

Subject: Trip Report by Dr. Finch to Kiev, Ukraine 3/22-3/29, 1999
To: For the Record
From: Stuart C. Finch, M.D.

A plenary session commenced at Sbyadoshen (location of the new hospital) at approximately 10:00 am.

Plenary Sessions Attendees were: Drs. Romanenko, Bazyka, Dyagil, Klimenko, Bebeshko, Ledoschuk, Gudzenko, Pilinskaya, Chumak and several other unidentified members of the Ukrainian team. Drs. Howe, Bouville, Burch, Finch and Tsvetkova represented the American side.

The meeting opened with Dr. Romanenko suggesting a tentative agenda which included 8 items as follows:

1. Quarterly report number 5.
2. Final report of the diagnostic hematology review.
3. Results of FISH-EPR comparisons.
4. Use of new oblasts.
5. The 5 tasks in question which were sent in a letter to Dr. Beebe.
6. Preliminary discussion of the next 6 months.
7. How the U.S. side would help in a Phase I report.
8. The impact of Phase I on the Phase II proposal.

I agreed with the agenda proposal and made a few introductory remarks. Dr. Howe then stated that at the moment there were three major responsibilities: #1 - finish Phase I tasks, #2 prepare a Phase I report and #3 prepare a Phase II proposal. For each of these responsibilities there must be a strict timetable. He then outlined two specific objectives of Phase I: #1 - we must show that a study of leukemia and lymphoma in the liquidators has a reasonable chance of providing an answer and #2 - we must provide the details of the study (which oblast, technology, etc.). He stated that he believes that the results are satisfactory and that we should go ahead with Phase II. He indicated that there must be focus on the important jobs to be completed during the next 9 months. We must show that the work done in Phase I justifies a Phase II. He believes that the Phase I report should accompany a Plan for Phase II. This would involve having a draft outline of a Phase II proposal by the end of June for a fairly complete proposal by the end of the summer. Again he emphasized that the time interval between Phases I and II should be kept at a minimum. I then mentioned that a new proposal should be primarily directed at NCI as there was little expectation of support from NRC or DOE. Dr. Romanenko then raised the question as to whether the project would be a combined NCI-Ukrainian study? Dr. Howe said that this was a difficult question. He thought that NCI would plan some role. He thought the Ukrainians should define their interests and we should advise how this best be done. He thought that perhaps there should be separate parts for the study. I suggested that the proposal would most

likely be in the form of a joint study, possibly including Columbia University. Dr. Howe then mentioned the reorganization at NCI of the leukemia and thyroid projects. He pointed out that the Director of NCI is strongly supportive of the Chernobyl studies. He also noted that Columbia may play a much greater role in the future with possibly himself as a principal investigator working with his team of Burch, Reiss, Geard and others. He also felt that Dr. Haskell at Utah might work with Dr. Chumak and possibly there could continue to be consultants to a Columbia project involving individuals such as Drs. McFee, Littlefield and Finch in association with Drs. Beebe and Bouville. He stated that we would keep them informed of any new changes in direction. Dr. Romanenko raised a question as to how Columbia's interest would interact with those of the French. Dr. Howe replied that the French interest must be explored, possibly as a separate proposal. Dr. Bebesko interjected that the Ukrainians have some proposals which might coincide with those of the French to include molecular studies. He suggested that the study could have an umbrella effect which would add other studies to the main study. He thought that there could be many studies proposed such as those involving marrow transplantation, molecular studies, metabolism of leukemic cells, etc. He agreed, however, that the primary objective of the proposal should be investigation of leukemia and lymphoma incidence in relationship to radiation exposure.

Dr. Romanenko then made inquiry as to our reaction as to the quarter 5 report. I replied that I had only had a brief opportunity to review it and Dr. Howe had still not seen the report. I suggested that after we had had a chance to review the report we would present our opinion of it at the next plenary session. Dr. Howe then mentioned that he felt that the hematology diagnostic review had been very good and he hoped that the excellent results in Dnepropetrovsk could be extrapolated to the other oblasts. He felt that it was important to determine the availability of histologic materials for the liquidators for the historical cases of leukemia, lymphoma and related disorders. He noted the importance of changes in the selection of oblasts and the importance of integration of disciplines in the study (i.e. why people refuse questionnaires, how we handle blood samples, etc.). Dr. Romanenko then suggested that we e-mail a response to him concerning report 5.

The next item on the agenda was my report on the hematology review. My discussion was essentially the same as that I gave to the French during our visit with them so that I again will not repeat it in detail in this report. However, I did stress the importance of both the positive and negative findings with emphasis on the immediate necessity to determine the status of the hematology tissues which may be utilized in confirming the diagnoses of leukemia, lymphoma and related disorders that the liquidators in the target oblasts for Phase II. Dr. Dyagil responded that they greatly appreciated having had the review which provided them with many good hematology contacts. She felt that the review was very revealing concerning the hematologic status of leukemia investigations in the oblasts. She thought that the draft of the report looked good along with the summary and recommendations. She noted that subsequent to the meeting they analyzed the quality of the diagnostic materials which were received from each oblast and recommended that this new information be added to the report. Dr. Gudzenko also felt that the review had been a valuable experience. She said that she had a few technical remarks concerning the data in the report which would be turned over to me. She thought that perhaps one would have to separate leukemia from the lymphoma based on the preliminary information which we have received.

The status of FISH determinations as the 3rd item on the agenda was discussed by Dr. Pilinskaya. She reported that they have had excellent results in the laboratory with good florescence of the chromosomes which was as good as that which she had seen in U.S.A. To date she indicated that she had checked 1,000 cells on 5 liquidators. She felt that she could finish the proposed work in the course of the next 6 months. She now has 2 lamps for her microscopes with an expected life of 200 hours each. She feels that she should have one more lamp as a back-up so that the work would not be interrupted if she had a lamp failure. She emphasized the immediate importance of cross-calibration of FISH with other methods for radiation dose.

The next agenda item discussed was that of the potential replacement of currently proposed oblasts with new oblasts. Dr. Gudzenko reported that, accompanied by Drs. Bebeshko, Klimenko, Dyagil and Tsvetkova, she recently had visited the oblast of Cherkassy. They found that Cherkassy has an excellent hematology department. Random sampling of cases from the general population of leukemia and lymphoma showed that records for all 3 time periods and good slides for the middle and late periods were available. She felt that the potential for procurement of histological materials and medical records was higher than for any other oblast. Hematology slides were identified for all 7 of the liquidators which they had identified for Cherkassy oblast. She indicated that we will get a report in English concerning the outcome of their investigations. She noted that the Chernobyl registry is in a special department in the oblast hospital in Cherkassy. Information in that registry was similar to that of the other oblasts. She reported that there was a cancer registry in the hospital in a separate department. The data developed for this registry was obtained locally (not from Kiev) which she felt made it easier to work with. She also noted that the volume and type of information for persons in the registry was the same as that for the National Registry after 1990. The registry related cancers to the type of person (i.e. Chernobyl liquidator, etc.) in electronic files but that the quality of this information needs confirmation. Finally she noted that all male adults were identified in the registry as to whether they were Chernobyl liquidators. Dr. Bebeshko emphasized that the oblast hospital and the Chernobyl registry were in the same location. The registry is run by young and enthusiastic people. They were able to very quickly find all slides and records. In 1 hour they were able to identify all Chernobyl related cases of leukemia and lymphoma of interest. In most instances the histologic slides were of good to fair quality. All cases had marrow smears and most had cytochemistry. There was a high level of diagnostic agreement between the results of his review and the diagnoses which had been made in Cherkassy. He noted that they use international standards for disease classification. He felt that the personnel was well informed with the project and were most willing to help in the future. He also felt that they would be very cooperative with his proposed bone marrow transplantation program. Dr. Romanenko emphasized that the location of Cherkassy is excellent and that they have only 1 hematology department. Dr. Howe then raised the question as to whether Cherkassy would be added in place of Sumy and Donetsk. Dr. Bebeshko replied that that was their hope but they must also consider the number of liquidators and other factors before making this substitution. Dr. Howe agreed with substituting Cherkassy for Sumy but again raised the question of Donetsk. Dr. Romanenko indicated that they would look into Donetsk but most likely would make a substitution. Questions were then raised by Dr. Howe regarding the number of liquidators in the oblasts. Dr. Gudzenko replied that there were 18,500 in Dnipropetrovska, and about 20,000 in Donetsk. Dr. Ledoschuk mentioned there are about 11,000 in Cherkassy and about 25,000 in

Kiev city and Kiev oblast. He felt that there would be enough liquidators for the study if one included Cherkassy and eliminated both Sumy and Donetsk. Dr. Howe agreed and suggested that possibly there could be a prospective study done in Donetsk, even if a retrospective study is not initiated. Dr. Romanenko said that this situation would be clarified before June. Dr. Howe then raised a question as to why the follow-up exam rate was high in all oblasts except Kiev city. He also inquired as to whether the Cherkassy liquidators are in the Chernobyl registry. Dr. Ledoschuk and Gudzenko said that they would find out this information from Dr. Kortushin. Dr. Howe stated that they have done a great job in evaluation of the new oblast and that a file cohort must be defined as soon as is possible (? include Cherkassy).

Dr. Howe then embarked on a rather detailed discussion as to how the Phase I report should be prepared. He emphasized that it is to be read by the people who will decide on Phase II so that it should focus on accomplishments to show how Phase II might be designed. He thought that the first draft should be done by the Ukrainians using the tasks as guides. He pointed out that many people who read the report do not know about the project so that the objectives of these tasks should be clearly stated. He suggested that the report should not be too long but that tables and specific reports could be added as appendices. He thought that the report should contain descriptions by topic (i.e., 1-basic catalog of what's available, 2-methods, 3-results, 4-recommendations). He felt that we might help through giving them ideas concerning organization and review of the draft materials. He thought the report should be collaborative and that it will be used as support for procurement of funding for Phase II. He stated that he would be willing to come to Kiev early in June to work with them on the Phase II proposal. I mentioned that the Phase I report most likely would go to NCI, NRC, DOE, the French and then possibly for publication. I felt that the report should emphasize the value in having used the two phase approach.

My afternoon was spent with Drs. Dyagil, Klimenko and Tsvetkova. I first informed them that I had decided not to go to Cherkassy during my current visit there so that I would have enough time to consider all of the problems which remain outstanding in the field of hematology. Initial consideration was that of the report of the hematology review session. Dr. Dyagil furnished me with a copy of their report concerning the quality of the histologic materials by oblast which is to be included in the appendix. I then discussed with Dr. Dyagil her lack of success in restaining slides. I suggested that the coverslips be removed by soaking the slides in xylene following which they be destained for 6 - 12 hours in alcohol before attempting to restain with Wrights stain or Giensa. The question was then raised as to when the first cases of myelodysplasia were first recognized in Ukraine. The reply was that the first case was diagnosed in Kiev in 1993 and since then a number of cases have been reported from the oblasts but most of them have been diagnosed by Dr. Klimenko. I made inquiry as to whose names should be included should there be a condensed publication of the hematology review. Dr. Dyagil responded that both Drs. Romanenko and Bebeschko would have to be included. I suggested that as soon as I had an opportunity to revise the hematology report I would send it back to Dr. Dyagil for final approval. I was then informed that each of the oblasts had been given a short report of the outcome of the review and that the slides had been returned. They also suggested they might have a short meeting at each of the oblasts about the review.

The next topic discussed was that of the possible needs of the hematology departments of the oblasts if we are to proceed with a prospective study of leukemia, lymphoma and related disorders. The opinion was expressed that they would need stain reagents, tissue transport boxes, a centrifuge, and a microscope. I then urged Dr. Dyagil to make careful logistical plans for the processing and transport of blood from the various oblasts to Kiev including method of transport and transport time. This would be needed in order to justify the equipment for each oblast. I also mentioned that I had designed new algorithms for the processing of blood for members of the subcohort which I had sent to them previously and they should use as a guide for preparing this material. They mentioned to me that they badly needed bone marrow biopsy needles. I indicated that these had been included in the original order and I would check on the status of them after I returned.

Discussion then was made regarding facilities for cryopreservation. Dr. Dyagil stated that they have only 1 freezer which is at -70° and is of Ukrainian origin. It currently is used for storage of marrow and various blood components. They have not received any Revco freezers. Currently they are using glass sealed ampoules for their biological specimens. Dr. Dyagil mentioned that the Center does have a liquid nitrogen tank for their bone marrow transplant program but currently there are problems with liquid nitrogen delivery. They believe that they will be able to work out something with the Blood Transfusion Center in the Institute of Hematology for their cryopreservation of biological tissues. I encouraged them to develop rules for utilization of their biological materials which are cryopreserved. I told them that I would send them the rules which have been developed for the Consortium group. Dr. Dyagil stated that they have been unable to preserve any red cells since they have not received the reagents for red cell preservation. I told her that I would also check on this after I returned.

Discussion then turned to immunophenotyping. I pointed out that at the present time they have no pathologist and no one trained in immunophenotyping. Possibly they could contract with someone outside of their institute to do this type of work. I emphasized that the equipment for automation is extremely expensive and I doubt that we would be able to justify any of this for Phase II. I was also concerned that there would be outdating of the reagents which had been ordered before they could possibly be used. Dr. Bazyka stated that they now have 2 FACS machines (one for sorting and the other for scanning). He indicated that he can do GPA and that he has 1 additional person in his laboratory who also knows the technique. Our final discussion concerned the performance of FISH studies on the mononuclear cells of patients with leukemia in order to obtain a possible estimation of dose. I suggested that Dr. Pilinskaya could take the mononuclear cells to the pellet stage and save them to do later if she is too busy to complete FISH determinations on them during the next few months.

Tuesday, 3/23 from 10:00 am - 12:00 noon.

The Tuesday (3/32) session was held in Dr. Ledoschuk's office from 10:00 to 12:00 noon. Present were Drs. Ledoschuk, Gudzenko, Finch, Howe, Burch and several unidentified other persons. The meeting commenced with Dr. Ledoschuk describing the Laboratory of Epidemiology and its staff. He indicated that Dr. Kortushin would arrive about noon. I then raised the question of current plans for investigating the availability of liquidator leukemia slides

and records at the other oblasts. Dr. Howe agreed that we should discuss this problem but he also raised the question as to whether the local computer network is connected with the State Registry. He suggested that Chumak's data will be included in the data base and they are now working on confirmation of the data base. In answer to my question Dr. Gudzenko stated they plan to fax a list of liquidator leukemia patients to Karkov and Poltava and in the course of the next few days to visit them for confirmation of their hematologic materials. She stated that the cases had been selected from the Chernobyl registry and that they would be checked against the oblast registry. Dr. Howe mentioned that there are 4 categories of cases: a) those with records and slides, b) those without slides but with records of proper studies (i.e. bone marrow, etc.), c) those with records without evidence of proper slide and d) those without any records or slides. Dr. Gudzenko indicated that the proposed trip to Karkov and Poltava would be taken in addition to herself by Drs. Dyagil, Klimenko, Tsvetkova and possible Bebeshko. They will plan to check on the quality of the slides, the records and registries. They expect to follow-up on 10-20 cases.

Dr. Howe again returned to a discussion of the report for Phase I. He mentioned that the report should include some information for each oblast. This should include what was actually done with the summary of information such as populations, distances from Kiev, communications, status of registries, etc. A list of questions regarding these topics should be made available by June. He stressed that information regarding cases of leukemia and lymphoma from the National Cancer Registry (Fedorenko) should be used if at all possible. He stated that he knows that this is a sensitive subject but that his relationships with them are good and he would be happy to help if at all possible. Dr. Ledoschuk said that their relationships were rather poor with the National Cancer Registry and they would welcome some improvement through intervention by Dr. Howe. Dr. Howe mentioned that they used a similar record system so that linkage with them would be extremely helpful. He thought that the European Union might support an overall better linkage system (European Union is funding cancer registries) which could be used by our group. He thought that the software for the system could be widely distributed. Dr. Ledoschuk then raised the question as to whether the number of liquidators to be included in the study should be in the proposal and/or in the report. Dr. Howe mentioned that the number of liquidators available should be in the report and the size of the cohort should be in the proposal.

My next question was whether they would be able to compare tissue recoveries from the general population with that of the liquidators in oblasts other than Cherkassy? Dr. Gudzenko stated that they will do Poltava and Karkov in the immediate future. She thought that Sumy and Donetsk probably are out, especially if Poltava proves to be good. She also thought that since the Dnipropetrovska record was very good for the general population that it would also be very good for the liquidators. I agreed that this probably was true but that I thought that they should not assume that it was true and should make some investigations even in Dnipropetrovska. Dr. Ledoschuk stated that they must decide in the next few months the oblasts to be used. He also felt that they should confirm the number of liquidators and the level of their hematologic investigations. He said that they also should work to assure good linkage and cooperation with the oblasts. Dr. Howe felt that focus on liquidator comparisons with the general population as to whether they had had proper hematologic investigation should be in the oblasts with poor general population results. He suggested that they should make contact with the people in the oblasts responsible for the biologic materials and ask them to hold them. Dr. Tsvetkova replied that this

already has been done. I then mentioned that there were approximately 25 cases at the hematologic review session for which there were clinical records but no slides. Those records did not indicate whether the appropriate studies had been done, even though there was a place for such information on the record abstract form. It is important that such information be obtained in the future. As a follow-up to task #30 it was mentioned that if liquidators came for interviews they all gave permission to have blood taken. Finally Dr. Gudzenko made a few interesting remarks. She found a few minor errors in case numbers in my summary of the hematology review and gave me a copy of her suggestions for change. Her investigations indicated that 1989 was the first year that myelodysplasia was diagnosed in any of the oblasts.

In the afternoon I again met with Drs. Klimenko and Dyagil along with Drs. Bazyka and Tsvetkova. Before Dr. Bazyka arrived Dr. Dyagil stated that hematology was not immunophenotyping any of the leukemias and that Dr. Bazyka was using the flow cytometer only for his immunologic studies. They reported to me that Dr. Bobylova is now the new Deputy Minister of Health and that the Minister of Health is Dr. Ryaisa Bogatyzeva. Again Dr. Dyagil indicated that they were lacking reagents for GPA, bone marrow biopsy needles, adequate long-term freezing facilities for biological samples, centrifuges for the oblasts and transport boxes for the biologic specimens which are sent to Kiev from the various oblasts. I then spent some time describing the method for a summary report of the hematology section for Phase I using the tasks as guides for the inclusion of separate paragraphs or sections defining each problem and its relationship. I also suggested that there probably should be separate sections on epidemiology and dosimetry constructed in a similar fashion. Dr. Bazyka arrived and mentioned that he had hoped that I might meet with the representative of Becton and Dickinson Company for purposes of discussion of a service contract for their flow cytometers. Dr. Bazyka then gave me copies of proposed service contracts for the flow cytometers with Becton and Dickinson in Kiev. I indicated that I would transmit these to Dr. Masnyk. I also said that I would write a summary article for possible publication of the results of the hematology review and that I would send it to them for their consideration.

A plenary session on 3/24 at Sbyadoshen commenced at 9:55 am with essentially the same persons in attendance that were at the first plenary session. Just prior to the meeting I spoke with Dr. Pilinskaya and asked her if she would do the FISH determinations on any of the new leukemia cases which occurred in the liquidators in the future. She indicated that she would be much too busy to do these determinations or even to separate the mononuclear cells and put them in pellet form. She also expressed considerable skepticism regarding the validity of such determinations. I then asked Dr. Dyagil if she would agree to separate the mononuclear cells and prepare them for FISH at a later date. She agreed to go ahead with this. ✓

Dr. Romanenko expressed his concern about the international situation (Yugoslavia) at the outset of the meeting. This was followed by my review of all of the hematology discussions that we had had during the previous day and a half. Particular emphasis was placed on the importance of investigating the prospective oblasts for the project for both recorded and actual evidence of histological verification of the diagnosis of leukemia, lymphoma and related disorders in the liquidators. I also discussed rather briefly the importance of long-term storage of histologic materials and the plans for the hematologists saving mononuclear cells in patients with leukemia for possible FISH determinations at a later date. Dr. Howe emphasized the much

improved situation with members of the program during the past several years and the coordination of disciplines for conduct of the study (i.e. combined epidemiology-hematology meeting yesterday). He pointed out that much of the work involves joint decisions (i.e. locating persons, drawing blood, etc.). There is a need for checking records for what studies were actually performed even if the slides were not available. He noted that the approach to dosimetry is not finalized but should be in the course of the next few months (i.e. Chumak approach, FISH, SEAD, official records, etc.). Epidemiologic tasks involve certain basic questions to be answered (who conducts the interviews?, where done?, how to manage lost to follow-up?, etc.). Other important issues emphasized were preparation of the report and plans for Phase II. Dr. Burch stated that he was impressed with the results of the pilot testing in Dnipropetrovska. He also suggested that the report on Phase I be concise and that it give practical answers to the questions raised.

Dr. Romanenko announced that he would leave the biggest problem to the last. He expressed the opinion that the dosimetrists are excellent scientists but they have come to no uniform agreement on either doses or methods. Dr. Bouville stated that dosimetry is a most difficult task. He feels that FISH now is working and there should be available some good information in 3 months. He stated that EPR still needs some equipment but should solve certain problems very soon. Dr. Chumak now has many teeth to analyzed and he is very optimistic that the oblasts will cooperate with him in sending many more. He noted that dose reconstruction and records are also under consideration. He mentioned that the preliminary results for the SEAD method look good. He felt that it could be extensively used in Phase II but needs further confirmation. There are more investigations of the method to be done in Russia. EPR will be compared with SEAD. Chumak should do 50 additional liquidators over the next 3 months. He felt that data from Russia should be available in June or July and will be considered at the proposed joint meeting in Russia in July. He agreed that dosimetry is a most difficult problem but that he will do his best to find the best methodology. He suggested there be extensive discussion of dosimetry methodology at the meeting in June.

Dr. Bebeshko wished to clarify the Ukrainian position concerning previous remarks. He agreed with the hematology report and stated that the extent of the oblast cooperation will depend to some extent on the assistance that could be given to them. He felt that the Phase I report should be concise. He sees some problems with Kryuchkov's SEAD method. He believes that FISH and EPR will be very useful, especially for patients with disease. De. Ledoschuk reviewed the procedure for the Phase I report. He agreed that it should be brief but should emphasize: 1) how changes in oblasts will effect the size of the cohort. He noted that Dr. Howe will make these calculations, 2) that the decision as to which oblast should be used should be based on the available liquidator information such as documentation of laboratory studies, 3) that all components of dosimetry should be made available for patients as some or many of them may die before actual interviews are done. He expressed a need for some software to do analysis of data.

Dr. Chumak indicated that we now have some information on EPR, FISH, dose reconstruction and official doses. He stated that dosimetry methods should be cheap and applicable to all liquidators. He felt that none of the above applied. The SEAD method is not verified at this stage but has a good potential. Another alternative is to use all estimates and to

pool the data. He stated that there should be 2 stages of Phase II dosimetry, 1) screening with simple and cheap methods and 2) secondary consideration of FISH, EPR and analytical dosimetry.

Dr. Romanenko identified the 3 major problems in the protocol. He believes that hematology and epidemiology are ok but that efforts to refine them should be intensified. He felt that there is no ideal solution to dosimetry but a decision should be made on methodology by next month. He also noted that new methods may be developed in the future.

After the coffee break I emphasized: 1) the importance of storing and protecting accumulated biologic samples, 2) the importance of documenting studies done in each oblast to establish the diagnosis of leukemia and lymphoma in the liquidators. I pointed out that we have or will have completed investigations in all target oblasts with the exception of Kiev oblast and Kiev city in for the immediate future. These also should be checked if possible.

Dr. Howe pointed out that ancillary studies should be given consideration but we always must keep the primary objectives of the program in mind. Those are - 1) estimation of risk of leukemia by dose from chronic exposure and 2) storage and preservation of biologic samples. There must be strong scientific justification for additional studies. The proposal must not be diluted down. Additional funding for ancillary studies may be obtained from other sources (i.e. French). There is need for a very defined plan for the Phase II proposal. Methods must not bias risk estimates and must be the same for the high-dose and controls or there will be bias. He feels that now only the SEAD method is applicable but should be calibrated against EPR. He believes that FISH is not sensitive enough at low-dose for general application. Dr. Burch indicated that he would accompany Dr. Howe in June to assist in preparation of the proposal.

Dr. Bouville stated that we must decide on the method to be used. He favors the SEAD method with EPR cross-check. The Ukrainians and the U.S. reviewers must be convinced that this is the best approach. Plans for the next 3 months include: 1) improve the SEAD method, 2) compare EPR to SEAD and 3) compare all methods together. He believes that we should recommend one method by 3 months from now.

Dr. Romanenko asked for a response to the consolidated task problems as mentioned in his letter to Dr. Beebe. I replied that Dr. Howe did not feel that either task #2 (effect of date of registration on distribution of liquidators in the State Registry) or task #4 (criteria and description of subcohort) constitute real problems and that there have been adequate discussion of them at the meeting. In regard to task #20 (availability of diagnostic materials in each oblast for the liquidators) I indicated that a detailed study of the diagnostic materials in the oblasts selected could be conducted at a later date but it was necessary to determine to some extent the availability of records for such materials in the oblasts before the final selection of oblasts for the research program can be made. Task #23 related to the availability of information about leukemia related disorders and just how this information is received and recorded in the registry. It is clear that although some of the basic information was investigated during the hematology review in March there has been no systematic search for records of these disorders in the State Registry. Further communication regarding this problem is necessary. It was my impression that task #24 involving meetings with the hematologists from the 6 oblasts had been completed

but I emphasized that it was a matter of their judgement as to whether these individuals were appropriately informed. I agreed that informing the oblast physicians about the technical aspects of blood sample collections and shipments to Kiev could wait until Phase II. Task #17 related to performance of FISH studies on patients with leukemia or lymphoma. I mentioned again that Dr. Dyagil is prepared to collect and store mononuclear cells on the patients with leukemia for FISH studies at a later date. Dr. Romanenko then requested that he receive a letter from Dr. Beebe addressing each of these problems.

Dr. Klimenko suggested that I discuss with everyone the method of putting together sections for the final document. In response to this I described the sequence of events which I had described to the hematologists previously. Basically this involved each of the 3 major parameters of the study (hematology, epidemiology and dosimetry) preparing a narrative regarding their objectives and accomplishments using the tasks as guidelines. I requested that these narratives be then sent to us in the States for revision and possible integration with one another. I also mentioned that the report probably also should contain introductory, summary and recommendation sections. Dr. Howe agreed that the final document should have good continuity and that a start should be made with separate sections using the tasks as guidelines. He felt that the tasks completed should be written up for the June meeting. Others could be completed later.

Dr. Romanenko noted at all of us are aging and our brain cells are declining and therefore we need lunch. Dr. Howe expressed gratitude for the excellence of the social and scientific aspects of the meeting.

On the afternoon of Friday, March 24th I again met with Drs. Klimenko, Dyagil and Bazyka. I first was given a new e-mail address for the Department of Hematology which is rcrm@mail.kar.net. Their fax number is 452-18-03. They indicated that they will check their computer in the American Project Office at Sbyadoshen daily for e-mails.

I expressed the opinion to Drs. Dyagil and Klimenko that I would hope that their hematology laboratory could become the best in Kiev. We would like to help them with this but in order to justify equipment and reagents for flow cytometry and immunophenotyping of leukemias and lymphoma they need trained personnel. My feeling was that they should make a special effort to train personnel for these sophisticated tests during the next few years. Perhaps they could get fellowships through IAEA, WHO, UICC, DOE and other agencies for training for some of their qualified people in the U.S. Their immediate needs for equipment were reviewed in order to conduct prospective studies with the oblasts. Discussion centered mostly around the needs for centrifuges in certain oblasts, microscopes, bone marrow biopsy needles and perhaps some educational materials. The need for liquid nitrogen for preservation of biological specimens and protection of these valuable materials again was emphasized. Dr. Bazyka stated that in 2 weeks all of their biological materials which are now being stored at -70°C will be transferred to the Blood Transfusion Institute where they will be stored in liquid nitrogen at -180°C. Dr. Bazyka felt that at the present time they are adequately prepared to handle immunophenotyping of the leukemias by flow cytometry. He said that on Tuesday's and Thursday's he and his staff do the work for both adult and pediatric hematology. The 2 FACS machines (SCAN and Flow) now belong to the Department of Hematology. Dr. Klimenko

suggested that possibly his son might be sent somewhere for training in the field of flow cytometry. I encouraged this possibility because of his familiarity with English and excellent training in the field of hematology. Noted, however, there continues to be a major problem with personnel for immunophenotyping of lymphomas. Dr. Bazyka stated that Dr. Romanenko intends to establish a department of pathology with one or more well-trained pathologists within the next 6 months. He noted that this of course was contingent on money being available. I indicated that we could not justify the purchase of equipment for the basic processing of tissues at their Hospital. They should work with slides and tissues which are received from the oblast hospitals. In order for them ever to embark on the immunophenotyping of fixed tissues they would need to start with a well-trained pathologist. Tissues probably would have to be stained by hand since it would be extremely difficult to justify purchase of automated immunophenotyping equipment for such a low volume prospective operation.

Our final discussions concerned dosimetry and biodosimetry in particular. Dr. Bazyka noted a rather poor correlation of EPR with SEAD (see table #13 in Quarter V task report). Correlation was only 25-50%. The correlation between ADR and SEAD was better but overall doses were lower. For doses of 4cGy by reconstruction the SEAD dosage generally was somewhat lower at 3cGy. He felt that there was still room for consideration of the use of biologic dosimetry. We briefly discussed some new biodosimetric methods and he expressed interest in learning more about assays of mitochondrial DNA which I felt were probably in about the same range of dose sensitivity as is FISH. Our discussion ended with discussion of the SKY (spectral karyotyping) workshop which was held at NCI last year and its possible future application of SKY to biologic dosimetry.