BEST MEDICINE | Bridging Engineering, Science & Technology

BEST Medicine is an event where the most talented and innovative middle and high-school students will have the chance to interact with each other and with leaders in medical device research and development. The setting will be in Akron, a city known for its focus on inventors and innovation and for pioneering breakthroughs in healthcare.

Student Handbook and Application

"BEST Medicine" Engineer Fair

March 24, 2012

National Inventors Hall of Fame® STEM School

Visit our website at: www.abiakron.org/bestmedicine

Direct questions to: BEST@abiakron.org or Rita Filer at 330-572-7553

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Austen BioInnovation Institute in Akron (ABIA) - an exceptional collaboration of Akron Children's Hospital, Akron General Health System, Northeastern Ohio Universities Colleges of Medicine and Pharmacy, Summa Health System, The University of Akron and The John S. and James L. Knight Foundation – is focused on patient-centered innovation and commercialization at the intersection of biomaterials and medicine.

The strategic alignment of institutional, state, federal and philanthropic support, accompanied with Akron's rich legacy in industrial and materials science, is working to pioneer the next generation of life-enhancing and life-saving innovation that will transform Akron and the surrounding region into a model for biomedical discovery and enterprise.

Economic Development

The Austen BioInnovation Institute has been designated as an Ohio Center of Excellence for Biomedicine and Health Care. As an alliance of five independent institutions, the Austen BioInnovation Institute leverages individual strengths and collective mass to create an impact beyond that possible by any one institution. Austen BioInnovation Institute provides the force necessary to develop compelling projects that will attract private funding and venture capital investment to the region. The Institute is moving Akron toward a secure economic future by accelerating the creation of 2,100 jobs within the next decade, and is a critical element of the City of Akron's Biomedical Corridor, a unique effort aimed at attracting health-related ventures to the region.

Nationally Distinct Centers of Innovation

The Austen BioInnovation Institute consists of four interrelated centers designed to accelerate translational research to biomedical commercialization as well as improve access, education, prevention, treatment and disease management. The centers include:

- ***Center for Biomaterials and Medicine*** – with core strengths in biopolymers, orthopedics and wound healing, the center leverages world-class polymer science and engineering into high-value clinical applications aimed at accelerating biomedical innovation;

- ***Medical Device Development Center*** – provides a unique resource for companies and researchers to design, test, synthesize and manufacture new materials and health care applications of biomaterials, while providing entrepreneurs and scientists with flexible and easy access to resources for commercialization of their ideas and products;

- ***Center for Clinical and Community Health Improvement*** – is building a community outreach organization to coordinate and deliver healthcare to the growing medically underserved populations, going beyond treatment to include the holistic integration of access, prevention and disease management. Support the attraction, launch and administration of clinical trials, and promote collaboration among scientists and clinicians across institutions;

- ***Center for Simulation and Integrated Health Care Education*** – is establishing a nationally recognized model for simulation-based education and training programs.

Eligibility

- BEST Medicine is open to all students in grades 6-12 in any public, private, parochial or home school in Ashland, Ashtabula, Carroll, Columbiana, Cuyahoga, Erie, Geauga, Holmes, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas and Summit Counties.

- A maximum of 15 projects can be entered from any high school, and a maximum of 12 projects can be submitted from any middle school. If exceptions to this rule are needed, please contact Rita Filer (rfiler@abiakron.org/330-572-7553).

- Students may only submit one project to the fair.

- Team projects are eligible.

- All projects at BEST Medicine are subject to the review of the Fair Director and the Scientific Review Committee (SRC). Projects which do not adhere to correct scientific principles or which involve inadequate protection of human or animal subjects may be disqualified. Students can assume approval of their project unless they are contacted by BEST Medicine.

Timeline of Events

SEPTEMBER 2011

Information packets and handbooks to be distributed to schools and made available online at www.abiakron.org/bestmedicine

FEBRUARY 2012

February 1 General Deadline for BEST Medicine Application Forms for students in Path 3 (see page XX)

Mail applications to:
Rita Filer, Events Manager
Austen BioInnovation Institution in Akron
1 S. Main St., Ste. 401
Akron, OH 44308

February 11 Acceptance letters mailed to students

MARCH 2012

March 1 Final Deadline for confirmation of participation (this pertains to those individuals in Paths 2 and 3.) (See page XX)

MARCH 24, 2012

March 24	8:00 – 9:00 a.m.	Student Check In and Project Setup
	9:00 – 12:30 p.m.	Judging of Projects
	9:00 – 12:30 p.m.	Teacher Workshops
	9:00 – 12:30 p.m.	Hands on Demonstrations
	12:30 – 1:30 p.m.	Lunch
	1:00 - 1:30 p.m.	Key Note Speaker
	1:30 – 3:00 p.m.	Award Ceremony
	3:00 – 4:00 p.m.	Removal of Projects

Contact Information

For general questions about BEST Medicine, application forms or deadlines, contact:
Rita Filer, 330-572-7553, rfiler@abiakron.org

Scientific Review Committee

It is the responsibility of the Scientific Review Committee (SRC) to assess and approve each project that is submitted to BEST Medicine. The SRC evaluates the scientific integrity of the project, especially those projects using human and/or animal subjects. The SRC also verifies that all project-appropriate paperwork is submitted with each student's application. Students that need to consult with the SRC about their project either before or after the application deadline may contact the Program Chair listed below for assistance.

Brian Davis, Ph.D. – Program Chair
Austen BioInnovation Institute in Akron/MDDC
bdavis@abiakron.org

2012 Category Descriptions

Biomaterials and Polymer Medicine: A natural or synthetic material (as a metal or polymer) that is suitable for introduction into living tissue especially as part of a medical device (as an artificial joint). Medicine dealing with a chemical compound or mixture of compounds formed by polymerization and consisting essentially of repeating structural units.

Cardiovascular/Soft Tissue Wound Healing: Of, relating to, or involving the heart and blood vessels. The healing of an injury to the body (as from violence, accident, or surgery) that typically involves laceration or breaking of a membrane (as the skin) and usually damage to underlying tissues.

Clinical Trials: A scientifically controlled study of a the safety and effectiveness of a therapy using consenting human subjects (Note that Institution Review Board (IRB) approval is required – even for studies that involve surveys)

Health/Medicine: The study of health and disease in humans or animals, including disease diagnosis, causes of disease, ways of treating disease, medical procedures, alternative therapies for diseases, or the way in which the human or animal body functions normally.

Modeling/Simulation/Medical IT: The use of a device to imitate or represent reality. Examples include computer models of human physiology simulation methods to test a new medical device or biomechanical models. Medical technology involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data.

Musculoskeletal: Of, relating to, or involving both musculature and skeleton. A branch of medicine concerned with the correction or prevention of deformities, disorders, or injuries of the skeleton and associated structures (as tendons and ligaments).

Sensors/Imaging: Methods for obtaining measurements of key importance to health. Examples include blood pressure measurements, ultrasound and temperature monitoring.

Value-driven Engineering: Redesigning a medical device essential to people and making it less complex at a price they can afford without compromising quality.

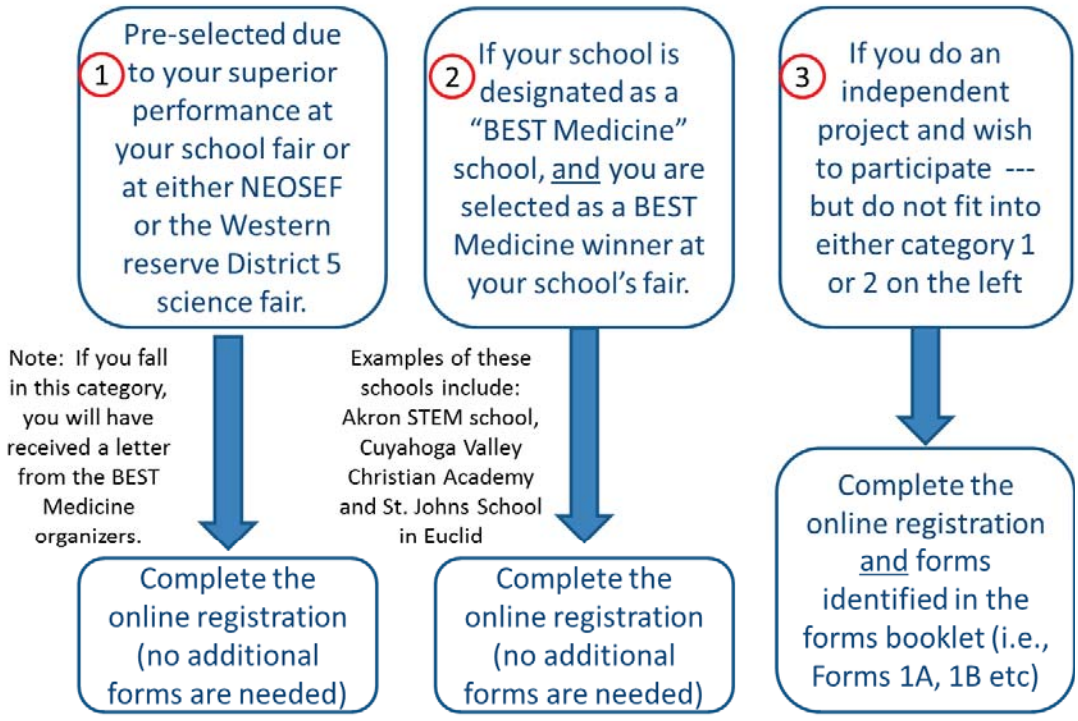
Paths to BEST Medicine 2012

Dear Student/Teacher,

This handbook contains a lot of information that can take some time to read. That being said, there are a few important things that we at BEST Medicine would like to make you aware of before beginning the engineering fair process at your school.

1. If your students will not be receiving an entire copy of the BEST Medicine Handbook, please provide them with copies of the necessary information to complete their paperwork and have the best chance to compete at the fair.
2. **Late entries will not be accepted at BEST Medicine**.
3. Bacteria and other microorganisms may not be grown at home! Culturing of bacteria, mold and viruses by students must be done at an institution (such as their school) under proper supervision.
4. BEST Medicine does not accept toxicity studies or projects that have incidental organism death rates greater than 25%. Death may not be used as an endpoint in a study, and students should design experiments to avoid harm or death to living organisms.

Three Paths to BEST Medicine 2012:



Elements of a Successful Project

Science is a process by which we learn about the universe around us. **Engineering** is the application of knowledge toward some useful goal. A good engineer fair project includes the proper use of scientific and engineering ideas, such as the scientific method. The following steps will help you get started, and hopefully guide you to a well-rounded and winning engineering fair project. If you need help, don't be afraid to consult with a scientist or engineer that specializes in your field of study.

STEP 1: Pick a Topic to Study

- Spend some time and give serious consideration to this part of your engineer fair project. Don't settle for a project that has been done before because it's easy. Originality tends to win over judges at BEST Medicine. Pick a topic that grabs your interest and you want to learn more about. The BEST Medicine website lists over 150 potential project ideas.

STEP 2: Do a Background Search

- While not the most exciting part of doing an engineer fair project, you will learn more about the topic that will provide you with the necessary information needed to come up with a hypothesis, appropriate methods to test your hypothesis, and allow you to draw conclusions about your results.
- This information will need to be included in your project report and engineer fair display.

STEP 3: Formulate a Goal

- Based on what you have read of learned from others around you, describe the problem you are going to solve.
- Ideally, the problem should relate to solving a medical need.
- Be sure your goal can actually be achieved within the confines of the timing and resources available to you and your engineering fair project.

STEP 4: Document Your Work (The Laboratory Notebook)

- One of the most important attributes of a good scientist is good record keeping. Doubt is a human trait so you need to be able to prove that what you found is correct and true. Do not rely on your memory.
- The lab notebook should contain all the procedures used in your experiments and all of the data that came from them. Both good results and bad results should be documented. Not every experiment works perfectly.
- Summaries, conclusions for each experiment, and any plans you may have for the next experiment should be written in your notebooks. While it is easy to write too little in your lab notebook, you can never write too much.

STEP 5: Design Experiments to Test Your Prototype (Methods)

- Experiments should test your prototype. Don't be afraid to design more than one experiment to test your idea. Some of the best designs test a prototype device using more than one strategy.
- Be sure to include appropriate comparisons to other design concepts.
- While it may seem labor intensive, test for only one thing in each of your experiments.

STEP 6: Results

- This is the section where you describe data generated from your experiments. It is best to repeat your experiments more than once to ensure reproducibility.
- SI units (grams, liters, meters, etc.) rather than English units (pounds, gallons, yards, etc.) are typically used in science. These units should be used whenever possible, although it will not count against you at BEST Medicine if you use English units.
- Statistics provide a quick summary of your data. Some commonly used statistics are the number of samples in each group (n); an indicator for the mid-point of your groups (average); the range (minimum and maximum values); and an indication of the variability of the data (standard deviation or standard error of the mean).
- Statistical tests (such as t-tests and ANOVA) can be used to mathematically determine if the differences between your groups is a result of the treatment you imposed rather than if it happened merely due to chance.

STEP 7: Evaluate Your Results and Strengthen Your Project

- Closely examine your data for any inconsistencies to fix, and any interesting findings.
- Take your project a step further. Many times the data you collect generates new questions to be answered. Most judges are impressed by second efforts.
- If your project has any short-comings in the design, you may want to resolve these problems in a second effort, or at least be ready to discuss them.

STEP 8: Draw Conclusions

- Try to summarize what the information you have obtained from your data actually means. Sometimes there can be more than one answer. If your findings are very specific, try to relate them back into the big picture.
- This section is also a good place to describe what future directions you would take your project.

STEP 9: Present Your Findings in a Research Paper

- A research paper is a formal written presentation of your engineer project. Good research papers are well written (using proper sentence structure, correct spelling and punctuation, etc.), well-organized and contain all of the following items:
  a. Introduction: A paragraph or two that state your topic, your goals, what you hope to achieve, and how you hope to achieve it.
  b. Background: A general introduction to the topic of study which includes the key findings or factors that lead you to what you decided to study.
  c. Goal: A statement or two about what you believe will be the outcome of what you are testing.
  d. Methods: Describe in detail the protocol(s) used to test your design. A person reading your research paper should be able to repeat your experiments completely on the basis of what is written in this section.
  e. Results: Describe the data that you obtained from your experiments. In addition to the written text, photos, tables, figures and graphs are good ways to help present your data to the reader. Don't forget to express your data values using appropriate units of measure (examples: 1.29 cm or 5.8 mL, etc.)
  f. Discussion: Explain what your data means. State how your experiments and data support or refute your idea. This section may be the longest and most important section of your paper!
  g. Conclusion: Did your idea work? Why or why not? What would you do differently? What would you do next?
  h. Acknowledgements and References: List the people and literature sources that assisted you with your project. Don't forget to thank any people or companies who donated time or supplies for your project.

STEP 10: Present Your Findings in a Project Display

- For engineering fairs, you need to construct a display that shows off your project and all the components discussed above. Spend some time on this part of the process. It is your opportunity to showcase your hard work.
- The project display is a visual tool to communicate your project, and should be designed to explain your project in your absence.
- Make your display attractive and eye-catching to draw judges and passers-by to your project. Make a good first impression. You may not get a second chance.
- Like a good research paper, a good project display should have all of the following:
  - Start with a good title. It may or may not be the same title as your research paper, but it should be displayed prominently.
  - Have text to summarize your project from start to finish. It is unlikely that you will be able to use all of the written text in your research paper on your display board. Select the most important points from each section to put on the board. You need enough information to convey your points, but don't overdo it. The text should be fairly large and easy to read. If possible, use a printer rather than writing by hand.

- Have an organized flow of information. Your display can be organized like your research paper, but make sure the different sections are placed in a logical order around your display board.
- Use photos, figures, tables and graphs to quickly illustrate your data. It is one of the easiest ways to convey your data.
- Include any necessary display items, especially your laboratory notebook and research paper.

SUMMARY:

- Identify a need. Be sure your idea is something that has a solution and is within your ability to construct
- Determine limits or other criteria that you must impose on your solution. Cost, materials, and time are all possible limiting criteria.
- Do some preliminary research to see what's already been done to satisfy your need. This process may provide additional ideas.
- Design something that you think will satisfy your need.
- Build and test a prototype, refining or redoing if necessary.

Instructions for Research Plan

REQUIRED for ALL Projects Before Experimentation

The research plan for ALL projects is to include the following:

A. **Question or Problem being addressed**
B. **Hypothesis/Engineering Goals**
C. **Description in detail of method or procedures** (The following are important and key items that should be included when formulating ANY AND ALL research plans).
    - **Procedures:** Detail all procedures and experimental design to be used for data collection
    - **Data Analysis**: Describe the procedures you will use to analyze the data that answer the research question or hypothesis
D. **Bibliography**: List at least five (5) major references (e.g. science journal articles, books, internet sites) from your literature review. If you plan to use vertebrate animals, one of these references must be an animal care reference.
    - Choose one style and use it consistently to reference the literature used in the research plan

<u>Items 1-4 below are guidelines to be followed when applicable:</u>

1. **Human subjects research**:
    - **Subjects** – Describe who will participate in your study (age range, gender, racial/ethnic composition). Identify any vulnerable population (minors, pregnant women, prisoners, mentally disabled or economically disadvantaged).
    - **Methods** – What will participants be asked to do? Will you use any surveys, questionnaires or tests? What is the frequency and length of time involved for each subject?
    - **Risks** – What are the risks or potential discomforts (physical, psychological, time involved, social, legal etc.) to participants? How will you minimize the risks?
    - **Benefits** – List any benefits to society or each participant.
    - **Protection of Privacy** – Will data be confidential or anonymous? If anonymous, describe how the data will be collected anonymously. If not anonymous, what procedures are in place for safeguarding confidentiality? Where will the data be stored? Who will have access to the data? What will you do with the data at the end of the study?
    - **Informed Consent Process** – Describe how you will inform participants about the purpose of the study, what they will be asked to do, that their participation is voluntary and they have the right to stop at any time.
2. **Vertebrate animal research**:
    - Briefly discuss **POTENTIAL ALTERNATIVES** and present a detailed justification for use of vertebrate animals
    - Explain potential impact or contribution this research may have
    - Detail all procedures to be used

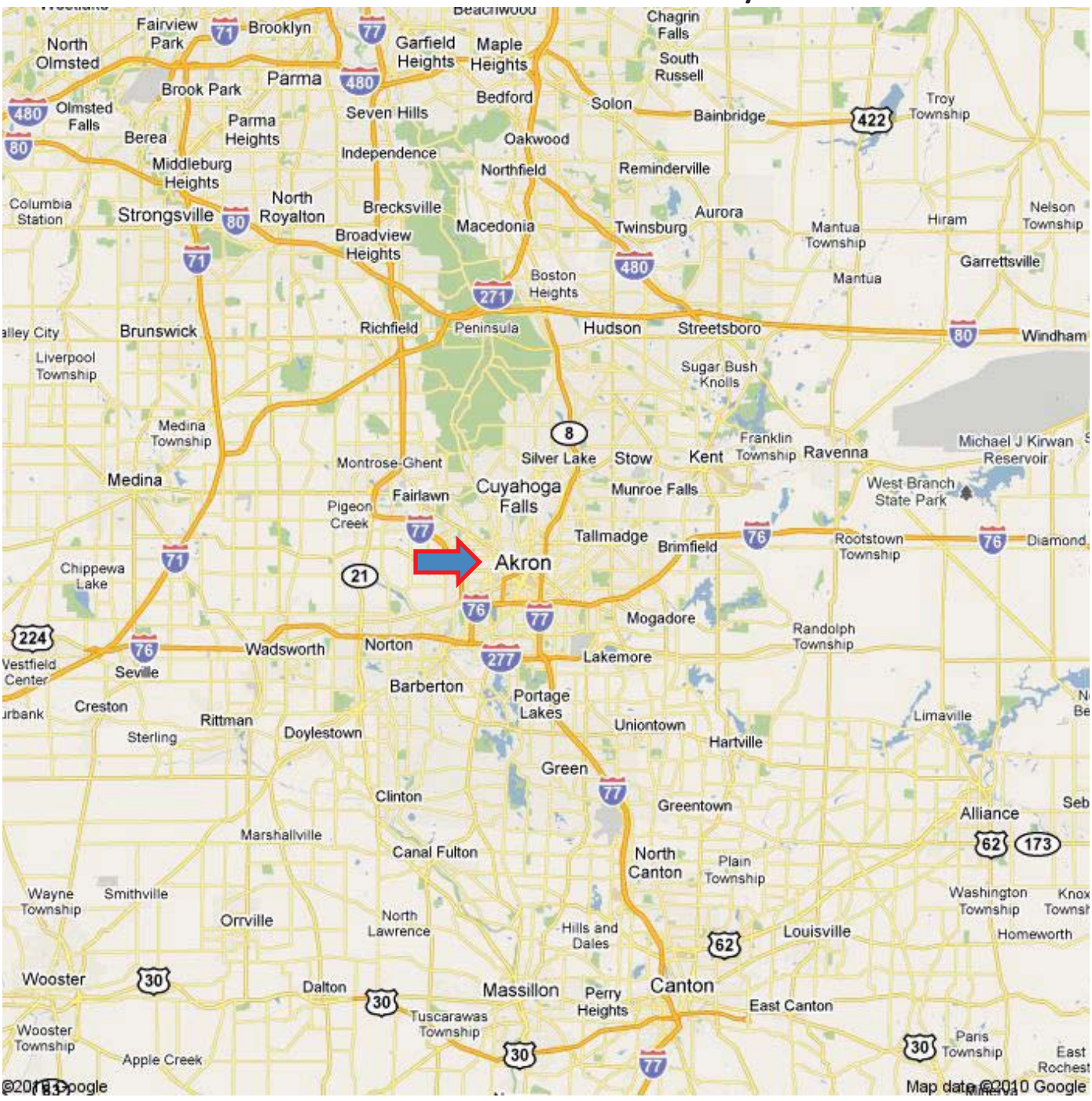
a) Include methods used to minimize potential discomfort, distress, pain and injury to the animals during the course of experimentation
b) Detail chemical concentrations and drug dosages

- Detail animal numbers, species, strain, sex, age, etc.
  - Include justification of the numbers planned for the research
- Describe housing and oversight of daily care
- Discuss disposition of the animals at the termination of the study

3. **Potentially Hazardous Biological Agents**:
   - Describe Biosafety Level Assessment process and resultant BSL determination
   - Give source of agent, source of specific cell line, etc.
   - Detail safety precautions
   - Discuss methods of disposal
4. **Hazardous Chemicals, Activities & Dives**:
   - Describe Risk Assessment process and results
   - Detail chemical concentrations and drug dosages
   - Describe safety precautions and procedures to minimize risk
   - Discuss methods of disposal

National Inventors Hall of Fame School
199 S. Broadway St.
Akron OH 44308

Directions see www.akronschools.com/scienceschool



Direct questions to: BEST@abiakron.org or Rita Filer at 330-572-7553

Rules and Regulations for 2012

In order to conduct an experiment and participate in the fair, all students must adhere to the rules and regulations mentioned below. These rules are meant to ensure the safety of all participants, research subjects, and spectators. All projects will be inspected for adherence to these rules on set-up day at the fair and any projects with violations must be corrected in order for the student to compete.

Ethics Statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researchers' work as one's own, or fabrication of data. Fraudulent projects will fail to qualify for competition in BEST Medicine fairs.

Eligibility/Limitations

1. Each school fair may send the number of projects provided by their school agreement.
2. A student must have participated in their school fair in grades 6-12 or equivalent to be eligible, none of whom has reached age 21 on or before January 1, 2012.
3. Each student may enter only **one** project which covers research done over a maximum of 12 continuous months between January 2011 and April 2012.
4. Students may compete in only one school fair.
5. Team projects may have a maximum of three members.
6. There is a broad range of categories in which students can complete BEST Medicine projects. A list of the categories and subcategories with definitions can be found at: www.abiakron.org/bestmedicine
7. A research project may be a part of a larger study done by professional scientists, but the project presented by the student must only be their portion of the complete study.

Requirements

GENERAL

1. All students competing in BEST Medicine must adhere to all of the rules as set forth in this document.
2. All projects must adhere to the Ethics Statement above.
3. Projects must adhere to local, state, country and U.S. Federal laws, regulations and permitting conditions.
4. The use of non-animal research methods and the use of alternatives to animal research are strongly encouraged and must be explored before conducting a vertebrate animal project.
5. Introduction or disposal of non-native species, pathogens, toxic chemicals or foreign substances into the environment is prohibited. See: www.anstaskforce.gov/Documents/ISEF.pdf
6. BEST Medicine exhibits must adhere to BEST Medicine display and safety requirements.

APPROVAL AND DOCUMENTATION

1. Every student must complete the online registration form.
2. Students in Path 3 (see page 7) must complete the following :
    - **Student Checklist Form (1A)**, the **Research Plan and Approval Form (1B)** and review the project with the Adult Sponsor as the **Checklist for Adult Sponsor Form (1)** is completed.
    - After initial approval (if required), any proposed changes in the **Student Checklist Form (1A)** and **Research Plan (1B)** must be re-approved before laboratory experimentation/data collection resumes.
    - If work was conducted in a regulated research institution, industrial setting or any work site other than home, school or field at any time during the current BEST Medicine project year, the Regulated Research Institutional/Industrial Setting Form (1C) must be completed and displayed at the project booth.
3. Projects which are continuations of previous years' work, and which require IRB/SRC approval must be reapproved prior to experimentation/data collection for the current year.
4. Any continuing project must document that the additional research is new and different.
5. After experimentation, each student or team must submit a (maximum) 250-word, one-page abstract which summarizes the current year's work. The abstract must describe research conducted by the student, not by adult supervisors.
6. A project data book and research paper is required to be displayed at the BEST Medicine event.
7. All signed forms, certifications, and permits must be available for review by ***February 1, 2012***.

Continuation of Projects

1. Any project based on the student's prior research could be considered a continuation project. If the current year's project could not have been done without what was learned from past years' research, then it is a continuation project for competition. These projects must document that the additional research is an expansion from prior work (for example, testing a new variable or new line of investigation, etc.) Repetitions of previous experimentation with the exact same methodology and research question, or increasing sample size are examples of unacceptable continuations.
2. Display boards and abstracts must reflect the current year's work only. The project title displayed in the Finalist's booth may mention years (for example, "Year Two of an Ongoing Study"). Supporting data books (not research papers) from previous related research may be exhibited on the table, properly labeled as such.
3. Longitudinal studies are permitted as an acceptable continuation under the following conditions:
    a. The study is a multi-year study testing or documenting the same variables in which time is a critical variable. (Examples: Effect of high rain or drought on soil in a given basin, return of flora and fauna in a burned area over time.)
    b. Each consecutive year must demonstrate time-based change.
    c. The display board must be based on collective past data and its comparison to the current year data set. No raw data from previous years may be displayed.

4. All continuation projects must be reviewed and approved each year and forms must be completed for the New Year.

Team Projects

1. At BEST Medicine, team projects compete within the scientific category of their research and will not be a separately judged category.
2. Teams may have up to three members. **NOTE**: Teams may not have more than three members at a local fair, and eliminate members to qualify for regionals.
3. Team membership cannot be changed during a given research year, including conversion from an individual project or vice versa. However, team membership *may* be altered in subsequent years.
4. Each team should appoint a team leader to coordinate the work and act as spokesperson. However, each member of the team should be able to serve as spokesperson, be fully involved with the project, and be familiar with all aspects of the project. The final work should reflect the coordinated efforts of all team members, and will be evaluated using similar rules and judging criteria as individual projects.
5. Each team member must submit an **Approval Form (1B)**. However, team members must jointly submit the **Checklist for Adult Sponsor (1)**, one **abstract**, a **Student Checklist (1A), a Research Plan (1B)** and other required forms.
6. Full names of all team members must appear on the abstract and forms.

Project Set-Up

Maximum Display Size:

Depth (front to back): 30 inches or 76 centimeters
Width (side to side): 48 inches or 122 centimeters
Height (floor to top): 108 inches or 274 centimeters

At BEST Medicine, fair-provided tables will not exceed a height of 36 inches (91 centimeters). Maximum project sizes include all project materials, supports, and demonstrations for the public and for judges. If a table is used, it becomes part of the project and must not itself exceed the allowed dimensions nor may the table, plus any part of the project exceed the allowed dimensions.

At BEST Medicine, any project with a component that will be demonstrated by the Finalist must be demonstrated only within the confines of the Finalist's booth. When not being demonstrated, the component plus the project must not exceed allowed dimensions.

Only students may set up the exhibit. No parents, teachers, siblings, etc. are permitted in the Exhibit Halls during set-up. (If the student is unable to set up his/her project, contact BEST Medicine to make other arrangements prior to the day of the event.)

The display must be set up in its entirety, and inspected and approved by BEST Medicine Officials before the student may leave. Students may not add additional material to their display after inspection without permission from a BEST Medicine Official.

While the Exhibit Hall is relatively secure, there is public access to the event. BEST Medicine recommends that you avoid bringing expensive equipment, such as computers, microscopes, calculators, etc.

Required to Be Visible and Vertically Displayed at BEST Medicine

- Originals of official abstract and certification as approved by the BEST Medicine Committee
- Display of Research Plan (see page 12 for the elements of a successful project)
- **Continuation Projects Form (6)** — when applicable
- Photograph / image credits

Display Rules/Regulations

We recommended that you take pictures or draw schematics of important steps/results that you wish to convey to the judges. You may bring packaging from non-permitted items, but all packages must be empty. We also suggest using artificial items to substitute for items not permitted in the fair (for example, artificial plants or food).

Not Allowed at Project or in Booth

1. Living organisms, including plants
2. Taxidermy specimens or parts
3. Preserved vertebrate or invertebrate animals
4. Human or animal food
5. Human/animal parts or body fluids (for example, blood or urine)
6. Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
7. All chemicals including water (Exceptions: water integral to an enclosed, sealed apparatus.)
8. All hazardous substances or devices [for example poisons, drugs, firearms, weapons, ammunition, reloading devices, or lasers (as indicated in item 5 in the section of these rules entitled “Allowed at project or in Booth BUT with the Restrictions Indicated”)]
9. Dry ice or other sublimating solids
10. Sharp items (for example syringes, needles, pipettes, or knives)
11. Flames or highly flammable materials
12. Batteries with open-top cells
13. **Awards, medals, business cards, flags, logos, endorsements, and/or acknowledgments** (graphic or written) unless the item(s) are an integral part of the project.
14. Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures
15. Active Internet or e-mail connections as part of displaying or operating the project at BEST Medicine

16. Prior years' written material or visual depictions on the vertical display board. [Exception: the project title displayed in the Finalist's booth may mention years or which year the project is (for example, "Year Two of an Ongoing Study")]. Continuation projects must have the **Continuation Project Form (6)** displayed.
17. Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project .
18. Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee, or Society for Science & the Public (for example large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)

Allowed at Project or in Booth BUT with the Restrictions Indicated

1. Soil, sand, rock, and/or waste samples **if permanently encased in a slab of acrylic**
2. Postal addresses, World Wide Web and e-mail addresses, telephone and fax numbers **of Finalist only**
3. Photographs and/or visual depictions **if:**
    a. They are not deemed offensive or inappropriate by the Scientific Review Committee, the Display and Safety Committee, or Society for Science & the Public. This includes, but is not limited to, visually offensive photographs or visual depictions of invertebrate or vertebrate animals, including humans. The decision by any one of the groups mentioned above is final.
    b. They have credit lines of origin ("Photograph taken by..." or "Image taken from..."). (If all photographs being displayed were taken by the Finalist or are from the same source, one credit line prominently and vertically displayed is sufficient.)
    c. They are from the Internet, magazines, newspapers, journals, etc., and credit lines are attached. (If all photographs/images are from the same source, one credit prominently and vertically displayed is sufficient.)
    d. They are photographs or visual depictions of the Finalist.
    e. They are photographs of human subjects for which signed consent forms are at the project or in the booth.
4. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points **if for display only and not operated.**
5. Any demonstration for judges or the public must be performed within the maximum size of the project permitted, an area 30"(Depth) by 48"(Width) by 108" (Height)
6. Class II lasers **if**:
    a. The output energy is <1 mW and is operated only by the Finalist
    b. Operated only during the Display and Safety inspection and during judging
    c. Labeled with a sign reading **"Laser Radiation: Do Not Look into Beam"**
    d. Enclosed in protective housing that prevents physical and visual access to beam
    e. Disconnected when not operating

Note: Class II lasers are found in laser pointers and in aiming and range-finding devices. They pose a risk if the beam is directly viewed over a long period of time.

7. Class III and IV lasers **if for display only and not operated** (*See the description of Class III and Class IV lasers in the Radiation section of the Hazardous Chemicals, Activities, or Devices, in the BEST Medicine Handbook.*
8. Any apparatus producing temperatures that will cause physical burns **if adequately insulated**

The only items that may be displayed on the front of the provided tables are the ones listed in the section of these rules entitled "Required to be Visible and Vertically Displayed at the BEST Medicine Fair"

Electrical Regulations at BEST Medicine

1. Participants are encouraged to bring their laptops and other technology as it is needed for their project.
2. Finalists requiring 120 or 220 Volt A.C. electrical circuits must provide a **UL-listed 3-wire extension cord** which is appropriate for the load and equipment.
3. Electrical power supplied to projects and, therefore, the maximums allowed for projects is **120V A.C., single phase, 60 cycle.** Maximum circuit amperage/wattage available is determined by the electrical circuit capacities of the exhibit hall and may be adjusted on-site by the Display and Safety Committee.
4. All electrical work must conform to the National Electrical Code or Exhibit Hall regulations. The guidelines presented here are general ones, and other rules may apply to specific configurations. The on-site electrician may review electrical work on any project.
5. All electrical connectors, wiring, switches, extension cords, fuses, etc. must be **UL-listed** and must be appropriate for the load and equipment. Connections must be soldered or made with **UL-listed c**onnectors. Wiring, switches, and metal parts must have adequate insulation and over-current safety devices (such as fuses) and must be inaccessible to anyone other than the Finalist. Exposed electrical equipment or metal that possibly may be energized must be shielded with a non-conducting material or with a grounded metal box to prevent accidental contact.
6. Wiring ***not*** part of a commercially available **UL-listed** appliance or piece of equipment must have a clearly visible fuse or circuit breaker on the supply side of the power source.
7. There must be an accessible, clearly visible on/off switch or other means of disconnect from the **120 or 220 Volt** power source.
8. Any lighting that generates considerable and excessive amounts of heat (high-intensity lamps, halogen lights, etc.) must be turned off when the Finalist is not present.

Other BEST Medicine Information and Requirements

1. *Finalists must be present at their projects for the Display and Safety inspection. The inspection is a process that takes place between the Finalist and inspector; therefore, no other persons should be present representing the Finalist except for an interpreter if necessary.*
2. No changes, modifications, or additions to projects may be made after approval by the Display and Safety Committee and the Scientific Review Committee.
3. Society for Science & the Public, the Scientific Review Committee, and/or the Display and Safety Committee reserve the right to remove any project for safety reasons or to protect the integrity of BEST Medicine and its rules and regulations.
4. A project data book and research paper is required.

5. *Display of photographs other than that of the Finalist must have a photo release signed by the subject, and if under 18 years of age, also by the guardian of the subject. Sample consent text: "*I consent to the use of visual images (photos, videos, etc.) involving my participation/my child's participation in this research."
6. Finalists using audio-visual or multi-media presentations (for example, 35mm slides; videotapes; images, graphics, animations, etc., displayed on computer monitors; or other non-print presentation methods) must be prepared to show the entire presentation to the Display and Safety inspectors before the project is approved.
7. If a project fails to qualify and is not removed by the Finalist, Society for Science & the Public will remove the project in the safest manner possible but is not responsible for damage to the project.
8. Any disks, CDs, printed materials, etc. (including unofficial abstracts) designed to be distributed to judges or the public will be confiscated by the Display and Safety Committee and will be discarded immediately.
9. Project sounds, lights, odors, or any other display items must not be distracting.
10. No food or drinks, except small containers of bottled water for personal consumption, are allowed in the Exhibit Hall.

In addition to the rules and guidelines posted above, there are several additional safety concerns that need to be addressed prior to conducting your experiment. All students should be trained and instructed before working with chemical substances, tools, and heat sources. Moreover, adult Permission and supervision is required when using any potentially dangerous or hazardous materials.

Judging

- Students must remain at their project during judging. The award ceremony will be directly after judging.
- Students who are not present at their projects during the judging process will not be eligible for any awards. No exceptions to this rule will be made. BEST Medicine Officials will verify attendance during the judging period.

Judges evaluate and focus on 1) what the student did in the current year; 2) how well a student followed the scientific, engineering, computer programming or mathematical methodologies; 3) the detail and accuracy of research as documented in the data book; and 4) whether appropriate experimental procedures were used.

Judges look for well thought-out research. They look at how significant your project is in its field; how thorough you were, and how much of the experiment thought and design is your own work. Initially, judges get their information from your board, abstract and research paper to learn what the project is about, but it is the **Interview** that will be the final determination of your work.

Judges applaud those students who can speak freely and confidently about their work. They are not interested in memorized speeches or presentations – they simply want to **talk** with you about your research to see if you have a good grasp of your project from start to finish. It is important to start the interview off right. Greet the judges and introduce yourself.

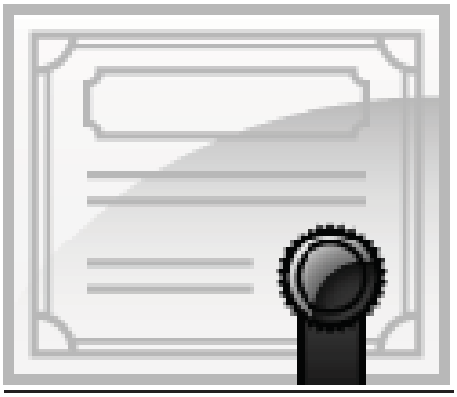
You want to make a good first impression. Appearance, good manners, appropriate attire, and enthusiasm for what you are doing will impress the judges. Judges often ask questions to test your insight into your projects

such as: “How did you come up with this idea? “What was your role?”, “What didn’t you do?”, “What further plans do you have to continue research?” and “What are the practical applications of your project?” Remember that the judges need to see if you understand the basic principles of science behind your project or topic area. They want to determine if you have correctly measured and analyzed the data. They want to know if you can determine possible sources of error in your project and how you might apply your findings to the ‘real’ world. Finally, the judges seek to encourage you in your scientific efforts and your future goals/career in science. Relax, smile and enjoy your time to learn from them and accept their accolades for your fine work.

Best Medicine Judging Criteria (points)

	Individual	Team
Creative Ability	30	25
Scientific Thought & Engineering Goals	30	25
Thoroughness	15	12
Skill	15	12
Clarity	10	10
Teamwork	----	16

AWARDS Ceremony: As courtesy to others, please do not leave the award ceremony prior to its conclusion.



There are MANY prizes for BEST Medicine participants!

3 - Grand Prize	Grades 11/12	
	9/10	
	6/8	
24 - First Prize (each category)	Grades 11/12	8 categories
Platinum	9/10	
Gold	6/8	
Silver		
Bronze		