أخلاقيات البحث العلمى
ETHICS IN MEDICAL RESEARCH

What we will discuss

- What is the research.
- Research article components.
- History of ethics in research.

What is research:

- Performing a methodical study in order to prove a hypothesis or answer a specific question.
- Finding a definitive answer is the central goal of any experimental process.

Research article components

- Title
- Abstract
- Introduction
- Methods.
- Results
- Discussion
- References.

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Estimation of sex from scapular measurements using chest CT in Egyptian population sample

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A B S T R A C T

Objectives: Sex is one of the most important aspects of a biological profile. Scapula is a short, flat bone that has not been given the same focus as other bones in anthropological studies to date. This research examined the use of scapular measurements obtained from chest CT to develop discriminant function equations specific for Egyptian population.

Materials and methods: Longitudinal (LL) and transverse scapular lengths (TL) were taken from 200 chest CTs (100 of each sex). Descriptive statistics and discriminant function analysis were developed for both dimensions.

Results and conclusion: When both dimensions were used in estimation of sex, this gave an accuracy of 87% in male and 95% in female with overall accuracy 91% in the estimation of both male and female sexes. When one dimension only was used, the TL was better than the LL in determining the sex. Thus, the discriminant function equation could be used in the estimation of sex from these measures and the scapula can play an important role in the estimation of sex. In addition, an equation specific to Egyptian population has been developed.

1. Introduction

Sex is one of the most important aspects of a biological profile, because it plays roles in age, stature, and ancestry estimations. In addition, it increases the possibility of identification of unknown persons. Accordingly, it is important to continue to improve and advance sex estimation techniques [1].

Anthropologists have widely used the morphological and the metric approaches to determine the sex from the skeleton; both approaches have proved to be very useful individually [2]. Due to its reproductive function, the examination of morphological characteristics of the bony pelvis is the most reliable technique for sex estimation [3]. The long bones and skull are the next most important anatomical regions to estimate biological sex [4]. However, skeletal remains found in archaeological or forensic contexts, are often incomplete due to conditions within the burial environment or other events, such as disarticulation, scattering, and commingling. Therefore, developing methods that allow the estimation of sex from a wide range of skeletal elements is essential [5].

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Forensic anthropologists recommended that all methods of sex determination should be independently tested for accuracy and precision [6]. It must also be reviewed and updated from time to time [7]. Many genetic and environmental factors are considered to influence the skeletal shape, including the effects of migration and heterosis, nutritional condition, and diet [8]. Changes in these factors may degrade the reliability of the method. Thus, sexing techniques should be tested only on the population group from which they were derived as the reliability of a discriminant function equation decreases when it is applied to another unrelated population group.

In Egypt, several bones were studied for sex determination as; hand bones [9], foot and patella [10], talus [11], calcaneus [12], femur [13], mandible [14], maxillary sinus [15] and pars petrosa ossis temporalis [16]. To our knowledge, this is the first study using scapula in the estimation of sex in modern Egyptian population.

The scapula is a short, flat bone. In spite of its higher chances over long bones to be preserved in chattered bodies, in cases of mass disasters, [17–19] it has not been given the same focus as other bones in anthropological studies. Consequently, we need to generate population-specific discriminant functions and sufficiently validate their classification's accuracy [20,21]. In this study, chest CT will be used to estimate sex from scapular measurements in Egyptian adults.

2. Materials and methods

The study was carried at Minia University Hospital in the period from December 2013 to June 2014. Chest CTs were taken for different medical purposes. Exclusion criteria included patient aged below 21 years, any old or recent scapular fractures, bone tumours or arthritis, pathological lesions such congenital and developmental dysplasia, metabolic bone diseases, connective tissue diseases and previous orthopaedic surgery to ensure normal bone evaluation. After explaining the purpose of the study to them, a written informed consent were taken from two hundreds patients (100 males and 100 females). Their ages, sexes and chest CTs were the only data used.

All patients underwent the same MDCT using 16-slice GE BrightSpeed machine (General Electric Company, Milwaukee, USA) with the same examination protocol using $64 \times 0.5\ mm^2$ collimation scanner with a gantry rotation speed of 400 ms/rotation, range of box 450–500, image thickness 0.5 mm, standard pitch factor of 0.641, reconstruction interval 0.5 mm. and total exposure time 6.949. Each scan was obtained with a tube voltage of 120 kV and 250 mAs.

Axial cuts were taken, and the reconstructed coronal and sagittal images were generated. To increase the accuracy of the measurements, post-processing volume rendering technique was used to obtain 3D reconstructed bones. Thus, the maximum length of the scapula (LL) and transverse length (TL) could be measured from the virtual bone.

4. Results

Age distribution among male cases was 48.18 ± 17.04 with a range of 62 (21–83) years and among female patients was 51.14 ± 15.77 with a range of 57 (52–82) years. Figs. 3, 4 and 5 show the distribution of LL and TL of scapula among males and females. Shapiro–Wilk test gave insignificant results for both LL and TL among males and females (p Value > 0.05), which indicates that data normality was not violated. Also, Levene's test gave insignificant results indicating equal variances of both dimensions in males and females (p Value > 0.05). Table (1) shows the means and standard deviations of LL and TL of the scapulae. Both dimensions were larger in males compared with the same measures of females. Highly significant sex differences were noticed in means of both LL and TL of the scapula (p Value < 0.001), indicating sexual dimorphism of scapular measures. However, there were insignificant correlations between both variables and age of the participants (p Value $= 0.279$ and 0.066 in LL and TL, respectively).

With regards to the discriminant function in determining sex from scapular measures; each variable was used separately at first, then, both variables were used concurrently. Box's M test for all was insignificant (p Value > 0.05). The result of the developed equations is considered male if the outcome is ≥ 0 and females if < 0 (as the number of cases of both male and female were equal).

Using LL alone, in determining sex, gave an accuracy of 87% in

5. Discussion

Estimation of sex is one of the four pillars of biological profiling and, is the first component to be assessed when rendering a biological profile from human skeletal remains. The other 3 pillars are age, ancestry, stature [23]. Estimation of sex is a crucial step in a biological profile as other aspects of the biological profile are sex-specific (e.g. stature and age) and cannot be adequately determined without this initial assessment [24].

This study developed discriminant function equations for estimation of sex for Egyptian population. These equations succeeded in the estimation of sex by using the scapula with an accuracy 89%, if LL was used alone and 90.5% in case of using the TL. This method can be used if scapula was fragmented and only one measure could be obtained. In cases of complete non-fragmented scapulae, sex can be estimated with an accuracy up to 91%.

Several works on the scapula of other populations were found that it gives good results in the estimation of sex using several measurements [25–30]. All of these studies took direct measurements from bony scapulae except for one study, which took measures from CT images. In a sample of American population, Dabbs and Moore-Jansen [25] determined sex from scapula with accuracy 91.5% in male and 93.6% in female with total accuracy 92.5%.

of the unknown. One limit of this work is that the sample was collected from only the attendants of Minia University Hospital who are mostly resident of Minia governorate. Further work that may collect a larger sample involving different areas of Egypt is recommended.

Conflicts of interest

None.

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References

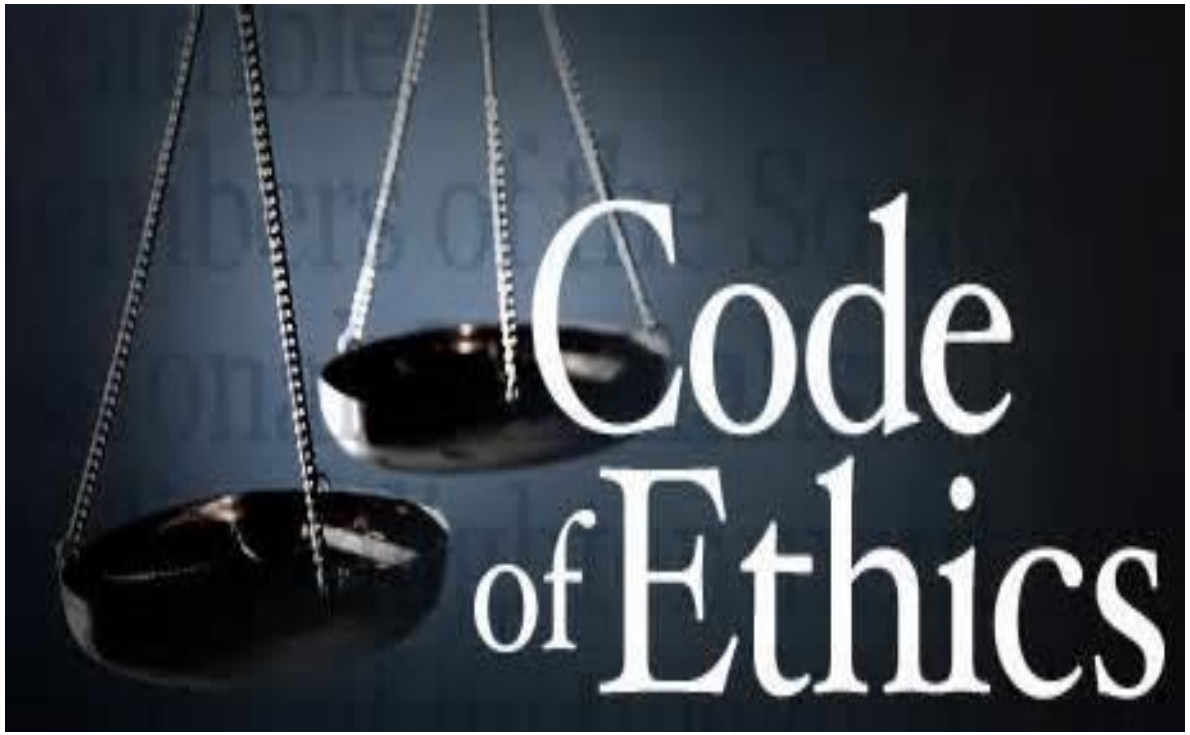
[1] Marik PE, Kory P, Varon J. Does vitamin D status impact mortality from SARS-CoV-2 infection? Med Drug Discov 2020;6:100041.

[2] Ali N. Role of vitamin D in preventing of COVID-19 infection, progression and severity. J Infect Public Health 2020;13:1373–80.

[3] Martineau AR, Jolliffe DA, Hooper RL, Greenberg L, Aloia JF, Bergman P, et al. Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. BMJ 2017;356:i6583.

[4] Fasano A, Cereda E, Barichella M, Cassani E, Ferri V, Zecchinelli AL, et al. COVID-19 in Parkinson's disease patients Living in Lombardy, Italy. Mov Disord 2020;35:1089–93.

HISTORICAL EVENTS AND DEVELOPMENT OF CODE OF ETHICS



1. NAZI MEDICAL EXPERIMENTS (1933-1945)

(Horrific experiments were carried out in concentration camps

by fascist doctors in Germany and Japan during the 1939-45 war)

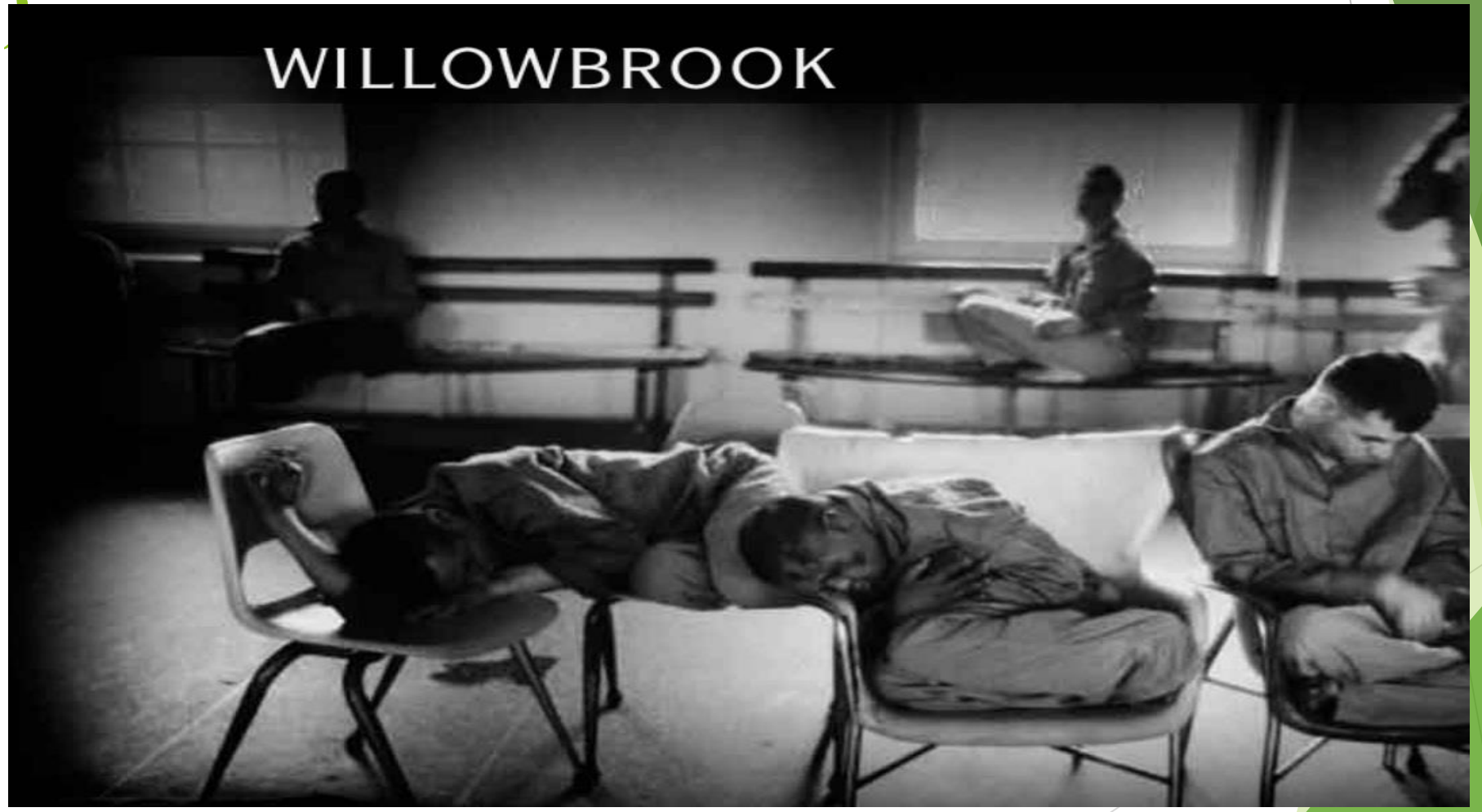
- ***Medical experiments involved exposing to high altitudes, freezing temperature, malaria, poisons, typhus fever, untested drugs and surgery without anaesthesia***
- ***Selection of subjects was racially based***
- ***Subjects had no opportunity to refuse the participation.***

- **Mistreatment of human subjects in Nazi experiments led to the development of Nuremberg Code (1947)**

International code of ethics NUREMBERG CODE-1947

- **Nuremberg Code contains 10 guidelines**
- **Voluntary consent**
- **Withdrawal of subjects from study is possible**
- **Protection of subjects from physical and mental suffering, injury, disability, and death.**
- **The balance of benefits and risks in the study.**
- The experiment should be conducted only by scientifically qualified persons
- The experiment should be so designed and based on the results of animal experimentation
- During the course of the experiment the scientist in charge must be prepared to terminate the experiment at any stage, if continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.
- The experiment should be such as to yield fruitful results for the good of society.

2. WILLOW-BROOK STUDY (1950-1970)

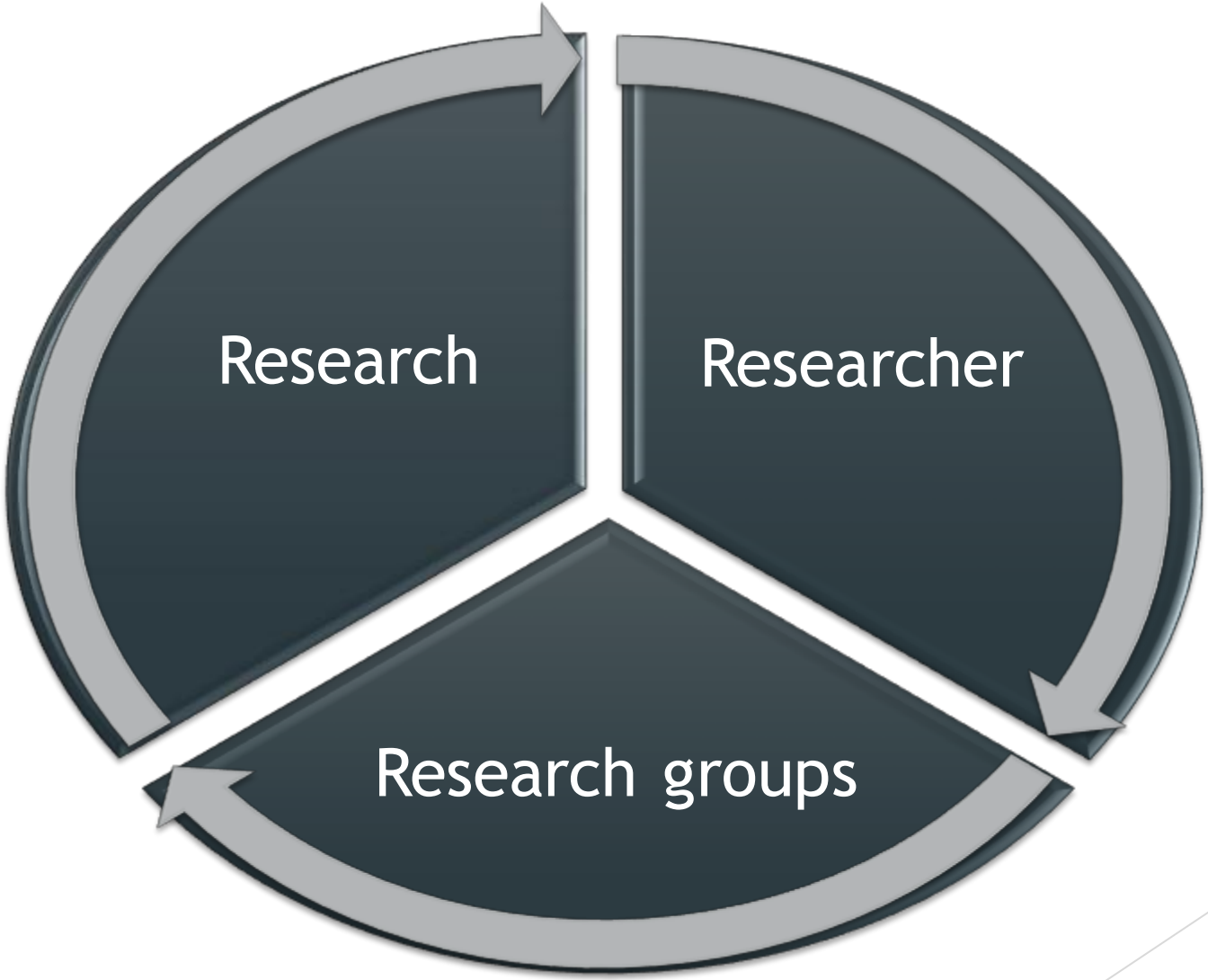


- **Research on hepatitis by Dr. Krugman at Willowbrook among mentally retarded children**
- **The researcher also wanted to determine the effectiveness of gamma globulin injections as protection against hepatitis.**
- **Early subjects were fed extracts of stool from infected individuals**
- **Later subjects received injections of purified virus**
- **Parents were forced to give permission for the child to be a subject.**

DECLARATION OF HELSINKI (1964)

- Greater care can be exercised to protect subjects from harm
- Strong, independent justification for exposing a healthy volunteer to substantial risk of harm
- Investigators must protect life and health of research subjects

Items of research



Ethics concerned the research:

- Researcher
- Research
- Target group

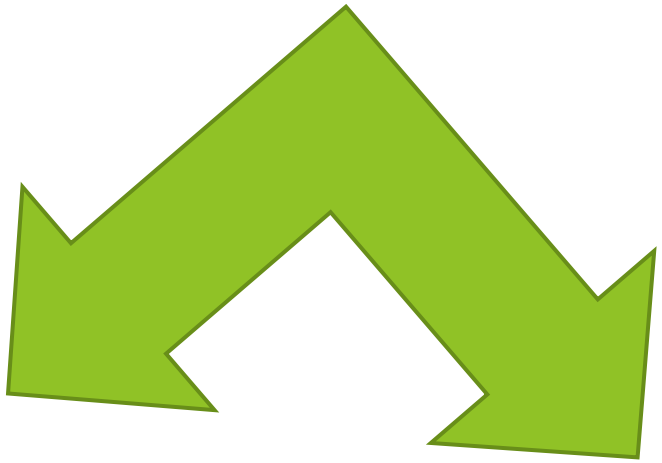
Ethics concerned the research itself:

- Follow scientific guidelines in the research.
- The research provides better alternative for the approved and used one.
- Follow the instructions as regard the environment.
- Don not violate religious rules.

The researcher should be:

- Well qualified and highly specialized.
- Collect all available data regarding the point of research.
- Follow scientific stages of the research.
- Respect research groups.
- Do not plagiarize the work of another research.

The research group: it is divided into



Animals

Human

subgroups

##children

###pregnant

####prisoners

Animals:

- Select the suitable number (not more not less to give significant statistical results).
- Suitable species.
- Do not perform more than one experiment on the same animal.
- Use the least harmful maneuver with animals.
- Use suitable food and care for the animals.
- If the experiment involves killing the animal, use non-painful technique.

Human

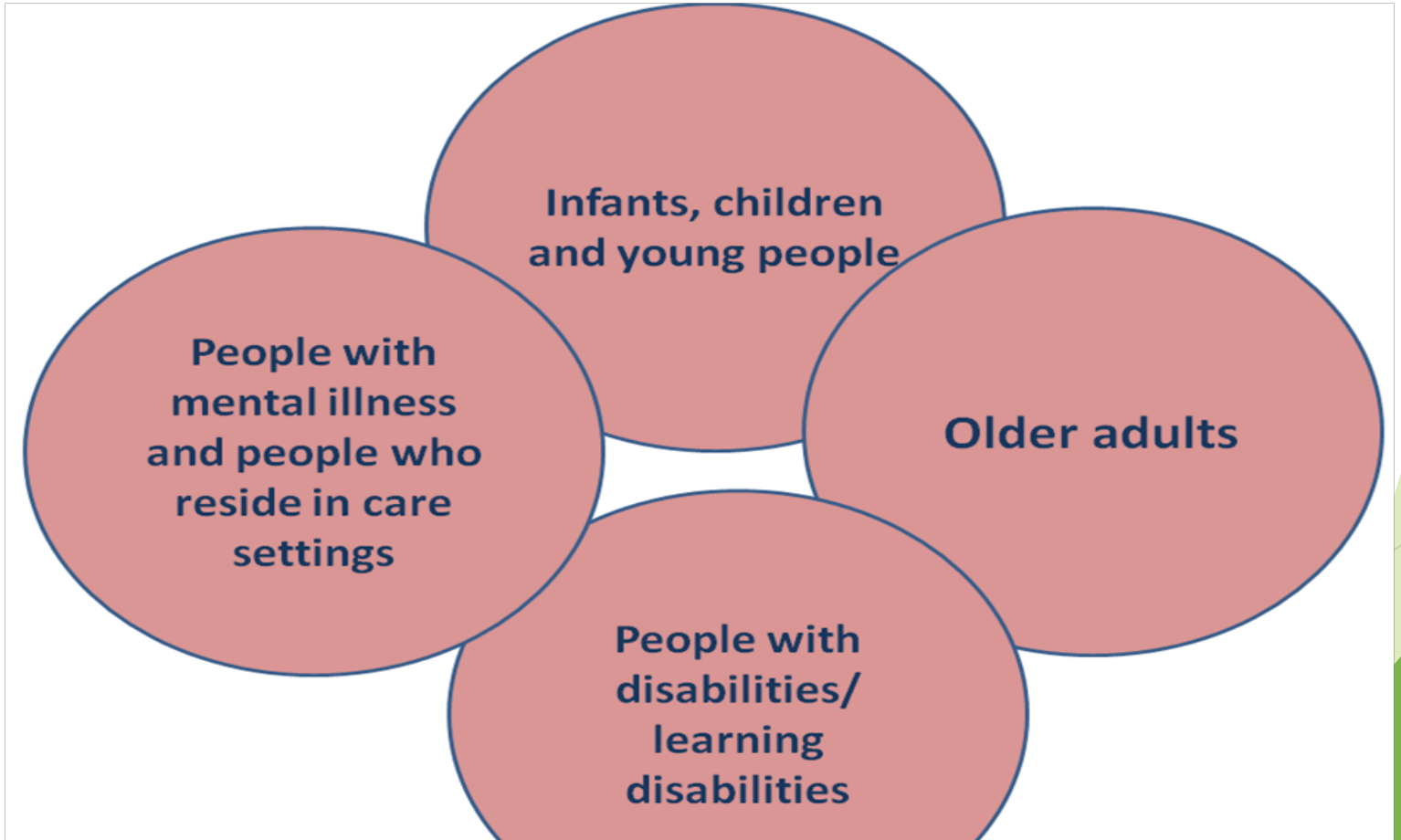
- Perform the experiment on animals before start to be tested on human.
- Obtain written **consent**:
  - Written in clear, simple language and must be explained to the volunteer by the research.
  - Contains research title, aim, procedures or steps, any side effects, and benefits of the research.
- Allow the volunteer to withdraw from the research at any time without threats or punish.

- Evaluation of the balance between the benefits and risk factors of the research.
- Suitable numbers of volunteers.
- Keep patients and volunteer’s data secret.
- Do best to minimize side effects and risk factors.
- Respect social and religious aspects of volunteers.
- Determine the point in which the research must stop.
- The main object of the volunteer is not gaining money.
- If any harm will occur, he/she will be compensated

Research on human :

- **Experimental study:** For example, in a clinical trial of a new vaccine, the investigator may randomly assign some of the participants to receive the new vaccine, while others receive a placebo shot. The investigator then tracks all participants, observes who gets the disease that the new vaccine is intended to prevent, and compares the two groups (new vaccine vs. placebo) to see whether the vaccine group has a lower rate of disease.
- **Observational study**: the epidemiologist simply observes the exposure and disease status of each study participant. Example: cohort studies
  - **Prospective study:** Informed consent will be taken from patients. In case of incompetent patients, the informed consent will be taken from the guardians.
  - **Retrospective study:** Confidentiality of records will be considered
- All drugs used in the research are approved by the Ministry of Health

VULNERABLE SUBJECTS: sub-segment of the general public requiring maximum care and particular special protections in research. Vulnerable population require close and careful attention during the clinical trial design with high quality observation methods of overall safety and efficacy strategies ensuing research



Children:

- In addition to the roles that followed in adult ones; the following should be done:
  - If the research is not applicable on adult.
  - This age group should gain the benefits of the results of the research.
  - Consent is obtained from the guardians.

Pregnant and lactating women:

- Consent is obtained from wife and husband.
- Inability to perform the experiment in non-pregnant women.
- Benefits of the research focus on this group.
- No risk to the infant and children.

Prisoners:

- Prisoners must obtain full medical care.
- Consent.
- Do not use any collected data against the prisoners.
- Have the full rights as free person

When to stop the research

- It is impossible to reach the main aim of the research.
- Endanger the life of the participants.
- The risk of the research is much more than its benefits.

Ethics of stem cell research

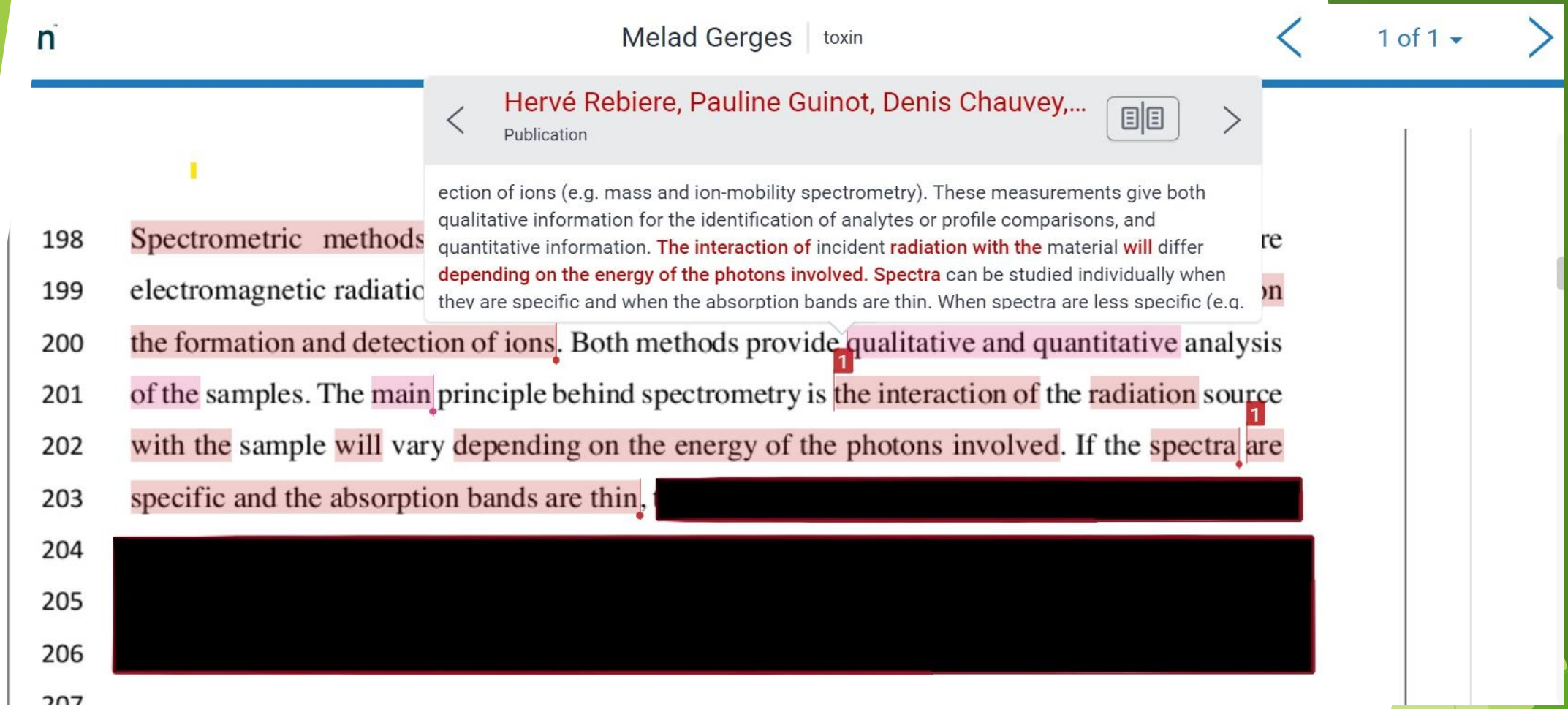
- Source: embryo or adult
- Consent of mother for cord blood should be taken
- Consent from couple in spare embryo should be taken
- Should be used in treatment only not for cloning

Areas of Academic misconduct

1. Plagiarism
2. Fabrication
3. Falsification
4. Non-publication of data
5. Faulty data-gathering procedures
6. Poor data storage and retention
7. Misleading authorship

Research misconduct

- *Fabrication is making up data or results and recording or reporting them.*
- *Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or* results.
- *Plagiarism is the use of another person's ideas, processes, results, or words without giving* appropriate credit and presenting them as your own.



PLAGIARISM CHECKER: as turnitin

Non-Publication of data

- Data not included in results because they don’t support the desired outcome

Authorship…

Misleading authorship—who should be an author?

- Technicians do not necessarily become joint authors.
- Authorship should involve only those who contribute directly.
- Discuss authorship before the project!

- Publication of the thesis
  - Should be regarded as the student's work
  - Students should be listed as primary authors
- Dual publication – a manuscript should only be published in a single journal
- Proper and complete referencing is an essential part of any research publication.
- Deliberate omission of an author or reference is unethical and unacceptable.

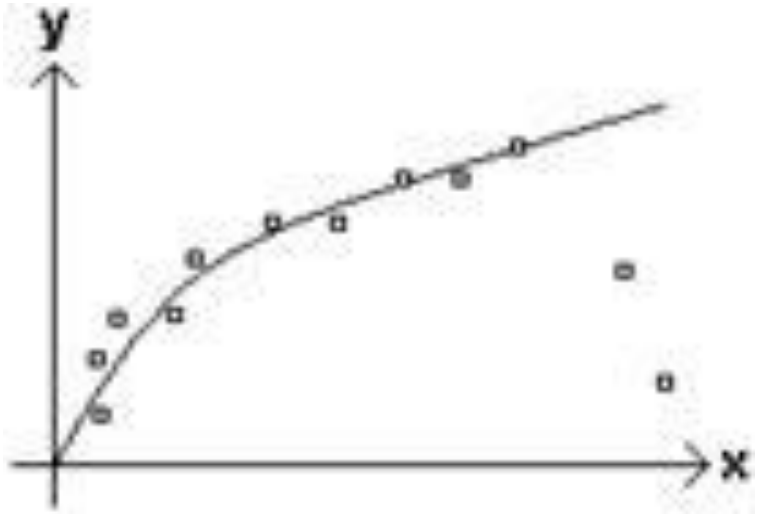
Ethics of clinical trial & drug development

1. experimentation on animals at first (preclinical study).
2. Follow 4 phases:

- Phase I:Healthy volunteers (10-80)
- Phase II: Diseased (100-300)
- Phase III: Diseased (1000-3000)
- Phase IV: After license and marketing

Case 1

- Two graduate students have made some measurements on a new material. The data points are as shown. To prove their hypothesis the results should lie on the curve shown. The two students considered omitting the two data points which were off the theoretical curve.



- Unethical as it would amount to falsification of data
- Should include outliers and give probable reasons or find out statistically acceptable ways of trimming outliers

case 2

A group of medical students conducted a research on the awareness of diabetic diet in medical clinic participants. Their research was recognized as the best undergraduate research and later they submitted the same research paper to two different journals to see which journal publishes it first.

- Unethical as:

  -it would give a false idea of the number of publications in each area

  -wasting of resources on the review and publication process

- Should submit to one journal and wait for response prior to submitting to another


Thank You!