations have tested in the past. Only one organization reports current testing but no past testing. Fifty-nine organizations (16.1% ) might possibly test in the future.

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1. INTRODUCTION

The National Opinion Research Center has conducted a mail survey of the 500 largest U.S. corporations, 11 unions, and 50 utilities to determine how many organizations have ever engaged in or might be considering the use of biochemical genetic or cytogenetic testing of employees or potential employees. This survey contributes to a larger research effort conducted by the Office of Technology Assessment for the Committee on Science and Technology of the U.S. House of Representatives. The research questions the survey was designed to address include:

- (1) the frequency of ~~present~~ and anticipated biochemical and/or cytogenetic testing in the workplace and whether it has been conducted on a routine, ~~special~~ or research basis;
- (2) the names of the tests used, for whom, and for what purpose;
- (3) the actions, ~~if~~ any, taken by the company on the basis of the results of the tests; and
- (4) the criteria against which tests have been measured to determine acceptability for use.

I I . METHODOLOGY

During February a pretest draft of the questionnaire was sent by Federal Express to twenty-five organizations in the Fortune 500. The objective was to determine whether the questionnaire could be answered properly and whether a reasonable rate of response could be expected. Without any follow-up, approximately 50% of these organizations returned a completed

questionnaire Since only relatively minor changes in the formatting of the instrument were required, and two items were deleted, we were able to include these responses in the final analysis.

On March 25, 1982, questionnaires were sent to 475 chief executive officers of the largest corporations, presidents of 11 unions and chief executives of 50 utility companies. Questionnaires were accompanied by two one-page letters, one from the Office of Technology Assessment, signed by John Gibbons, the Director, and one from NORC, signed by Cynthia Thomas, NORC's project director, and by a post card and a return envelope. A list of the names of members of an advisory panel to OTA of experts in genetics, occupational medicine, and law, also was enclosed.

The letter from OTA introduced the study by stating that the Committee on Science and Technology of the U.S. House of Representatives had asked for the assistance of leading organizations in completing the questionnaire. The CEOs were asked to direct the questionnaires to their chief executives for health affairs.

NORC's letter mentioned the importance of the study, the confidential nature of the information, and the use of a pre-paid post card to be returned by the respondent indicating that a questionnaire was completed, in order to keep the identity of responding organizations separate from the questionnaires.

Half of the questionnaires were sent by Federal Express and half by first class mail, since the budget for postage was limited. Two hundred cases were targeted for follow-up telephone calls, with priority given to companies in the Fortune 100 and in key industry groups, including those involved in

chemicals, rubber and plastic products , metal manufacturing, and”  
pharmaceuticals .

From the pretest, we learned that the office of the chief executive, as suggested in the cover letter, often referred the questionnaire to someone else in the organization, such as a chief medical officer. Sometimes several subsidiaries had to be consulted before the questionnaire could be completed. Consequently, it was realistic to expect the questionnaire to take several weeks or more to be completed after its receipt. To allow enough time for organizations to respond, the first telephone follow-ups during the main field period were scheduled for the week of April 19. Up to and including the 20th of April, 219 post cards and 239 questionnaires had been received.

Telephone follow-up calls were initiated with 200 of the organizations which had not sent in post cards by April 21. The office of the chief executive officer was contacted, the purpose of the study and the urgency of a response was stated, and the respondent, generally an executive secretary or administrative assistant, was asked to determine whether the questionnaire had been received and, if so, who now had it. The procedure usually either resulted in the request for an additional questionnaire, or the identification of one or a series of executives to whom the questionnaire had been referred.

Repeated follow-up calls were made to the offices of those reported to be in possession of the questionnaire, each time allowing a reasonable time period for the respondent to expedite the return of the post card before an additional call was made. Ultimately, 373 questionnaires were returned or the information required to complete them was obtained by telephone or in a

letter, yielding a response rate of 64.5%, including the pretest cases. The number of post cards received was 307, including post cards from the pretest. Twenty-six organizations declined to complete the questionnaire (4.6%), generally citing reasons of time or survey relevance.<sup>1</sup> Results presented in the following tables are based on responses received by June 1 (the first 366 cases). No questionnaires received after that date contained any instances of testing. An analysis of non-respondents is presented in Appendix A.

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<sup>1</sup>Specifically, ten organizations stated that their policy is not to reply to surveys. Three claimed they were not interested or had no time, one objected to the methodology, and twelve refused by telephone giving no reason.

### III. REVIEW OF LITERATURE: SURVEY DESIGN METHODOLOGY

The survey was designed to obtain accurate responses from a reasonably high proportion of potential respondents as cost efficiently as possible, within a limited budget. Several issues related to the selection of procedures for completing this survey have been addressed in the literature. We were not able to find any studies dealing with the topic of biochemical genetic and cytogenetic testing, however. Some of the advice in the literature, and related approaches chosen for this study, are reviewed below.

#### Method of Administration

Typically, serious studies of elite populations (people high in status, income, or education) employ a personal interview, with open ended questions for data collection. Generally, however, such studies are concerned with opinions and unusual experiences or perceptions. The literature on elite interviewing, consequently, focuses on the conduct of personal interviews and is of little help in providing guidance for this survey<sup>2</sup>, which was completed by mail with telephone followups.

Most information to be obtained for this study was factual -- whether or not testing had taken place, and if so, what types of testing. Consequently, the function of the elite respondent, the chief executive officer was to provide impetus for the questionnaire to be completed -- principally by routing it to the appropriate official within his organization. Therefore a personal interview was not necessarily appropriate. Indeed, the

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<sup>2</sup>See, for example, Lewis Anthony Dexter, Elite and Specialized Interviewing (Evanston: Northwestern University Press, 1970).

cost of data collection was the principal criterion for selecting a method of administering the instrument. Consequently, a survey by mail was selected as the approach to data collection.

### Obtaining a High Rate of Response

Most of the literature on obtaining high response rates for mail surveys deals with surveys of the general population, and not with surveys of organizations.<sup>3</sup> Nevertheless, some of the principles can be applied to contacts with organizations.

#### Confidentiality/Anonymity

It is generally believed important to convey to respondents that the information they provide will remain anonymous (as well as to ensure that it does), especially when the topic may be a sensitive one. There were indications that corporations would find this topic of cytogenetic and biochemical testing sensitive.<sup>4</sup> One study suggests that high income respondents are more likely to react favorably to assurances of anonymity than those with low incomes and, consequently, to complete questionnaires.<sup>5</sup> It was decided to protect anonymity by omitting any identifying information on the questionnaire and by asking respondents to send a post card naming their organization and indicating that a questionnaire had been completed.

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<sup>3</sup>See, for example, Don A. Dillman, Mail and Telephone Surveys: The Total Design Method (New York: John Wiley & Sons, 1978).

<sup>4</sup>Articles in the New York Times had contributed to the controversy.

<sup>5</sup>Wesley H. Jones, "Generalizing Mail Survey Inducement Methods: Population Interactions with Anonymity and Sponsorship," Public Opinion Quarterly (POQ), Spring, 1979, p. 108.



There are several pitfalls to this approach that should be noted. First, organizations may return post cards but not questionnaires, and vice versa. (We received 307 post cards and 373 questionnaires; even some of these may not have been matched pairs.) Second, organizations which did not return post cards were contacted by telephone and, in some cases, were re-sent questionnaires if they could not find them. Some of them may have sent in a questionnaire without a post card and later completed and returned a second questionnaire. We have no way to know whether this happened, but believe it occurred in only a couple of cases. It is also possible, of course, for questionnaires or post cards to be lost in the mail or lost between the desk of the chief executive officer and the company's mail room.

#### Questionnaire Design

Instrument design, it has been found, can be important in dealing with sensitive questions in an interview. Although methodological work on this topic generally has dealt with face-to-face interviews of members of the general population, some findings can be applied to this mail survey.<sup>6</sup> There are indications, for example, that whether to report any threatening behavior is not influenced by such factors as question length. Reports on the amount of a behavior, however, seem to be affected by availability of open-ended response categories and the opportunity for the respondent to explain an answer. Several questions in the survey were constructed to allow respondents to explain or qualify their answers.

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<sup>6</sup>Norman M. Bradburn, et al., Improving Interview Method and Questionnaire Design (San Francisco, Jossey-Bass Publishers, 1980), pp. 18-25.

### Importance Factor

The literature suggests that the more important the survey is perceived to be by the respondent, more likely (s)he is to complete a questionnaire.<sup>7</sup> Several methods were used in this survey to convey a sense of importance to respondents. Sponsorship of the study by the U.S. Congress was emphasized, along with the possibility that hearings would be held. A letter from OTA was individually addressed and signed by the Director. The questionnaire was printed on a folded sheet of paper rather than xeroxed on separate pages. As noted, some questionnaires were sent by Federal Express and others by first class mail; mailing methods indicate that the communication is important. As shown below, however, the Federal Express mailing may have conveyed a greater sense of importance than we ultimately needed. Finally, during telephone followups, the caller once again conveyed the urgent need for responses to the questionnaire.

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<sup>7</sup>See, for example Kent L. Tedin and C. Richard Hofstetter, "The Effect Of Cost and Importance Factors on the Return Rate for Single and Multiple Mailings," Public Opinion Quarterly, Spring, 1982, pp. 122-127.

#### Iv. RESULTS

##### Response Patterns

It is not easy to gain the attention of the chief executive officers of major corporations with a questionnaire, especially when many of them report receiving hundreds a year and have established corporate policies of not responding. Table 1 shows the cumulative totals of post cards received by the end of each weekly time period during the main survey. Separate rates are shown for organizations which received Federal Express versus first class mailings. In Table 2, organizations also are listed according to whether they are among the two hundred largest or three hundred smallest of the corporations, or whether they are utilities or unions.

It can be seen from Table 1 that organizations that received the questionnaire by Federal Express held a lead in the post card returns throughout the survey period, but the size of the lead diminished significantly after the first week. By the end of week 10, 52.9% of the 293 postcards received had been returned by organizations which had received a Federal Express mailing; 47% of those returning post cards had received a first class mailing. The small difference in rates of return suggests to NORC that Federal Express was not a particularly cost effective method of mailing, given that it cost \$1,450 for the Federal Express mailings and only \$50 for those sent first class. The seventeen additional cases contributed by the more expensive approach each cost \$82 more than the others.

Whether better rates of response were obtained from larger or smaller companies is of interest. It should be remembered that all of the 200 largest companies received telephone followups, whereas companies in the

bottom 300 were recontacted only if they belonged to a key industry group. Table 2 shows that, prior to week 3, when telephone follow-ups began, approximately 33% of the largest organizations had returned post cards, whereas 28% of the smallest organizations had done so. Over time, the lead of the largest corporations increased, suggesting that the impact of follow-up activities was greatest for this group, as it should have been. Of course, other factors as well may have contributed to the higher response rate of larger companies. The response rate for utilities was relatively high, at 68%, and for unions low, at 36%.

#### Response Quality

##### Coverage

Generally, those responding to the questionnaire with whom we talked on the telephone attempted to locate someone within the company with the expertise to answer the questions. Some organizations in the Fortune 500 are holding companies,<sup>7</sup> owning subsidiary organizations that operate autonomously. Some organizations refused to respond because they were unable to devote resources to contacting their subsidiaries to ask about testing. Others either answered to the best of their knowledge or made efforts to contact their subsidiaries. We have no knowledge about the level of effort employed in completing each questionnaire.

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<sup>7</sup>Fortune includes holding companies in their listings if more than 50% of revenues are from manufacturing or mining.

### Missing Data

A limitation of an anonymous questionnaire is that it is not possible to contact the respondent about missing information or unclear responses. Generally, the proportions of cases missing information on any particular item was low. On questions 1-6, approximately 3% of respondents failed to answer each item, generally by leaving it blank. Eight questionnaires (2%) did not include enough information so that the company could be classified as a corporation or utility.

Table 1  
 POST CARDS RECEIVED BY WEEK, BY TYPE OF MAILING,  
 (MAIN SURVEY ONLY)

	Time Period									
	Week 1 3/31 - 4/6	Week 2 4/7 - 4/13 Cumul.	Week 3 4/14 - 4/20 Cumul.	Week 4 4/21 - 4/27 Cumul.	Week 5 4/28 - 5/4 Cumul.	Week 6 5/5 - 5/11 Cumul.	Week 7 5/12 - 5/18 Cumul.	Week 8 5/19 - 5/25 Cumul.	Week 9 5/26 - 6/1 Cumul.	Week 10 6/2 - 6/8 Curall.
	Number %	Number %	Number %	Number %	Number %	Number %	Number %	Number %	Number %	Number %
PostCards:	102 -	171 -	219 -	234 -	245 -	256 -	266 -	275 -	279 -	293 -
Type of Mailing:										
Federal Express	68 66.7	96 56.0	118 53.8	124 53.0	128 52.0	134 52.3	138 52.0	146 53.0	148 53.0	155 52.9
First Class	34 32.4	75 43.4	101 46.1	110 47.0	117 48.0	122 48.0	128 48.0	129 47.0	131 47.0	138 47.0

TABLE 2  
POST CARDS RECEIVED BY ORGANIZATION SIZE AND TYPE

Post Cards	Time Period													
	Week 1 3/31 - 4/6	Week 2 4/7 - 4/13	Week 3 4/14 - 4/20	Week 4 4/21 - 4/27	Week 5 4/28 - 5/4	Week 6 5/5 - 5/11	Week 7 5/12 - 5/18	Week 8 5/19 - 5/25	Week 9 5/26 - 6/1	Week 10 6/2 - 6/8	Number	Percentage	Cumulative Number	Cumulative Percentage
<b>Totals</b>	102	171	219	234	245	256	266	275	279	293	102	19.0%	293	100.0%
<b>Organization Size</b>														
Top 200	34	65	84	91	97	103	109	114	117	123	34	33.3%	123	42.0%
Bottom 300	53	84	100	107	112	117	121	124	124	132	53	51.7%	132	45.0%
<b>Organization Type</b>														
Corporations														
Utilities	14	19	31	32	32	32	32	33	34	34	14	13.8%	34	11.6%
Unions	1	3	4	4	4	4	4	4	4	4	1	0.9%	4	1.4%
<b>Totals</b>	102	171	219	234	245	256	266	275	279	293	102	34.1%	293	100.0%

### Testing: Overall Rates

The following tables summarize the answers to the various questions on testing. Percentages are based on the total number of responses included in the analysis: 366. The questionnaire contains the precise phrasing of each question.

Few organizations report current biochemical genetic or cytogenetic testing; slightly more have conducted any such tests in the past twelve years; still more anticipate at least a possibility of conducting such tests in the future. Organizations were instructed on the questionnaire to include in their answers any instances of testing, so that positive responses can include isolated instances of testing as well as long term testing programs. Table 3 summarizes these results by type of organization, main industrial classification, and according to industrial group.<sup>8</sup> Among the six organizations currently testing (1.6%), two of them are engaged in the chemical industry as their principal activity. Two others are utilities, and the other two are in the electronics industry.

Seventeen organizations (4.6%) have tested in the past. Half of these are in the chemical industry. Of those organizations that have tested in the past twelve years, five are still testing today. Only one organization reports current testing but no testing in the past twelve years.

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<sup>8</sup>Each organization was rated according to the first industrial group into which it classified itself and then according to other industrial categories listed, up to three. The table shows testing by main (first) industrial category and, in parentheses, any representation in that industry.



Table 3

TESTING : CURRENT, PAST AND FUTURE TESTERS  
BY ORGANIZATION TYPE AND MAIN INDUSTRY

	<u>Current Testing</u>	<u>Past Testing</u>	<u>Future Testing</u>	<u>No Testing</u>
	N = 6	N = 17	N = 59	N = <b>244</b>
<u>Organization type:</u>				
Corporations	4	16	49	<b>234</b>
Unions	0	0	0	<b>5</b>
Utilities	<b>2</b>	1	<b>9</b>	<b>5</b>
Other			1	0
<u>Main Industry:</u>				
Chemicals	<b>2</b>	8	11	14
Utilities	<b>2</b>	1	<b>10</b>	5
Petroleum	0	0	4	26
Pharmaceuticals	0	0	3	8
Rubbers, Plastics	0	0	3	1
Metals	0	0	2	22
All others (any others)	2	8	26	244
Total	6 (1.8%)	17 (5.2%)	59 (18.1%)	244 (74.8%)

Fifty-nine organizations (16.1%) may test in the future, they report.

More animal testing is conducted than testing in the workplace, according to answers to question 18 on whether the organization ever has conducted test on animals. Twenty-four organizations report testing on animals for chromosomal aberrations; ten have tested for genetic predisposition to harmful effects from chemicals. Of those testing on animals, five have ever tested on humans. (See Table 4.)

Table 4

ANIMAL TESTING, BY EVER TESTED IN WORKPLACE

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<u>Current or Past Workplace Testing</u>	<u>Animal Test for:</u>	
	<u>Chromosomal aberrations</u>	<u>Genetic Predisposition</u>
	N = 24	N = 10
No	20	9
Yes	4	1

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Types of Testing: Biochemical Genetic and Cytogenetic

Organizations that reported some biochemical genetic testing were asked whether they had ever tested employees for any red blood cell and serum disorders (A), liver detoxification systems (B), immune system markers (C), or heterozygous chromosomal instabilities (D). Within each of these four broad categories A through D, several examples were included. Of those testing, there were fourteen organizations that have tested for red blood cell and serum disorders (category A), three in category B, five in category C and no organizations reporting a test in category D. Those organizations testing in category A frequently have conducted more than one test within this category, such as sickle cell trait, G-6-PD, or SAT. The most frequently used test is that for sickle cell trait, for which ten organizations have tested. G-6-PD and SAT were both the second most frequently used individual tests. (See Table 5 for summary of the frequency of individual biochemical genetic tests.)

For each individual test, companies were asked about the purpose of the testing and the type of employee tested. Testing was usually routine, less often for research purposes, or conducted for other reasons. These other reasons are not specified.

The type of employee chosen for testing was most often based on ethnicity and race for sickle cell testing, and job category for other types of tests. No organization reported basing a test on employees' sex.

Organizations that report having conducted cytogenetic testing were asked whether they had looked for chromosomal aberrations (CA), sister chromatic exchanges (SCE), mutations by assaying the DNA (DNA), mutations by assaying the enzymes (ENZ), or something else. Four organizations have tested for chromosomal aberrations and two for SCE. No one claimed to have tested

Table 5

TYPE OF TESTING BY REASONS TESTED

Sickle Cell	G-6-PD	SAT	Methemo- globin	Ann Da	Ann Pd	Ann Cd	CA	CMP
5	3	1	0	1	1	4	1	0
1	0	2	1	2	1	0	1	2
6	2	2	1	2	1	3	3	0

Reasons/Types tested:

- (a) Testing routine?
- (b) Testing for research?
- (c) Other reasons?

Table 6

TYPE OF TESTING BY EMPLOYED CATEGORY TESTED

N = 18)

2. Testing by:								
(a) Job category?	1	2	2	0	2	1	1	2
(b) Ethnicity/race?	7	0	0	0	0	0	0	0
(c) Sex?	0	0	0	0	0	0	0	0
Total testing	10(2.7%)	4(1.1%)	4(1.1%)	1(.3%)	3(.8%)	2(.5%)	4(1.1%)	2(.5%)

<sup>a</sup>Test not specified by company.

<sup>b</sup>Since categories above are not mutually exclusive, total can be less than/more than sum of categories.

for mutations, by assaying either the DNA or the enzymes. CA testing was done for unspecified reasons by three companies; SCE testing was done for research purposes. Job category was the only one of the three employee-related characteristics taken into account in deciding whom to test except for sickle cell. (See Table 6.)

Several questions were asked for each type of testing (biochemical genetic and cytogenetic) about factors considered in decisions to implement testing programs and criteria employed in selecting specific tests. All categories provided received at least one response. Ten responses indicated that data was reviewed either from animal studies or from epidemiologic studies in decisions on whether to perform biochemical genetic testing. In four instances, such reviews were conducted in deciding whether to implement cytogenetic testing. The various criteria for selecting a particular test were fairly evenly employed, although cost appears to have been less important than the various scientific criteria. (See Table 7 for the distribution of responses.)

### Results of Testing

Organizations have taken a considerable range of actions as a result of the biochemical genetic or cytogenetic testing programs they have conducted. The most common action reported is informing an employee of a potential problem. Eight organizations have taken such an action. Five of the categories are related to actions taken to inform the employee or to protect him, ranging from the most minimum such activity - merely informing the employee - to the most extreme, that of discontinuing a product.

Employees were informed in eight Instances (out of the 18) and a product was discontinued only once. In seven cases, an employee was either transferred or another job was suggested. The actions taken, by frequency, are listed in Table 8.

Table 7  
 TYPE OF TESTING BY  
 FACTORS/CRITERIA FOR SELECTING TESTS

	<u>Biochemical genetic</u> N-17	<u>Cytogenetic</u> N-18
<u>Factors in implementing testing</u>	<u>Number</u>	<u>Number</u>
Cost benefit analysis	2	0
Data from animal studies	4	2
Data-epidemiologic studies	6	2
Legal consequences of not testing	3	0
Unions/employee initiative	3	0
Other	4 <sup>a</sup>	3 <sup>a</sup>
No response	2	0
<u>Criteria for selecting tests</u>		
Predictive value of test	5	1
Sensitivity of test	3	0
Specificity of test	5	1
Scientific consensus	4	2
Cost of test	2	0
Other	4	3 <sup>b</sup>
No response	2	1

<sup>a</sup>Includes reasons related to protecting employees, research findings.

<sup>b</sup>Includes research findings (general).

**Table 8**

## RESULTS OF TESTING

N = 18

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<u>Action Type</u>	<u>Number</u>
Informed employee	<b>8</b>
Transferred employee	5
Personal protection devices	3
Other action	3
Suggested other job	2
Engineering controls	2
Implemented research program	1
Discontinued/changed product	1

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Comments on the Questionnaire/Postcards

Respondents were encouraged to qualify their responses or to comment on the questionnaire either on the questionnaire itself or on **the** postcard. Three companies currently testing provided comments on their questionnaires. One of them stated that their . . . "Answers should not be taken to imply any large scale program or problem." Once mentioned testing for pre-placement and **as a part of annual physicals. The third uses testing in "continuing health evaluations"** of certain employees.

Two former testers offered comments. One claimed that testing had been used at the request of the State health department for a brief period.



Another reported sickle cell testing as part of a "preventive medical program" on certain people of child bearing age.

Seven possible testers made comments. One noted that "what may be done will depend upon demonstrations that indicated procedures have practical utility." Others expressed observations about the potential for testing in their organization.

Comments received on post cards and from organizations which have never tested, and have no plans to test (approximately 37 were received) ranged from statements that the questions were inappropriate to their organizations to beliefs that testing had no proven value. Many questioned the usefulness of the survey. *Several* organizations felt that the questionnaire could be misleading because information was not requested on how much testing was done.

#### v. CONCLUSIONS

There was great uncertainty at the onset of this study as to whether to expect any cytogenetic or biochemical genetic testing among the major U.S. corporations, unions and utilities. Six organizations, however, did report testing. Of the organizations that tested in the past, only one continues to test, suggesting a tendency for testing to decline. On the other hand, fifty-nine organizations answered "possibly" to the question of whether they anticipated conducting testing in the next five years.

It is interesting to speculate as to why so many organizations may have stated that they "possibly" anticipate conducting testing in the next five years, especially since many organizations have dropped their testing

programs . Some may have chosen to hedge their bets -- as a result of the current controversy surrounding the issue, perhaps good reasons for testing, not now apparent to them, may surface. Perhaps, also, some are not aware of the issues surrounding testing and simply do not know whether this topic may some day apply to them.

APPENDIX A<sup>1</sup>ANALYSIS OF NONRESPONDENTS

The analysis of nonrespondents among the Fortune 500 companies is based upon 193 cases, including 38 companies who sent in anonymous questionnaires but did not send in postcards identifying themselves as respondents.

Geographically, nonrespondents, like respondents, were spread fairly evenly across the country, as shown in Table A-1.

TABLE A-1

## LOCATION OF ALL COMPANIES AND NONRESPONDENTS

Region	Nonrespondents		Companies	
	Number	Proportion	Number	Proportion
Northeast	82	42%	215	43%
Southeast	8	4%	30	6%
Central	80	41%	191	38%
Mountain	2	1%	9	2%
West	21	11%	55	11%

The nonrespondents were concentrated in the smaller two hundred companies. This most probably reflects the fact that our follow-up activities focused on the larger three hundred companies, in addition to industries in key industrial groups. The breakdown of nonrespondents by company size is shown in Table A-2.

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<sup>1</sup>This appendix was prepared by Ken Cohen.

TABLE A-2  
SIZE OF NONRESPONDING COMPANIES

Size of Company	Number	Nonrespondents Proportion
Fortune 100	29	15%
Fortune 200-300	62	32%
Fortune 400-500	102	52%

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Companies in the combined key code industries (chemicals, petroleum refining, rubber and plastic products, metal manufacturing and pharmaceuticals) had a nonresponse rate of 31%, which is somewhat lower than the overall nonresponse rate of 38.6% for the Fortune 500 companies. (Again, these companies were the focus of our follow-up efforts). Otherwise, particular industries did not deviate significantly from the overall rates. The breakdown by industrial type is given in Table A-3.

#### Conclusion

These tables do not suggest that any particular type of organization was more likely than any other to refuse to respond to the questionnaire.

TABLE A-3

## NONRESPONDENTS BY INDUSTRY TYPE

Industry Type	Nonrespondents		Total Companies	
	Number	Proportion	Number	Proportion
10 - Mining, Crude Oil	7	<b>3.6%</b>	13	2.6%
20 - Food	23	11.9%	54	10.8%
21 - Tobacco	1	---	4	---
22 - Textile	5	2.5%	13	2.6%
23 - Apparel	5	2.5%	9	1.8%
25 - Furniture	1	---	1	---
26 - Paper, Fiber, Wood	16	<b>8%</b>	30	6%
27 - Publishing, Printing	8	<b>4%</b>	13	2.6%
28 - Chemicals	11	5.7%	40	8%
29 - Petroleum Refining	11	<b>5.7%</b>	41	8%
30 - Rubber, Plastic	2	---	6	1.2%
31 - Leather	1	---	2	---
32 - Glass, Concrete	3	---	16	3.2%
33 - Metal Manufacturing	14	7.2%	38	7.6%
34 - Metal Products	11	5.7%	23	4.6%
36 - Electronics, Appliances	10	<b>5.2%</b>	37	7.4%
37 - Shipbuilding, Railroad & Transport Equipment	4	2%	9	<b>1.8%</b>

Industry Type	Number	Proportion	Total Companies	
			Number	Proportion
38 - Measuring Equipment	4	2%	15	2.6%
40 - Motor vehicles	5	2.5%	19	3.8%
41 - Aerospace	3	---	14	2.8%
43 - Soaps, Cosmetics	3	---	8	1.6%
44 - Office Equipment	3	---	13	2.6%
45 - Industrial & Farm Equipment	23	11.9%	43	8.6%
46 - Jewelry, Silverware	0	---	0	---
47 - Musical Instruments, Toys	3	---	5	1%
48 - Broadcasting, Motion Pictures	3	---	6	1.2%
49 - Beverages	3	---	11	2.2%