Clinical Trials in a Nutshell

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Disclosure

- Research contracts with Hologic, Inc., Koios Medical Inc., GE Healthcare
- Advisory Board: iCAD, Inc., MaiData Corp.
- Royalties: Hologic, Inc.

Overview of presentation

- Discuss concept of clinical trials
- Overview of components
- Goal is to give you a basic understanding of a clinical trial so that you can participate as an investigator without feeling completely lost

What is a clinical trial

- Clinical trial is a research study performed in people with the goal of evaluating a medical technology
- Designed to prove or disprove a hypothesis
  - This requires two different conditions (arms) that participants are subjected to
    - All participants could be subjected to both conditions
    - Participants are randomized in one of the two conditions

Study Design (in a nutshell)

1. Form an hypothesis (A is better than B)
2. Power the study (number of patients)
3. Recruit patients to the study

- Record outcomes in the two study arms
  - Patient forms
- Statistically test the hypothesis using the results
  - Biostatistician

1. Hypothesis versus Null Hypothesis

- Hypothesis: A is better than B
- Null hypothesis: There is no difference between A and B
- Want to disprove null hypothesis:

$$|A-B| > 0$$

2. Trial Statistics (in one slide)

- Given a null hypothesis: $|A-B| > 0$
- Need to power the trial (# of patients) to have at least 80% confidence that we can disprove the null hypothesis
  - Type II error, accept null hypothesis when it is false (FN)
- Statistically, if we were to repeat the trial many times, then we want 95% of times $|A-B|>0$
  - Critical p-value, alpha = 0.05; want p-value < 0.05
  - Type I error, reject null hypothesis when it is true (FP)

3. Patient Recruitment

- Need to consent patients → IRB
  - Institutional Review Board
  - Approves all human subjects research
  - PI needs to submit a protocol for approval

What Does the IRB Do?

- They enforce the law: 45 CFR 46 (code of Federal Regulations)
- Protect the rights, privacy, and welfare of human participants in research
- Main responsibilities:
  - initial review
  - continuing review of research involving human subjects

Writing an IRB Protocol

- Similar to writing a grant (but less detail and less rigorous)
- Protocol contains:
  - Background
  - Hypothesis
  - Clinical significance
  - Method (outline only)
  - # of subjects
  - Statistical plan
  - Consent form
- Retrospective or Prospective study

Prospective study

- Patients will likely need to give consent
- A consent form will need to be written

Retrospective study

- De-identified data
  - Not human subjects research, if no research team member has access to patient identifiers
- Honest broker

- Will discuss in a few minutes

Types of Review by IRB Committee

(1) Exempt Review
- not human subjects research
- very low or no risk research

(2) Expedited Review
- low-risk
- don’t need to consent subjects

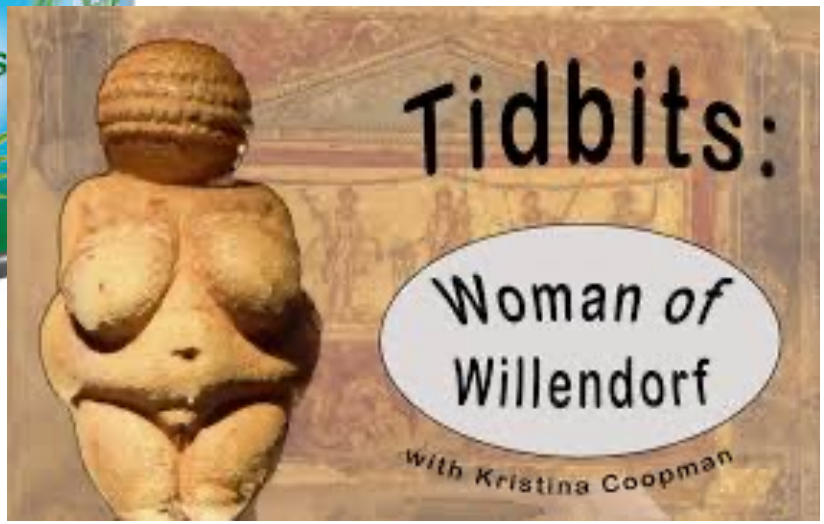
(3) Full Review
- patient consent needed

Other (Important) Tidbits

HIPAA
Health Insurance Portability & Accountability Act

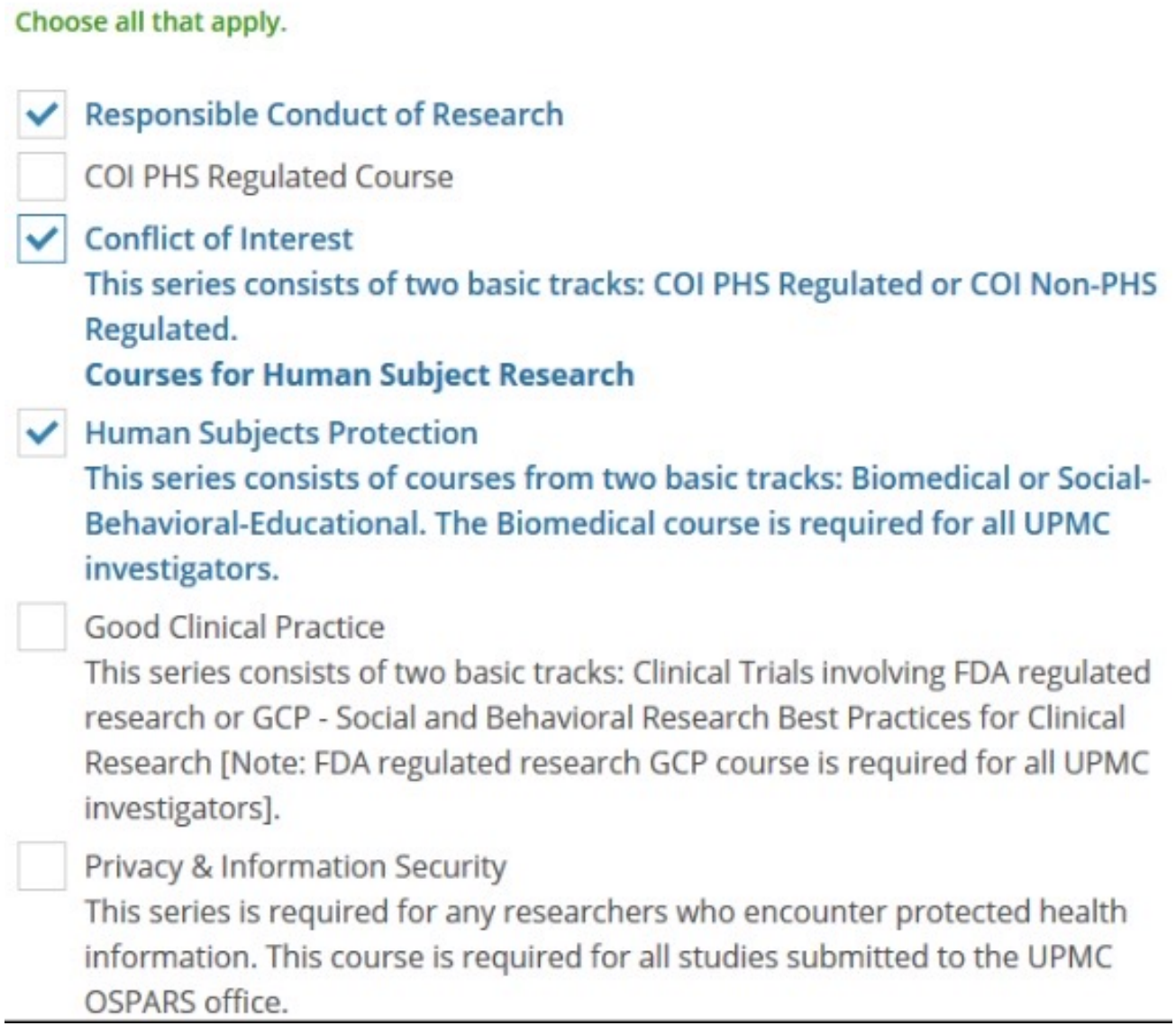
TIDBITS

TOP TECH TIDBITS
The Week's News in Adaptive Technology



CITI PROGRAM

CITI Training: Collaborative Institutional Training Initiative



HIPAA

- HIPAA = Health Insurance Portability & Accountability Act
- Provides data privacy and security
- PHI = protected health information
  - e.g., Name, medical record number, date of birth

Retrospective study

- De-identified data
  - Not human subjects research, if no research team member has access to patient identifiers
  - Cannot readily ascertain the identity of the individual(s) to whom the coded private information pertains
- Honest broker
  - Person not associated with the research project who de-identifies the data

Anonymize versus De-identify

- In practical terms:
  - Anonymize = remove or encode patient identifiers (PHI) so that patient cannot be identified based on identifiers
  - De-identify = modify patient data so that patient identification is not possible
    - e.g., AAPM member, diagnostic imaging, Full professor, 15213, Asian, male

Closing Thoughts

- Clinical trials are an essential component of medical research
- I encourage all AAPM members to participate in clinical trials
- You may still need to delve in deeper into these topics to fully participate in a clinical trial
- Education Council has identified several resources that you can use