Institute of Legal Medicine, University Medical Center
Hamburg-Eppendorf/Germany

8th Interdisciplinary Forensic Summer School 1st – 5th July 2019

Forensic science: fostering evidence-based practice in the East African region

A South-South/ South-North partnership between Rwanda, Uganda and Germany

Universitätsklinikum Hamburg-Eppendorf

in cooperation with

UNIVERSITY OF RWANDA

8th Interdisciplinary Forensic Summer School
1st – 5th July 2019

Theme: "Forensic science: fostering evidence-based practice in the East African region- A South-South/ South-North partnership between Rwanda, Uganda and Germany"

School of Medicine and Pharmacy
College of Medicine and Health Sciences
University of Rwanda (UR)

Kampala International University (KIU)

and

Institute of Legal Medicine, University Medical Center
Hamburg-Eppendorf/Germany

In cooperation with

Department for Psychiatry and Psychotherapy, Center for Psychosocial Medicine, University Medical Center Hamburg-Eppendorf

Clinic of Ophthalmology, University Medical Center Hamburg-Eppendorf

Center for Mental Health, University of Rwanda

National Commission for the Fight against Genocide/Rwanda

Rwanda Forensic Laboratory; Rwanda National Police

Supported by

DAAD Deutscher Akademischer Austausch Dienst
German Academic Exchange Service

General information

Venue:
Nobleza Hotel I Kicukiro District I Kigali I Rwanda

Date:
July, 1st – 5th, 2019

Organizing Institutions:
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf/Germany (UKE)

School of Medicine and Pharmacy,
College of Medicine and Health Sciences
University of Rwanda (UR)

Kampala International University (KIU)

Collaborating Institutions:
Clinic and Polyclinic for Psychiatry and Psychotherapy,
University Medical Center Hamburg-Eppendorf/ Germany (UKE)

Clinic of Ophthalmology, University Medical Center Hamburg-Eppendorf (UKE)

Rwanda Forensic Laboratory; Rwanda National Police

National Commission for the Fight against Genocide/Rwanda (CNLG)

General information

Chairpersons

Prof. Stephen Rulisa, MD, PhD
Dean of the School of Medicine and Pharmacy,
College of Medicine and Health Sciences, University of Rwanda (UR)
Email: s.rulisa@gmail.com

Prof. Patrick Kyamanywa
Deputy Vice Chancellor
Kampala International University- Western Campus
Email: pkyamanywao@gmail.com

Prof. Dr. med. Klaus Püschel,
Director, Institute of Legal Medicine,
University Medical Center Hamburg-Eppendorf,
Butenfeld 34, 22529 Hamburg / Germany
Email: pueschel@uke.de

Congress Organization Committee

Prof. Dr. Klaus Püschel
Institute of Legal Medicine
University Medical Center Hamburg-Eppendorf, Germany

Oliver Krebs
Institute of Legal Medicine
University Medical Center Hamburg-Eppendorf, Germany

Prof. Dr. Martin Spitzer
Clinic of Ophthalmology,
University Medical Center Hamburg-Eppendorf (UKE)

Dr. Herbert Mushumba
Institute of Legal Medicine
University Medical Center Hamburg-Eppendorf, Germany

Prof. Dr. Ingo Schäfer
Institute of Legal Medicine
University Medical Center Hamburg-Eppendorf, Germany,
Department for Psychiatry and Psychotherapy, Center for Psychosocial Medicine, University Medical Center Hamburg-Eppendorf

Prof. Dr. Stephen Rulisa, MD, PhD
Dean, School of Medicine and Pharmacy
College of Medicine and Health Sciences, University of Rwanda

Prof. Dr. Leon Mutesa, MD, PhD
Director of Center for Medical Genetics
School of Medicine and Pharmacy, University of Rwanda

Prof. Dr. Patrick Kyamanywa
Deputy Vice- Chancellor
Kampala International University- Western Campus

Prof. Dr. Vincent Sezibera, PhD
Department of Clinical Psychology,
College of Medicine and Health Sciences, University of Rwanda

School of Medicine and Pharmacy,
College of Medicine and Health Sciences,
University of Rwanda

July 2019

Ladies and Gentlemen,

It is with great privilege and honor to welcome you to this year's interdisciplinary forensic summer school hosted by the School of Medicine and Pharmacy, College of Medicine and Health Sciences, University of Rwanda.

This year's summer school, the 8th of its kind with the theme "Forensic science: fostering evidence-based practice in the East African region- A south-south/ south-north partnership between Rwanda, Uganda and Germany", will be held thanks to renewed funding from the German Academic Exchange Service (DAAD) for the project period 2019-2022.

Under the existing memorandum of understanding between the University of Rwanda (UR) and the Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf (UKE), we at the University of Rwanda are grateful to the DAAD that the project scope has been expanded to include the Kampala International University (KIU) so as to foster a south-south/south-north partnership between Rwanda, Uganda and Germany, aimed at improving forensic science practice in the greater East African Region.

As has been the norm, theoretical lectures and practical sessions in the fields of forensic pathology, forensic DNA, toxicology, mass disaster victim identification, legal issues concerning tissue harvesting and transplantation as well as forensic medical education and research will be delivered by experts from UR, KIU and UKE.

On behalf of School of Medicine and Pharmacy and my own behalf, I would like to thank all partners for the continued effort to make this year's summer school a success as well as encourage the participants to value this course.

Words of Welcome

Thank you all

Prof. Stephen Rulisa, MD, PhD
Dean, School of Medicine and Pharmacy
College of Medicine and Health Sciences
University of Rwanda

Kampala International University,
Western Campus

July 2019

Ladies and Gentlemen,

It gives me great pleasure to share a word of welcome from Kampala International University in Uganda. It is almost ten years now since we started the collaboration between the Institute of Legal Medicine at the University of Hamburg – Eppendorf in Germany and the School of Medicine and Pharmacy at the University of Rwanda. This year we are witnessing the budding of a South-South-North capacity building network, which will be capable of great innovations using a rich mixture of western and local ideas to find local solutions to local problems. The contextualization of the knowledge exchanged is vital not only for applicability but also for sustainability. The south-south component of the collaboration makes this and the comparison of experiences and transformational changes much easier to realize.

We remain very grateful to Prof. Klaus Pueschel for his great vision and leadership, and for believing that this collaboration was timely and relevant to the Great Lakes region. I also extend our appreciation to the team from Germany which has year after year been able to spare time to come and share

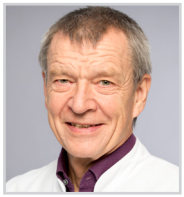
their knowledge and expertise with us. Many thanks to the Rwandan team led by Prof. Leon Mutesa for the consistent excellent management of the collaboration and sustenance of the interest of the young scientists in Rwanda in the field of Forensic and Legal practice.

This year we are pleased to welcome onboard the participants from Uganda. I challenge you to multiply this seed so as to influence practice and interest back home as well as building networks with the Rwanda and German colleagues that will find solutions to the many challenges in the field of forensic and legal practice. Special welcome to the AIGP Dr. Moses Byaruhanga and Dr. Samuel Kalungi who are at the fore front of forensic medical practice in Uganda. Your willingness to be a part of this effort is very much appreciated. Lastly I wish to thank the DAAD for the continued funding that makes this exchange possible and the University of Rwanda for hosting us. I hope we can one day host this activity and you all in Uganda.

I wish you all an exciting and enriching time.

Prof. Patrick Kyamanywa
Deputy Vice Chancellor
Kampala International University, Western Campus

Faculty of Medicine,
University Medical Center Hamburg-Eppendorf



July 2019

Dear friends,

Good news: The German Academic Exchange Service (DAAD) decided recent-

ly to support our project for an additional 4-year-period of cooperation. And the Foundation for the Promotion of Science and Culture in Hamburg promotes our training and coaching for scientists from Rwanda, who spend a study period at the Institute for Legal Medicine in Hamburg. Last but not least, the Witt-Foundation sponsors activities concerning tissue explantation and transplantation in Rwanda. This must be in concordance with law and ethics. Our partners and counsellors come from the Ministry of Health and Ministry of Justice in Rwanda. We think this is a very comprehensive and encouraging approach.

We highly appreciate to be in Rwanda again. It's a great honour for our team from Hamburg to welcome all participants to this year's 8th Forensic Summer School. The cooperation between the universities as well as police, justice, governmental and non-governmental organisations and between the societies of our countries has developed in a very positive, sustainable, institutional and especially personal way on the basis of mutual exchange, acceptance, confidence, loyalty and friendship. And we proudly announce that we extended our activities to Uganda under the auspices of Professor Patrick Kyamanywa.

We express our gratitude to our partners at the University of Rwanda. Thanks for their tremendous work to make this conference possible. Thanks, too, to all our co-workers in Kigali, Kampala, Hamburg and Hannover, who have selflessly contributed their creativity, knowledge, and experience. Last but not least we are grateful especially to the DAAD for their idealistic and financial support.

This year's topic will again combine basic aspects of forensic pathology, identification, toxicology, DNA-technology, quality management, post-graduate education and psychosocial care are presented. Crime investigation technology is deepened especially under practical points of view and in a workshop atmosphere. From the point of view of psychosocial care different aspects of posttraumatic stress disorder are discussed. We are very happy that this fo-

Words of Welcome

rensic-medical conference is expanded on other fields of cooperation, especially anthropology, conservation and preservation – in close cooperation with CNLG, the Commission against the Fight of the Genocide - and clinical ophthalmological aspects of cornea explantation and transplantation – in close cooperation with the Ministry of Health and the Ministry of Justice as well as ophthalmological clinicians. We signed a new memorandum of understanding and contracts for the exchange of academic start-ups, PhD-students and postdocs.

Our common plan is to build up an Institute of Legal Medicine in Kigali according to international standards and based on intensive cooperation of the following authorities in Rwanda: the university, the Ministry of justice, the police, the Ministry of Interior, the CNLG. The CNLG is our essential partner for the activities concerning anthropology, archaeology, preservation and human remains. It is an acknowledged political goal to form a center of excellence in Kigali. Forensic medicine serves as an important factor of internal security and plays an important role in a peaceful society. Institutional and political support is precious and prerequisite for transnational activities. – The newly established highly sophisticated Forensic Laboratory represents a very promising development.

We wish everybody an interesting and creative conference in a very stimulating atmosphere in this wonderful city of Kigali, in Rwanda within the heart of Africa at the roots of modern humans and the "Cradle of Humankind".

Yes, we can... Rwanda first!

Prof. Dr. Klaus Püschel
Director, with the team of the Institute of Legal Medicine
University Medical Center Hamburg-Eppendorf

Lectures

First Day: Open Day 9h – 17h10 Monday, 1th of July 2019 Venue: Hotel Nobleza/ Kigali		
Time	**Duration**	**Title, Lecturer**
9h	30 mins	**Registration** Participants
Session 1: Forensic Pathology/Anatomy		
9h30	20 mins	**Keynote address,** Contribution of Forensic Pathology in Rwanda Society, J. Byukusenge
9h50	10 mins	**Evaluation of Bilateral Asymmetry in the Humerus of Human Skeletal Specimens,** Dr. S. Dare
10h	10 mins	**Haemorrhage as a Cause of Sudden Non-traumatic Death,** A. Ron
10h10	10 mins	**Medico-legal Aspects in Dark-skinned Persons whose Deaths were Investigated at the Hamburg Institute of Legal Medicine: A Retrospective Study,** Dr. H. Mushumba
10h20	10 mins	**Sudden Cardiac Death, Emphasis on Hypertensive Obstructive Cardiomyopathy,** A. Fitzek
10h30	30 mins	**Break**
11h	10 mins	**Rape in Context of Warlike Conflicts,** A. Fitzek, A. Ron
11h10	10 mins	**Assessment of Challenges Faced in Performing of Autopsies in Rwanda**, A. Ntakiyiruta
11h20	20 mins	**Q & A Session 1**
Session 2: Forensic Anthropology		
11h40	20 mins	**Keynote address, Differentiating Human and Nonhuman Bones: A Gross Morphological Comparison of Human, Gorilla and Goat Bones,** Y. Mutabazi Tumukunde
12h	10 mins	**Preserving Memory through Partnerships in Forensic Science,** Dr. JD Gasanabo
12h10	10 min.	**Fundamentals in the Creation and Development of Basic Forensic Capabilities Inside a Forensic Institution – Challenges and Way Forward in the Case of Rwanda Forensic Laboratory,** J. Ashimirwe

Lectures

12h20	10 mins	**Determination of Age and Sex of Selected Human Remains using Forensic Morphological and Anthropological Characteristics,** PC Nsanzurwimo
12h30	20 mins	**Q & A Session 2**
12h50	60 mins	**Lunch**
Session 3: Physical Evidence; Organ and Tissue Transplantation		
13h50	20 mins	**Keynote address, Anatomy of the Cornea and Penetrating Keratoplasty,** Dr. M. Casagrande
14h10	10 mins	**Forensic Examination of Bloodstain Patterns (Experiments, Interpretations and Analysis),** F. Kagame
14h20	10 mins	**Legal and Ethical Issues Relating to Organ Transplantation: Rwandan Perspective,** Dr. Paul N. Musila Nthenge
14h30	10 mins	**Effectiveness of Handwriting Characteristics for fixing the Authorship in Cases of Handwriting Disguise,** A. Habumugisha
14h40	10 mins	**Identification of Criminals Using Forensic Fingerprint Analysis,** G. Rwamurangwa
14h50	20 mins	**Q & A Session 3**
Session 4: Psychotrauma/Psychology/PTSD		
15h10	20 mins	**Keynote address, Understanding Trauma 25 Years after the Genocide Committed against the Tutsi in Rwanda: Morbidity and Treatment Seeking,** Prof. V. Sezibera, Prof. Schäfer
15h30	20 mins	**Break**
15h50	10 mins	**Role of Horticulture Therapy in Mental Health and Stress Management,** Prof. E. Bantu
16h	10 mins	**Beyond Gender: Female Perpetrators in the 1994 Genocide against the Tutsi,** Dr. C. Cassady
16h10	10 mins	**Trauma Victims of Human Trafficking,** J. Kalisa
16h20	10 mins	**Protection Factors of Resilience for the Minors Incarcerated in Nyagatare Juvenile prison in post-genocide Rwanda,** A. Mukamana

Lectures

16h30	10 mins	**The Role of the Community Resilience Model Skills Trainings in Trauma Healing among 1994 Genocide against the Tutsi Survivors in Rwanda,** S. Mashyaka
16h40	20 mins	**Q & A Session 4**
17h	10 mins	**Information for the next day,** Prof. Mutesa/ Prof. Kyamanywa/ Prof. Pueschel
Second Day **09h – 16h40 Tuesday, 2nd of July 2019** **Venue: Nobleza Hotel/ Kigali**		
Time	**Duration**	**Title, Lecturer**
9h	30 mins	**Registration of participants**
Opening Ceremony		
9h30	5 mins	**Opening remarks ,** Prof. L. Mutesa
9h35	5 mins	**Opening remarks ,** Prof. P. Kyamanywa
9h40	5 mins	**Opening remarks ,** Prof. S. Rulisa
9h45	5 mins	**Opening remarks ,** Prof. K. Pueschel
9h50	5 mins	**Opening remarks ,** Representative of RFL
9h55	5 mins	**Opening remarks ,** Representative of CNLG
10h	5 mins	**Opening remarks ,** Representative of the German Embassy
10h05	5 mins	**Opening remarks ,** Representative of UR
10h10	5 mins	**Opening remarks ,** Prosecutor General/ Rwanda
10h15	5 mins	**Guest of Honor**
10h20	30 mins	**From Idea to Implementation – Cleaning and Presentation of the Human Remains from Murambi, Rwanda,** M. Lehmann, D. Schaarschmidt, M. Muhoza, R. Rurenzi
10.50 a.m.	40 min.	**Group photo/ Coffee Break**

Session 5: DNA		
11h30	20 mins	**Keynote Address, One Year Experience of DNA Testing in Rwanda Forensic Lab: Retrospective study on received cases,** A. Ndungutse, K.U. Kabayiza
11h50	10 mins	**DNA Databank- Towards Vision of Justice: Legal and Ethical issues,** Dr. T. Murangira
12h	10 mins	**Enhancing Justice through Forensic Evidence and Databases,** E. Niyibizi
12h10	10 mins	**CpG for ID: Molecular Techniques for DNA Methylation and Profiling in Forensic Casework** A. Uzabakiriho
12h20	10 mins	**Prospective Study of Twin Zygosity DNA Testing using Genetic Analyzer 3500: Cases from National Police College Forensic Laboratory,** S. Mashyaka
12h30	10 mins	**Forensic Determination of the Degree of Similarity between Monozygotic and Dizygotic Twins' Fingerprints,** T. M. Akimana
12h40	10 mins	**Prospective Study of Paternity Testing with Paternal Grandparents using Genetic Analyzer 3500, E. Ndacyayisenga**
12h50	20 mins	**Q & A session 5**
13h10	60 mins	**Lunch**
Session 6: Toxicology		
14h10	20 mins	**Keynote Address, Study of Poisonous Plants in Rwanda: A Comprehensive Approach to Forensic Botany and Toxicology,** Dr. J. Kabera
14h30	10 mins	**Cancer amongst Ugandans is Associated with Increased Pb and Cd Contamination in Food and Drinking Water,** K. I. Kasozi
14h40	10 mins	**Qualitative and Quantitative Analysis of Hydrogen Cyanide from Manihot Esculenta Crantz (Cassave plant),** G. Niyonzima
14h50	10 mins	**Low Concentrations of Probiotics (Yoba®) are safe in male Drosophila melanogaster,** K.I. Kasozi

15h	20 mins	**Q & A session 6**
15h20	20 mins	**Break**
Session 7: Child Abuse		
15h40	20 min.	**Keynote address, The Medico-legal Approach to Child Abuse,** Jan P. Sperhake
16h	10 mins	**Use of Forensic Evidence in Identification of Child Sexual Abuse Cases,** C. Abimpuhwe
16h10	20 mins	**Q & A session 7**
16h30	10 mins	**Informations for the next day,** Prof. Mutesa/ Prof. Kyamanywa/ Prof. Pueschel

Workshops

Third Day: Workshops in parallel sessions 9h – 17h Wednesday, 3rd of July 2019	
Autopsy **Venue:** Autopsy Hall – Kacyiru Hospital **Designated Teachers:** Dr. F. Hakizimana, Dr. V. Higiro, Dr. A.S. Schröder, Dr. H. Mushumba, A. Fitzek, A. Ron, Dr. A. Heinemann, Prof. J. Sperhake, Prof. K. Püschel **Participants:** Group 1	
9h – 11h30	**Workshop: Practical autopsy session (1)**
11h30 – 12h	**Coffee Break**
12h – 13h	**Workshop: External examination of a cadaver**
13h - 14h	**Lunch**
14h – 17h	**Workshop: Practical autopsy session (2)**
Autopsy / Forensic reconstruction / GBV / Child abuse **Venue:** Hotel Nobleza or School of Public Health **Designated Teachers:** A. Fitzek, A. Ron, Prof. J. Sperhake, Dr. A. Heinemann, Dr. H. Mushumba, Prof. K. Püschel, Dr. A.S. Schröder **Participants:** Group 2	
9h – 11h	**Workshop: External Examination and Autopsy Techniques** A. Fitzek, A. Ron
11h – 11h30	**Coffee Break**
11h30 – 13h	**Workshop: Child Abuse/GBV** Prof. Jan Sperhake
13h - 14h	**Lunch**
14h – 17h	**Workshop: Forensic Reconstruction** **Crime Scene, Weapon and Corpse-Casework** **Experience with Forensic Imaging** Dr. Axel Heinemann

Workshops

Fourth Day: Workshops in parallel sessions 9h – 15h30 Thursday, 4th of July 2019	
Autopsy **Venue:** Autopsy Hall – Kacyiru Hospital **Designated Teachers:** Dr. F. Hakizimana, Dr. V. Higiro, Dr. A.S. Schröder, Dr. H. Mushumba, A. Fitzek, A. Ron, Dr. A. Heinemann, Prof. J. Sperhake, Prof. K. Püschel **Participants:** Group 2	
9h – 11h30	**Workshop: Practical autopsy session (1)**
11h30 – 11h45	**Coffee Break**
11h45 – 12h30	**Workshop: External examination of a cadaver**
12h30 - 13h30	**Lunch**
13h30 – 15h30	**Workshop: Practical autopsy session (2)**
Autopsy / Forensic reconstruction / GBV / Child abuse **Venue:** Hotel Nobleza or School of Public Health **Designated Teachers:** A. Fitzek, A. Ron, Prof. J. Sperhake, Dr. A. Heinemann, Dr. H. Mushumba, Prof. K. Püschel, Dr. A.S. Schröder **Participants:** Group 1	
9h – 11h	**Workshop: External Examination and Autopsy Techniques** A. Fitzek, A. Ron
11h – 11h30	**Coffee Break**
11h30 – 12h30	**Workshop: Child Abuse/GBV** Prof. Jan Sperhake
12h30 - 13h30	**Lunch**
13h30 – 15h30	**Workshop: Forensic Reconstruction** **Crime Scene, Weapon and Corpse-Casework** **Experience with Forensic Imaging** Dr. Axel Heinemann

Workshops

Third and fourth Day: Workshops in parallel sessions 9h – 17h Wednesday, 3rd and 9h – 15h30 Thursday, 4th of July 2019	
Trauma and PTSD **Venue:** Hotel Nobleza **Designated Teachers:** Prof. V. Sezibera, Prof. I. Schäfer	
9h – 11h	**Workshop**
11h – 11h30	**Coffee Break**
11h30 – 13h	**Workshop**
13h - 14h	**Lunch**
14h – 17h	**Workshop**
Ophthalmology/ Cornea Transplant **Venue:** Rwanda Military Hospital (RMH) **Designated Teachers:** Dr. Alex Nyemazi, Dr. Maria K. Casagrande	
9h – 11h	**Workshop**
11h – 11h30	**Coffee Break**
11h30 – 13h	**Workshop**
13h - 14h	**Lunch**
14h – 17h	**Workshop**
Fifth Day: Closing Ceremony **9h – 12h Friday, 5th of July 2019**	
9h – 12h	**Final Lectures and Comments** **Awarding of Certificates**

Scientific and Social Meeting

Will take place on Thursday evening, the 4th of July. Time and Location will be announced later.

The scientific staff and the lecturs will join for academic exchange to make plans for future activities. Location will be announced on time.

Workshops

Third Day: Workshops in parallel sessions 9h – 17h Wednesday, 3rd of July 2019	
Toxicology / DNA / Anthropology **Venue:** Nobleza Hotel or RNP Forensic Lab **Designated Teachers:** Dr. J. Kabera, Prof. L. Mutesa, K.U. Kabayiza, A. Ndungutse, Dr. E. Jopp-van Well, O. Krebs **Participants:** Group 1 (max. 25)	
9h – 11h	**Workshop: Toxicology**
11h – 11h30	**Coffee Break**
11h30 – 13h	**Workshop: DNA**
13h – 14h	**Lunch**
14h – 17h	**Workshop: Forensic Anthropology**
Fourth Day: Workshops in parallel sessions **9h – 15h30 Thursday, 4th of July 2019**	
Toxicology / DNA / Anthropology **Venue:** Nobleza Hotel or School of Public Health **Designated Teachers:** Dr. J. Kabera, Prof. L. Mutesa, K.U. Kabayiza, A. Ndungutse, Dr. E. Jopp-van Well, O. Krebs **Participants: Group 2 (max. 25)**	
9h – 10h30	**Workshop: Toxicology**
10h30 – 11h00	**Coffee Break**
11h00 – 12h30	**Workshop: DNA**
12h30 – 13h30	**Lunch**
13h30 – 15h30	**Workshop: Forensic Anthropology**

Book of Abstracts: Lectures

Contribution of Forensic Pathology in Rwandan Society

Francois Xavier Hakizimana[1], Janvier Byukusenge[2]
[1]Forensic Doctor, Kacyiru Hospital /Rwanda (Supervisor)
[2]Forensic Officer, Rwanda Forensic Laboratory, Rwanda (Researcher)
E-mail: janvierbyukusenge@gmail.com

Forensic pathology known as medical legal investigation and this is an investigation applied in criminal justice system in fact by examination of dead bodies. Globally, forensic pathology is useful to provide diagnosis, to determine the cause and manner of death revealing services for social development.

The use of medical legal investigation has a long story worldwide where it presented some cases to deal with in 13th century to 19th century with the beginning of examining bodies through dissection of bodies at the University of Bologna in Italy. Here someone named Surgeon Ambrosio Paré (French), who was considered as father of Legal medicine when in 1575 began a real scientific period in France.

In Rwandan society, we get social, economic and health problems that are closed and associated with unexpected deaths; the cause of death is to be determined and could be investigated by forensic pathologist.

Ahead from those problems, in this study the researcher intended to contribute on the development of Rwandan society by generating an advanced knowledge about what can be the obstacle or contrast on forensic pathology service. Gathering information, the researcher had set questionnaires, structured interview and focus group discussion.

The results of this research are presented in chapter three and are organized in tables, analyzed by the use of software for packages of social sciences knows as SPSS Version 16. The outcome information showed that the target of forensic pathology is to determine the cause of death, manner of death respectively presented by 64.7% and 35.3% agreed. The justice system needs forensic pathology services, this was agreed by the totalities of 100% of respondent with collaboration of Judicial Police Officers and forensic pathologists.

The findings from respondents showed positive understanding regarding the importance of forensic pathology with total percentage considering inquiries, application and legal provision of forensic pathology services. The society benefited through different

systems as for local authorities, judicial system, health system and academic system. All respondents gave same understanding pointing on Reassure family members and remove conflicts, leadership in monitoring and protection citizens. The determined cause and manner of death helps in rending justice in criminal solving by incrimination or exoneration of suspect and elaboration of laws. Besides, it has discovered that forensic pathology, in health system, helps in production of accurate vital statistics and discovering the new disease and development of medicament.

Evaluation of Bilateral Asymmetry in the Humerus of Human Skeletal Specimen

Samuel Sunday Dare, Kintu Mugagga, Masilili Godfrey
Department of Human Anatomy, Faculty of Biomedical Sciences, Kampala International University Western Campus, Uganda
E-mail: samuel.dare@kiu.ac.ug

Bilateral symmetry in paired morphological traits is evident in humans, however significant deviation from this observed in internal organs, human brain and especially in upper limb is referred to as bilateral asymmetry (Zaidi 2011).

Several studies have established a relationship between morphological and behavioral asymmetry making investigations of bilateral bone asymmetry an attractive and important research area. Examination of the upper and lower limb asymmetries can be useful to medical scientists, archeologists, and anthropologists (Iscan & Shihai 1995; King et al., 1998), to the police and forensic experts and for medico-legal studies (Steyn & Iscan 1999; Mall et al. 2001). In most cases the left bone have been reported to be more variable in weight and length but the average lateral asymmetry was to the right in the arms.

The aim/objectives of our study was to investigate bilateral asymmetry pat- terns of skeletal specimen from five geographical locations (Rwanda, Burundi, Congo, Kenya and Uganda) at Galloway Osteological Collection, Department of Anatomy, School of Biomedical Sciences, Makerere University College of He- alth Sciences at Makerere University. The angle of humeral torsion, mid shaft circumference, length and weight of 232 pairs of humeri were investigated.

Angles of torsion, mid shaft circumference, length and weight of 232 pairs of humeri were determined as follows:

(i) A Torsiometer was used to measure the angle of torsion in degrees according to Krahl and Evans 1945.

(ii) A tape was used to measure the mid shaft circumference at the level of the apex of the deltoid V in centemeters.

(iii) An osteomeric board was used to measure the length of the humerus in centimeters.

(iv) A weighing balance was used to measure the weight of the humerus in grams.

Our analysis of humeral asymmetry with respect to parameters of the human skeletal specimen investigated revealed bilateral asymmetrical status observed in the angle of torsion, length, weight and mid-shaft circumference. Our result mostly showed lateralization to the right in all the parameters investigated except the torsion angle which is to the left. We established the existence of bilateral asymmetries in the humeri of all the geographical regions investigated with more asymmetry observed in the male compared with the female.

Bilateral asymmetry exists in the humerus across the geographical regions investigated. Our investigation revealed that humeral torsion is inversely proportional to weight, length and mid-shaft circumference of the humerus.

Haemorrhage as a Cause of Sudden Non-traumatic Death

Alexandra Ron, Klaus Püschel, Axel Heinemann
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
E-mail: a.ron@uke.de

Sudden unexplained deaths occur in 10% of all the cases in forensic casework. They are defined as unexpected rapid death within 24 after the onset of symptoms in apparently healthy people without preceding diseases and with no presence of trauma, violence or intoxication.

Most common causes of sudden unexpected death are due to cardiovascular diseases. As the external post mortem examination is not revealing it, the gold standard is the detection by conventional autopsy. However, with the implementation of post mortem imaging in cadavers some of the death causes can be readily determined, as for example PMCT scan is effective to show any kind of haemorrhage – intracranial, pericardial, pleural and intraabdominal – being the final condition of various acute internal diseases.

For further elucidation of the exact vascular damage/leakage/the sources of bleeding post mortem CT angiography (PMCTA) was developed and complement the investigation. It is conceivable that forensic imaging despite its specific limitations – e.g. on behalf of post mortal modifications – can identify the cases in which a conventional autopsy is needed. There are first experiences worldwide that could replace the conventional autopsy in specific frameworks at least in some areas of non- forensic natural deaths.

Medico-legal Aspects in Dark-skinned Persons whose Deaths were Investigated at the Hamburg Institute of Legal Medicine - A Retrospective Study

Herbert Mushumba, Klaus Püschel
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
E-mail: h.mushumba@uke.de

This study aimed to determine the autopsy rate, commonest causes and manners of death in dark-skinned persons whose deaths were investigated at the Hamburg Institute of Legal Medicine. Specifically, we aimed at determining the frequency as well predisposing factors leading to homicides and suicides in dark-skinned persons in relation to other population groups.

A retrospective analysis of external examination and autopsy reports of 116 deceased persons of dark-skin color whose deaths were examined from 1st January 1994 to 31st December 2017. The deceased's demographics and clinical information were retrieved using the keywords „Schwarze Hautfarbe"; „Afrikaner"; „Afro-Amerikanisch"; „dunkler Hautfarbe" and „Schwarzafrikaner" and entered onto a pre-established data collection form.

The mortality rate in the study group was 0.15%. 70.7% died before the age of 50 years. 68.1% of the deceased were males. Where the status of the deceased was reported, 59.1% were refugees or asylum seekers. 50% of the deaths were certified as natural and 30.2% as unnatural. Cardiovascular diseases accounted for the majority of natural deaths- 44.8%, while suicides and homicides were the predominant unnatural deaths- 62.9%. The most frequent mechanism of suicide execution was strangulation by hanging (50%) while stabbing with a knife was the most frequent mode of homicide execution (80%).

Significant statistical conclusions could not be drawn from this study due to the relatively small number of cases and the lack of background information in a relatively high proportion. From a medico-legal point of view however, it can be said that numerous medical or sociocultural problems of dark-skinned persons play no relevant role in the daily routine.

Sudden Cardiac Death, Considering especially HOCM

Antonia Fitzek, Herbert Mushumba, Klaus Püschel
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
E-mail: a.fitzek@uke.de

Sudden cardiac arrest is the abrupt loss of heart function, breathing and consciousness. The condition usually results from a cardiac arrhythmia, resulting in disruption of the pumping action, stopping blood flow to the body.

Sudden cardiac arrest can happen in people who have no known heart disease. However, a life-threatening arrhythmia usually develops in a person with a pre-existing, possibly undiagnosed heart condition. Most cases of sudden cardiac arrest occur in people who have coronary artery disease. But there are a lot of other conditions, like valvular and congenital heart diseases, electrical problems in the heart and an enlarged heart, known as cardiomyopathy. Cardiomyopathy is a group of diseases that affect the heart muscle. Types of cardiomyopathy include dilated, hypertrophic and restrictive cardiomyopathy, as well as arrhythmogenic right ventricular dysplasia and unclassified cardiomyopathies.

We will have a closer look at the hypertrophic cardiomyopathy. The hypertrophic cardiomyopathy, divided in non-obstructive and obstructive, is a genetic disorder of the heart muscle, characterized by a small left ventricular cavity and marked hypertrophy of the myocardium. The danger of these cardiomyopathies is, that they are often underdiagnosed and can lead to fatal sudden cardiac arrests. Several case reports are presented.

Rape in Context of Warlike Conflicts

Antonia Fitzek, Alexandra Ron, Barbara Franke, Herbert Mushumba, Klaus Püschel
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
Email: a.fitzek@uke.de

Sexual violence and mass rape in context of warlike conflicts are well known. By adoption of the crime of rape into the Statute of the International Criminal Court, rape is defined as a crime against humanity or a war crime. It is differentiated between the following assaults:

- Rape
- Sexual slavery
- Forced prostitution
- Forcible impregnation
- Forced sterilization
- Other forms of sexual violence of comparable severity.

After the genocide in Rwanda there were convictions of accused persons. The unique thing was, that some of the perpetrators could be designated and exactly identified by the DNA investigations of the mother and the child, evaluated by the Institute of Legal Medicine Hamburg. The testimonies and the laboratory results were used by the court for conviction. With the DNA results, the paternity could be clarified and proven paternity verified the rape.

Recently, Germany addressed this concern through the UN-Resolutions (Nr. 2467 [2019], S/2019/280). Here, however, ways of preserving evidence in case of rape to force a final judgment are not mentioned.

Assessment of Challenges Faced in Performing an Autopsy in Rwanda

Francois Xavier Hakizimana[1], Alphonse Ntakiyiruta[2]
[1]Forensic Doctor, Kacyiru Hospital /Rwanda
[2]Forensic Officer, Rwanda Forensic Laboratory/Rwanda
E-mail: alphonsentakiyiruta@gmail.com

Autopsy is an examination of a body after death to determine mainly the cause, manner, and mechanism of death. The character and extent of changes produced by disease or any other circumstances related to the crime investigation are also analyzed. Worldwide, autopsies are performed and meet sophisticated work by practitioners. In South Africa Medico-legal autopsies were performed without the next of kin's consent and performed by authorized medical practitioners (Saayman, 2012). Referring to Julius (2011), in east Africa all autopsies were done by a consultant pathologist. Around the world the previous review of adult and pediatric autopsy series indicated treatment errors in 8% to 24% of cases; about 86 autopsies of cancer patients 26% provided diagnoses missing, and around 50% of diagnoses had severe effects on patient (Sheri et al, (2012). During autopsy, all systems were examined, but with the emphasis on the heart, lungs, brain and blood vessels. Indeed, Rwanda is engaged to develop all sectors including health and justice. In Rwanda autopsies are performed in hospitals by any medical doctor whatever the training and specialization.

Objectives of this study were to determine challenges faced in the performing an autopsy in Rwandan context and therefore, suggest the measures that can be followed up to overcome them. The research will contribute in enhancing the knowledge of Rwandan situation regarding autopsy service.

The sample size of this study was ten Judicial Police Officers (JPOS) working from GASABO District Police Unit (DPU); five Medical Practitioners and twenty beneficiaries (population and local authorities). Data collection was performed using questionnaires and presented in tables where were analyzed also by utilization of statistical package for social studies (SPSS) as software.

The main challenges faced during performing the autopsy in Rwanda, were: Laboratory capacities for 42.9% of respondents, the insufficiency of knowledge and skills to perform autopsy for 22.9% of respondents and lack of awareness to the Rwandan society about management of a dead body at the crime scene for 22.9% of respondents.

This point of view notified a big task to be encounter and stimulated to have a set of recommendation

Based on findings, the research recommends ensuring and developing Laboratory capacities, sensitizing and mobilizing the Rwandan population about the benefits of carrying out the autopsy and setting up many courses for judicial police officers and medical practitioners and facilitates all concerned staff to share the experience in performing the autopsy from other countries.

Differentiating Human and Nonhuman Bones: A Gross Morphological Comparison of Human, Gorilla and Goat Bones

Yvette Mutabazi Tumukunde
Rwanda National Police (RNP), Kigali, Rwanda.
E-mail: dyvette36@gmail.com

Forensic anthropologists are tasked with the responsibility of identifying human remains in a forensic context. This includes differentiating between human and non-human osteological remains either by destructive or non-destructive methods, Previous research has been only limited to addressing an identity to the recovered skeletal remains either by sex determination, age estimation, height estimation, and determination of cause of death by analyzing bone trauma. Therefore, the intent of this thesis was to use a non-destructive method to compile a gross morphological comparison between the human species and animal species that addressed both cranial and post-cranial skeletal elements.

At first the main objective of this research was to differentiate human and non-human skeletal remains in general. non-human skeletal remains selected were of the mammalian class as humans including goats and gorillas. Next, the analysis consisted of detailed photographic documentation of cranial and post-cranial skeletal elements of the three species from different collections. Humans skeletal remains which were donated to the National Police College by the Institute of Legal medicine in Hamburg, were from the National Police College Laboratory, goat bones were from a butchery in Kigali, and gorillas' skeletal remains were from the department of conservation in Rwanda Development Board (RDB) presently conserved in the Dian Fossey Gorilla Fund International facility. The images were then edited to highlight the most diagnostic features that differentiate humans from non-human's skeletal elements.

These results were then discussed by differentiating humans, goats, and gorillas' skeletal elements such as the cranium, mandible, scapula, sternum, ribs, humerus, radius, ulna, vertebrae, pelvis, sacrum, femur and tibia in relation to their biomechanics. Differences were abrupt between humans and goat's skeletal elements but subtle between humans and gorilla's skeletal element due to their close resemblance, for this reason further analysis such as DNA and histology may be used if the bone is fragmented or not present in whole.

Preserving Memory through Partnerships in Forensic Science

Jean-Damascene Gasanabo
National Commission for the Fight Against Genocide (CNLG), Rwanda
E-mail: gasanabo@gmail.com

CNLG is committed to the preservation of the memory of the 1994 Genocide Against the Tutsis and is pursuing various conservation projects at the eight genocide memorials maintained at the national level. By working towards the restoration of authentic textiles at the Nyamata Genocide Memorial and the preservation of human remains at Murambi Genocide Memorial, CNLG continues to fight against genocide ideology in Rwanda and abroad.

Since 2016, CNLG has partnered with PennDesign at the University of Pennsylvania to sort, clean, and maintain the 40 cubic meters of textiles on display at the Nyamata Memorial site as challenges such as pests, dust, and high temperatures have caused some of the materials there to deteriorate. CNLG has worked with PennDesign to mitigate this degradation by installing specialized equipment to clean and maintain the textiles as well as training the staff at the memorial site in techniques to monitor the materials and to conduct routine maintenance of the site.

At Murambi, CNLG has partnered with the Institute of Legal Medicine at the University Medical Center Hamburg-Eppendorf and the Lower Saxony State Service for Cultural Heritage to preserve the remains of genocide victims recovered from mass graves at the memorial site. The build-up of dust and other debris on the remains has posed a threat to their conservation and this ongoing partnership has produced new techniques to ensure that the bodies are displayed in a dignified manner. Specific attention to the remains that exhibit signs of trauma related to the genocide ensures that these remains serve as proof against those who wish to deny the Genocide Against the Tutsi.

The partnership between CNLG and German institutions has allowed for the gentle cleaning of the bodies and close monitoring of their weight in order to observe moisture levels and the degree of deterioration. CNLG deems that the conservation measures taken at both the Nyamata site and the Murambi site have been successful in mitigating the degradation of primary materials. The work with both teams is ongoing, and the work of the German team will be expanded to other sites in Rwanda to further prevent the decline in quality of relevant artifacts.

Fundamentals in the Creation and Development of Basic Forensic Anthropology (FA) Capabilities inside a Forensic Institution – Challenges and Way forward in the Case of Rwanda Forensic Laboratory (RFL)

Japhet Ashimirwe
RFL Corporate Secretary and Forensic specialist, Rwanda
E-mail: jamirwe01@yahoo.co.uk

The Republic of Rwanda is committed to continue building a State governed by the rule of law as it is clarified in the Constitution of the Republic of Rwanda of 2003 as revised in 2015. One of the ways to fulfill this commitment is the fair justice that is based on strong evidence both testimonial and scientific.

In this line, a state-of-the-art laboratory, Rwanda Forensic Laboratory (RFL) was established by the Law N°41/2016 of 15/10/2016 determining its mission, organisation and functioning.

RFL has the following operational services: DNA, Documents, Fingerprints and Forensic Medicine. Other units are equipped with little equipment missing to be fully operational: Microbiology, Drugs & Toxicology, Ballistics and Digital Forensics.

Moreover, there are units that are to be created progressively in accordance with available resources, Forensic Anthropology unit among others.

This unit is of paramount importance given the history of the Genocide against Tutsis in Rwanda whereby human remains from the victims are still in mass graves, not buried yet in dignity, a number of cases of human identification failed when suspects mislead investigations on the type of bones (human or animal for example).

Currently, RFL is challenged by the lack of capabilities to examine bone samples related to human remains in order to facilitate the judicial system in solving criminal issues. Other bones identification issues can't be managed: many cases are dropped away, mishandled or sent abroad.

In order to create and develop forensic capabilities, are needed: human resources (staff and training), infrastructure, quality control and continued education program, and integration with other areas DNA and Forensic pathology.

In terms of infrastructure, basic forensic capabilities can be build up with the following conditions: a room of around 5 m by 5 m, with good light and ventilation; four tables to use as tables for the skeletons; areas for storage boxes with skeletal remains, for cleaning the remains (running water), for photography, area to cut bone samples, for stationary and books, etc.

RFL projects to have forensic anthropology unit in its 3rd year structure (in 2019/2020). The existing partnership, between the Institute of Legal Medicine, University Hospital Hamburg-Eppendorf and Rwanda Forensic Laboratory, is an option and great opportunity to create and develop forensic anthropology capabilities mainly the training of staff personnel for this new unit, and mentorship throughout the process.

Determination of Age and Sex of Selected Human Remains Using Forensic Morphological and Anthropological Characteristics

P. Celestin Nsanzurwimo[4], Eilin Jopp-van Well[1], Mathieu Pierot Ngugi[2], Martin Muhoza[3]
[1]Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf / Germany
[2]Kenyatta University
[3]National Commission for the Fight against Genocide
[4]National Police College, Rwanda
E-mail: nsanzurwimopcelestin@gmail.com

Forensic anthropology is an applied branch of biological anthropology and an active part of forensic medicine. Through the collection of thousands of specimens, skeletal analysis and application of archeological techniques differences within a population can be detected which is important in solving criminal cases. Forensic morphological and anthropological characteristics can be used in determination of age and sex of any skeleton that has been discovered from crimes scene and help the founder (expert) to known the range of age and sex of that skeleton remain.

The work of forensic anthropology is built on the theoretical and practical methods of the identification of human remains in determination of age and sex by using forensic morphological and anthropological characteristics. This study was intended to get information on human remains identification at MURAMBI memorial site.

By using the anatomical characteristics that developed for human being: skull sutures, eye socket, supra-orbital ridges pubic arc mastoid process, frontal head, zygomatic arch and glabella can give us the information about the range of age of the skeleton remain that discovered from the crimes scene and for sex determination respectively.

The study was conducted on 75 skulls, where 47 were identified as male and 28 females. From those sex classifications, the researcher classified again according to their ages: 22 of 47 male were under 30 years and 25 remaining were above age and only 13 of 28 female were less than 30 years while 15 remaining were above 30 years.

This presentation will give you a short overview of the field of forensic anthropology and how it can be used as tool in criminal investigation by determining the age and sex of any skeleton remain that discovered from the scene of crime by using morphological and anthropological characteristics.

Anatomy of the Cornea and Penetrating Keratoplasty

Maria Casagrande
Clinic of Ophthalmology, University Medical Centre Hamburg-Eppendorf
Email: m.casagrande@uke.de

The aim of this presentation is to give a short introduction into corneal anatomy and penetrating keratoplasty.

The cornea constitutes part of the outer covering or coat of the eyeball. It is a transparent avascular tissue that acts as a structural barrier and protects the eye against infections. Along with the tear film, it provides proper anterior refractive surface for the eye. Cornea contributes to two-third of the refractive power of the eye. Normal human cornea is avascular and heavily innervated. The aqueous humor is the main source of nutrients to the cornea. The cornea consists of 5 layers with different functions. From outside to inside the corneal layers are epithelium, Bowman's layer, Stroma, Descemet's membrane and endothelium.

The first successful keratoplasty was performed in 1905 by an Austrian ophthalmologist named Eduard Zim. Penetrating keratoplasty has been the dominating procedure for almost 100 years. Penetrating keratoplasty (PK) is a procedure, in which a full thickness resection of the patients' cornea is performed and followed by a replacement of a full-thickness graft. Interrupted or running sutures are placed radially. The sutures have to be removed over time, commonly after 1 year. Indications for this procedure are among others stromal scarring, corneal ectasia, corneal ulcers and perforations. Complications reach among others from postoperative corneal astigmatism to graft failure and graft rejection. Up to today it is the worldwide most commonly performed tissue transplantation.

Forensic Examination of Bloodstain Patterns: Experiments, Interpretations and Analysis

François X. Hakizimana[1], Fred Kagame[2]
[1]Medical legal Doctor, Kacyiru Hospital , Rwanda. (Supervisor)
[2]Bachelors with Hon. in forensic science, Rwanda. (Researcher)
E-mail: kagamefredb@gmail.com

Blood behaves conferring to certain scientific principles; appearance of bloodstains seem to be a randomly distributed at a crime scene but stains can be categorized by collecting information from spatter patterns, transfers, voids and other marks that support investigators in recreating the sequence of events that occurred after bloodshed and analyst requires to recognize and interpret patterns to determine how those patterns were created.

The experiments of study focused on practical application of bloodstain patterns analysis during crime scene reconstruction and analysis. Different techniques of blood shedding/ dropping procedures, scientific calculations and measurements during bloodstain patterns analysis (BPA) were applied referring to the international protocols.

Throughout the experiments, the blood dropping, calculations, measurements, interpretation and analysis of bloodstain patterns and reconstructions exercises were performed on different surfaces including; cement, ceramic and wall surfaces to exemplify the possible blood involving crime scenes to determine a best method that can be applied to provide accurate, actual and effectual results to upgrade the integrity and reliability of scientific evidences in Rwandan court of law.

Research study analysis concentrated on the calculation of angle of impact, area of origin of bloodstain, direction, and height of an origin of bloodstains as well as type of a bloodstain patterns hence reconstruction of scene to determine the position, direction and location of persons/ objects during deposition of blood that can lead to the correlations of evens.

Interpretation and analysis made discussed, the known parameters used during an exercise (angles:(900, 450 & 150) and distances:(0.20m, 0.5m, 1m & 1.7m)) were compared to the trigonometric method parameters results after experiment and also to the parameters measured results after exercises of reconstructions. And discussion focused on the real cause of variations including: laws of motion, external factors like air resistance, gravitational potential and so on.

The comparison between the literature hypothesis and the practical results. All methods applied are productive and valuable but best one is Trigonometric as discussed and possible challenges were anticipated. Therefore, scientific evidence-based practice should be nurtured in Rwanda, East African region and worldwide as BPA is of its complete part assimilated.

Legal and Ethical Issues Relating to Organ Transplantation: Rwandan Perspective

Paul N. Musila Nthenge[1], Murangira B. Thierry[2]
[1]School of Law, Jomo Kenyatta University of Agriculture and Technology
[2]Rwanda Investigation Bureau (RIB) and Kigali Independent University (ULK)
E-mail: plmusila@gmail.com, thierrybm_murangira@yahoo.com

Organ transplantation dates back to the ancient times and since then it has become one of the important developments in modern medicine; saving the lives, as well as improving the quality of life of many patients. As the demand for organ transplantation far exceeds the organ availability, the transplant program is often surrounded with complex legal and ethical issues. This article highlights the legal and ethical issues that might arise regarding organ transplantation and appraises the existing legal frame work governing organ transplantation in Rwanda.

Information on legal, cultural, religious and medical ethical issues regarding organ transplantation in Rwanda was obtained through various literatures including conference proceedings, law and other related publications were collated and analyzed.

In decision making for organ transplantation, the bioethical principles like autonomy, beneficence and justice must be employed. It was believed by Catholic Theologians that to mutilate one living person to benefit another violates the principle of totality. Among Muslim scholars and researchers, there are those who throw legal support as to its permissibility while the other group sees it as illegal. Organ transplantation is considered a medical intervention that touches on the fundamental rights of the donor or the recipient. Where there is an unlawful infringement of the right of such persons in any way may be regarded as against the Law Nº53/2018 of 13/8/2018 regulating therapeutic, educational and scientific utilization of organs and products of the human body. Worldwide, the researchers and government bodies have agreed on informed consent for organ/tissue donation and for recipient should be obtained without coercion before embarking on such medical treatment.

The Government should endeavor to include Organ transplantation funding in the National Health Insurance Scheme. It should also encourage research in the field of transplantation in conformity with Helsinki declaration of 1964. The Government should take measures to protect the poor and vulnerable groups from transplantation tourism and should also setup ethics commission to ensure the ethics of cells, tissues donation and organ transplantation. National Transplant Registry should be established in order to monitor and regulate the program in the country.

Effectiveness of Handwriting Characteristics for Fixing the Authorship in Cases of Handwriting Disguise

Aphrodis Habumugisha, Login Hategekimana, Emmanuel Nshingabigwi
Documents Unit, Physical Evidence Division, Rwanda Forensic Laboratory, Kigali, Rwanda
E-mail: aphromugisha@gmail.com

Disguised handwriting is the willful modification of a person's normal writing for the purpose of concealing identity. The criminals disguise their handwriting in an attempt to escape justice.

Methods of disguise vary with the ability and imagination of the writer. An extreme change of slant the most popular means and the least effective method of disguise. Not more writers are ambidextrous.

Disguised handwriting fails to accomplish its objective in the same way that a forged writing fails to copy the genuine writing.

Inconsistency is the most important characteristic indicating disguise.

Frequent changes in slant, letter formation, spacing, pen pressure, size and legibility

are indicative of the writer's effort for to create new handwriting characteristics in place of his own normal writing habits.

Most the forger writers feel safe when changed the pictorial effect of handwriting. In response this study has examined the principles and practices of disguised handwriting analysis.

Any claims and observations made in the literature have been reviewed and empirically tested. A body of controlled data was collected from thirty volunteers who produced samples of disguised handwriting.

The analysis is expressed in the form of a comprehensive technique for classification of distinctive features of deviant handwriting.

- To study the effectiveness of handwriting characteristics for fixing the authorship in cases of handwriting disguise.
- To clarify the indications of disguise as observable features in handwriting.
- To determine the different methods, use by the writers for disguise handwriting.
- To study the methods, apply by the document examiners in detection of handwriting disguise.

The volunteers were first asked to produce samples of their natural handwriting to serve as the control sample, followed by disguise writing and again natural sample. Each subject was asked to produce minimum three samples, two samples in their natural handwriting and one in disguised form.

The act of disguising handwriting will have a negative effect on the pictorial and structure of that handwriting.

- Never writer can realize to disguise all his or her habits in handwriting, the pictorial effect may change but many characteristics will remain.
- Habit never dies and non-forgery is perfect.

Identification of Criminals using Forensic Fingerprint Analysis

Godfrey Rwamurangwa, Samson Maniriho, Emmanuel Nshingabigwi
Fingerprint Unit, Physical Evidence Division, Rwanda Forensic Laboratory, Kigali, Rwanda
E-mail: rwamugod@gmail.com

The fingerprint system consists of unique pattern of ridges and furrows on the surface of the fingertips, which have been used to identify criminals, victims or individuals for hundred years. Each person's fingerprints are said to be unique. Fingerprint have friction ridges to assist the ability to grasp and hold an object and these ridge patterns are known as minutiae. Fingerprint and palm prints are the impression or reproduction left on any material by friction skin, which are found on inner surface of the hands, fingers, soles of the feet. Fingerprint identification and classification system has a long history rooted in scientific research and empirical observation. From 16 centuries to the present day, the study and use of fingerprint information has served to modernize the criminal justice system and forensic science.

The Objectives are to analyse and compare fingerprint, palm print or footprint brought from crime scene to the known one, to identify criminals, terrorist or individual, and to assist judicial justice and investigation process as it related to fingerprint.

Two methods were used in this study for developing fingerprint, palm print and footprint. The first one which is the powder method was used on non-porous surfaces whereas the second one which is the chemical method (ninhydrin spray, DFO) was used on porous material.

The ridge characteristics on fingerprint pattern will be presented.

The results strongly support that fingerprint impression is very important due to the three main principles, that is, unchanged, persistent and permanent. This study highlighted the usefulness of fingerprint analysis in criminal and civil cases to assist judicial justice and investigation process.

Understanding Trauma 25 Years after the Genocide Committed against the Tutsi in Rwanda: Morbidity and Treatment Seeking

Vincent Sezibera
Centre for Mental Health, College of Medicine and Health Sciences/University of Rwanda, Rwanda.
E-mail: vsezibera@gmail.com, v.sezibera@ur.ac.rw

Rwanda, a country in Central Africa, has long been known as the Country of a Thousand hills, with parks and vegetation attracting tourists. Rwanda is also one the most densely populated countries in Africa with 12M living on 26M km2, or 474.64/km2.

However, the year 1994 marks a turning point in the history of Rwanda because of the genocide committed against the Tutsi which was the culmination of a century of genocidal ideology based on ethnic Hutu, Tutsi and Twa categorization. Divisionism, ethnic polarization, discrimination, stigmatization, exclusion, ethnic massacres, deportations and exile were the active ingredients that have characterized the political and social history of Rwanda and have affected the country on several levels.

The consequences of genocide are usually huge and enormous. At the social level, genocide has terribly affected social relations, peaceful cohabitation and the unity of Rwandan considered the „founding myth" of the nation. Indeed, we note that Rwandans think and adhere to the idea that all Rwandans are brothers and sisters because they're all born of „Gihanga". In so doing, genocide is often experienced as a fratricidal tragedy that comes to compromise this original brotherhood of Rwandans in other words that breaks the social contract of living and surviving together.

The consequences at the psychological level, and mental health in general, are considerable and alarming. The few studies on the psychological impact of the genocide show that post-genocide distress (e.g. post-traumatic stress disorder) affects more than a third of the general population.

25 years after the genocide against the Tutsi, its consequences are still many and complex. Efforts to deal with the aftermath (i.e. trauma cases) have been initiated with the government of Rwanda as well as national and international organizations. At institutional level, various programs have been developed namely the training of professionals in trauma management, community education on the concept of trauma and its management, and a number of clinical services have been put in place and have undoubtedly yield positive results. Community-based psychosocial programs have also been initiated mainly by civil society organizations and the community has been mobilized to support the most vulnerable people who were and are still mourning and ruined by the genocide.

With the 25th commemoration of the genocide, it is highly important to evaluate the country's efforts with regard to the trauma management, solutions that were deployed and the lessons learned. It is also time to explore the needs that are still prevalent with regard to the mental and psychosocial health of Rwandans.

Role of Horticulture Therapy in Mental Health and Stress Management

Edward Bantu[1], Peter Baguma[2], Mwajuma Efrance[3]
1Kampala International University, Uganda
[2]Makerere University, Uganda; [3]Bugema University, Uganda
E-mail: bantuedward@gmail.com

Horticulture therapy is generating popularity and its value is convincing. Its role in mental health and stress management cannot be overemphasized. Unlike the conventional mental health medication models which isolate patients in private corners, horticulture therapy engages patients actively in animal and plant care. This provides them with an opportunity to nurture mental health while significantly contributing to community development. This farm work undertaken during horticulture therapy involves strenuous physical exercise which offsets emotional trauma, provides an intervention for cerebral palsy, schizophrenia, musculoskeletal pain and an improved ability to cope with chronic pain (Verra et al, 2012). Despite the significant contribution of horticulture therapy, a number of challenges exist. These include limited knowledge concerning use and benefits of this therapy, limited land available for gardening and low productivity. Studies have been conducted to expound on the role and effectiveness of horticultural therapy, however a knowledge gap still lies on how horticulture productivity can be stimulated. The present study therefore assessed factors influencing technical efficiencies of Open Field tomato production among small scale farmers in Kiambu. A multistage sampling technique was used to draw a sample of 120 respondents who participated in the study. A two stage analysis using a Cobb Douglas stochastic frontier analysis and a Tobit regression was used to compute the mean technical efficiency and determine factors influencing technical efficiency respectively. Results indicated a mean technical efficiency of 65.5% ranging from 24% to 95%. Education, family size and Experience positively influenced technical efficiency while gender and farm size had a negative significant influence. The study recommends that the government and other responsible bodies should invest more in farmer education through organizing agricultural trainings so as to enhance their education and experience. Also all inputs used positively influenced efficiency therefore the study recommends that the government should put in place policies which enable farmers acquire such needed inputs at affordable prices. This may be through subsidization of inputs and creating room for private distribution of these inputs.

Beyond Gender: Female Perpetrators in the 1994 Genocide Against the Tutsi

Cindi Cassady
Caraes Ndera Neuropsychiatric Hospital, Rwanda
E-mail: cindi.cassady@gmail.com

Background: Historically, women have been appropriated the role of the victim; recipients of horrific acts perpetrated during violent conflict. Rarely are women viewed capable of inflicting the extreme violence so readily attributed to the male gender. Rwandan women who participated in the killing and rape of others during the 1994 Genocide against the Tutsi, are either viewed with disgust for their betrayal of the feminine mystique, or they are perceived to lack agency and are the victims of others who have manipulated them.

Method: This theoretical paper offers a psycho-political framework to the discourse on feminism, agency and women's participation in acts of genocide and mass atrocity. Wendy Lower (2014) notes in Hitler's Furies, a general agreement among scientists that the environment is the principal factor in determining whether one will become a perpetrator of genocide. If so, what kind of environment or combination of factors produces women capable of participating in the extermination of a targeted group?

Objectives: I suggest the combination of a patriarchal culture within an authoritarian state, with harsh or punitive childrearing practices, lends itself to the development of a people with rigid stereotypical thinking. These external conditions usurp the individual's ability to develop an internal locus of control within which empathy and moral reasoning become internalized. In these states, gendered roles are rigidly oppressive. Women are viewed primarily in pro-creative terms with the ethnic group and state having ownership of their bodies. Women are "liberated" from their oppressed second-class status when the state's political agenda turns to genocide and they become a useful tool for the propaganda machine. I propose the political and familial subjugation of women in patriarchal, authoritarian states, coupled with the pre-genocide elevation to a new socio-economic status, allows them to identify with the aggressor against a dehumanized targeted group.

Trauma in Victims of Human Trafficking

Joseph Kalisa
Centre for Mental Health, College of Medicine and Health Sciences, University of Rwanda
E-mail: josephka300@gmail.com

The article was inspired by an observation during a baseline research on "Situation of Human Trafficking in Rwanda" commissioned by International Organization for Migration in which I was a co-researcher. This research among other objectives looked to assess the impact of Human Trafficking on Victims.

The article presents the main psychological consequences that were observed in victims of Human Trafficking as well as the existing victim-support mechanisms at different levels.

The research however did not explore sufficiently the Trauma-related issues in victims of Human Trafficking given the atypical circumstances of the problem of Human Trafficking in Rwanda.

Field investigations were carried-out in the form of in-depth interviews involving 5 Victims of Human Trafficking, 20 key informant interviews with institutions and individuals in-charge of community reintegration process as well as psychologists who have accompanied victims during the process of treatment. Key informants were also from Organizations of sex workers, and refugees from refugee camps as vulnerable groups to Human Trafficking.

Key observations from this study show that Trauma in Victims of Human Trafficking presents unique challenges to both victims and practitioners. This is due to the process and coercive tactics or force used by traffickers which leave victims with a feeling of worthless and emotionally imprisoned, lose their sense of identity and security. Other psychological consequences that were witnessed in the victims included; shame and guilt, social withdraw, and profound fear. However, these consequences varied according to gender with most victims of sexual trafficking being women, both physical and psychological suffering presented profound symptoms of Trauma among this group of people. Other symptoms observed in victims that were interviewed included; cognitive impairment, and memory loss.

Although there exists victim support especially at Isange One Stop Centers as SGBV cases, a variety of psychological symptoms in victims that were interviewed surfaced over a period of time even after victims' reintegration process is done which points a gap in the trauma management in victims for Human Trafficking.

Three recommendations emerging from this observation can provide insight on key areas that can be strengthened with regard to Trauma informed care for Victims of Human Trafficking, these include providing trauma-specific therapy to Victims of Human Trafficking, establishing dependable safety and referral network specific to victims of trafficking as well as fostering an empowering environment for victims.

Conclusively, failure to embrace specific therapies to victims of trafficking exposes them to possible revictimization.

Protection Factors of Resilience for the Minors Incarcerated in Nyagatare Juvenile Prison in Post-genocide Rwanda

Eugene Rutembesa[1], Adélite Mukamana[2]
[1]University of Rwanda
[2]Healing and Psychotherapy Unit, Never Again, Rwanda
E-mail: eurut@yahoo.fr, madelite76@yahoo.fr

This study assessed the rehabilitation program in Nyagatare prison and its impact on the minors in the process of integration. The study included 30 participants divided into three categories. The first category is composed by minors all detained in Nyagatare Correctional center and have been released after serving their sentences and live currently in their community at least since the last six months or above. The second category is their family members and the third category is composed of staff involved in their psycho education rehabilitation.

This study focuses on two complementary questions regarding the lived experience of minors during and after incarceration in a given correctional center from Low and Middle Income country (Rwanda): (1) what is the lived experience of minors during incarceration and rehabilitation at Nyagatare correctional center? (2) How much have this experience affected the reintegration of returning minors, 6 months later?

The minors were accused of committing different crimes such as infanticide, abortion, rape, theft, and homicide and drug abuse.

The study revealed some criminal factors during the interviews such as neglect from parents, witnessing family violence, harsh physical punishment or abuse.

The intervention model was at different level: individual and group therapy; make the link between the minors and their natural families by regular family visits; intervention to the community and society level to prepare and facilitate community reintegration.

The former beneficiaries of the rehabilitation services testify that Nyagatare center was as a school where they learnt to develop a positive way of thinking and believe it has saved their lives. The study noted a strong relationship between rehabilitation services and the behavior change after the integration.There is a need to follow-up these minors for a long period to determine the long time impact of the rehabilitation process.

The Role of the Community Resiliency Model skills Trainings in Trauma Healing among 1994 Tutsi Genocide Survivors in Rwanda

Samuel Habimana[1], Emmanuel Biracyaza[2], Evariste Museka[3], Emmanuel Habumugisha[4], Jean Mutabaruka[5]

[1]Rwanda Resilience and Grounding Organization

[2]Prison Fellowship Rwanda

[3]National Rehabilitation Service

[4]Rwanda, National Commission for Children

[5]University of Rwanda, Clinical Psychology Department

E-mail: samhabimana78@gmail.com

The presence and intensity of symptoms of Secondary Traumatic Stress before and after Community Resiliency Model Trainings were studied among 1994 genocide survivors from districts of southern province of Rwanda, Huye, Nyamagabe and Nyaruguru. The role of the Community Resiliency Model (CRM) skills trainings was also studied.

An experimental group made up of one hundred and thirty genocide survivors (130) including 73 females and 57 males aged between 25 and 65 years old. A control group was made up of one hundred twenty (120) participants including 67 females and 53 males aged between 25 and 65 years old. All participants experienced genocide and had lost some of their beloved family relatives and friends in the Genocide against Tutsi in Rwanda in 1994.

Secondary Traumatic Stress was assessed using Havard Trauma Questionnaire (HTQ); α: 0.81) and Secondary Traumatic Stress Scale (STSS; α: 0.80). Depression symptoms were assessed using Patient Health Questionnaire-9 (PHQ-9; α: 0.80). After trainings, Community Resiliency Model skills were assessed using a self-constructed questionnaire with six CRM skills components (CRMQ; α: 0.75).

The intensity of trauma symptoms among participants before CRM skills training was higher in the two groups of participants. After CRM skills trainings, significant difference of trauma symptoms among these two groups were observed and within experimental group, the trauma symptoms were significantly decreased (t=37, p=.000) and these would explain the CRM skills contribution in trauma healing and to improving mental health quality.

From Idea to Implementation – Cleaning and Presentation of the Human Remains from Murambi, Rwanda

Monika Lehmann[1], Dorte Schaarschmidt[1], Martin Muhoza[2], Régis Rurenzi[2]
[1]Lower Saxony State Service for Cultural Heritage, Department of Conservation and Restoration/F3, Hannover, Germany
[2]National Commission for the Fight against Genocide, Kigali, Rwanda
E-mail: monika.lehmann@nld.niedersachsen.de, dorte.schaarschmidt@nld.niedersachsen.de,
martin.muhoza@cnlg.gov.rw, regis.rurenzi@cnlg.gov.rw

For a long time there has been a desire to preserve the victims of the genocide in Murambi as admonishing witnesses of the atrocities. Since 2016, an international cooperation project between the Commission for the fight against Genocide (CNLG), the Institute of Legal Medicine, Hamburg (UKE) and the Lower Saxony State Service for Cultural Heritage, Hannover (NLD) has been working on the implementation of this idea.

So far, four work assignments have taken place on site and major goals were achieved, the following points should be mentioned:

- Construction and Installation of 2 Blasting Cabinets/Cleaning stations
- Description of the work processes with setting up the corresponding workstations
- Long-term monitoring of the climatic conditions in the rooms
- Long-term monitoring of the Human Remains
- Training colleagues from CNLG in all processes
- Modification and upgrading the Acrylic Coffins
- Presentation of the 20 selected Human Remains in the Conservation Hall

On the occasion of the 25th Commemoration of the Genocide against the Tutsi this April, the selected human remains have been successful presented.

So far seven bodies could be cleaned. In future the trained team from CNLG will clean further human remains in an ongoing process and take care of the exhibition.

One Year Experience of DNA Testing in Rwanda Forensic Lab: Retrospective Study on Received Cases

Aimable Ndungutse, Karolina Uwantege Kabayiza
DNA Unit, Biology Division, Rwanda Forensic Laboratory, Kigali, Rwanda
E-mail: naimable80@gmail.com, aimable.ndungutse@rfl.gov.rw

In March 2018, Rwanda Forensic Laboratory (RFL) started its activity. DNA unit was one of the operational services: it was receiving samples that were conditioned and sent to Institute of Forensic Medicine in Hamburg (Germany) for DNA analysis. From May 2018, RFL DNA unit have been handling most of the cases internally.

At the beginning, cases were taken to RFL by National Public Prosecution Authority (NPPA) and to a lesser extent by Rwanda Investigation Bureau (RIB). From June 2018, DNA unit received requests from other institutions and private cases.

Most of the samples are brought to the laboratory by NPPA prosecutors or RIB investigators. However, samples for paternity testing are collected by DNA unit specialists in RFL collection room.

Paternity testing is the only analysis requested in private cases; it is also the main request from judicial system in relation with defilement cases. The other important activity in DNA unit concerns presumptive and confirmatory tests on semen or blood stains.

Depending on the type of tests required, delivery time of reports ranges from one day to one month. Results are withdrawn at RFL front desk by requestors.

After one year of activity, we should be able to partially delineate the work accomplished in RFL DNA unit, its strengths and its weaknesses. The results of the retrospective study will also help us to assess impact of DNA unit work.

The objective of retrospective study is to draw a picture of DNA testing work done at RFL during a bit more than one year.

All data available about DNA unit work will be compiled to reveal characteristics about customers, types of cases and samples, report results ...

- Overview of the work done in DNA unit;
- Detailed review of customer profiles, cases and conclusive answers

- Overall idea of professional and public awareness of DNA services through the country

RFL DNA unit has been working for one year and a few months. From March 2018 to April 2019, it handled more than 500 cases. We observed that the number of received cases has been increasing with time and that customers diversify. However, impact of DNA tool on justice dispense and resolution of private cases is still unclear.

This study will provide a first overview of DNA unit output. Study results will help us to define a strategy for a better service to justice and population.

DNA Databank - Towards Vision of Justice: Legal and Ethical Issues

Murangira B. Thierry
Rwanda Investigation Bureau (RIB) and Senior Lecturer at Kigali Independent University
E-mail: thierrybm_murangira@yahoo.com

Advances in DNA technology and the discovery of DNA polymorphisms have permitted the creation of DNA database of individuals for the purpose of criminal investigation. DNA database is a storehouse of genetic records or repository of DNA profiles, generated from biological samples, which can be electronically stored for comparison with profiles generated from material found at the crime scene. Many ethical and legal problems arise in the establishment of a DNA database and these problems are especially important when one analyses the legal regulations on the subject.

The prime purpose of the creation of DNA database is to link suspects to unsolved cases by means of DNA profiling and various researchers suggest that DNA database should be exclusively limited to the identification purposes only. However, DNA databases established in various countries worldwide have proved to be very flourishing investigative tools. In opposition of these advantages, the drawbacks in terms of the potential infringement of an individual's human rights, such as the right to privacy, bodily integrity, informed consent and autonomy of the body to name a few, are also well thought-out.

There is an ongoing discussion concerning the potential misuse of DNA samples in infringement of genetic privacy and to discriminate against people. This is due to the fact that DNA sample are likely to be the sources which can predict the future of one's personal genetic information such as health information, predisposition to disease etc.) and can also reveal information relating to an individual's identity.

Comparing to fingerprint, facial recognition, researchers claim that the use of DNA sample for various purposes pose threat to fundamental rights, because fingerprints is limited to the identification of an individual, while DNA sample is comprised with important health information both about himself and his family, including relatives as well as ancestors and descendants. Hence, utilizing DNA information for forensic purpose poses possible risk for privacy than utilizing other conventional evidence like fingerprints and photographs, as these are limited to provide only information related to the identification of that individual alone without implication of relatives.

This paper attempts to identify and contextualize issues of concern in the contemporary environment which relate to the collection, use and effectiveness of DNA databases in criminal investigations. It emphasizes the significance of establishing a complete and explicit legal framework for the establishment and management of the DNA database.

Enhancing Justice through Forensic Evidence and Databases

Emmanuel Niyibizi
Rwanda National Police, Territorial Unit, District Police Unit: Rulindo
E-mail: whizzemmy@gmail.com

Before the raise of forensic technology in justice, investigations mostly were based on Circumstantial evidence and testimonial evidence. However now, scientific knowledge and practices are being used to substantiate the realities connected to the case, this research was intended; to display contribution of forensic evidence toward fair justice and to give recommendation to the establishment of Forensic Databases such us DNA database and Fingerprint Database.

Paper reviews and internet search on standard forensic investigation process, forensic evidence preservation and use of Forensic Databases were used to get relevant information and ideas developing the topic.

Forensic evidence is obtained by scientific methods such as ballistics, blood test, fingerprint analysis and DNA test then is used in court. With some examples biological evidence, gunshot residues, fired projectiles, fingerprint evidence. Trace evidence is a common term for small things including microscopic, it covers a wide variety of evidence, including fibers, hair, building materials and so on.

Admissibility of evidence, it is highly needed to ensure proper handling of evidence just from the early stage of investigation. In Brief, to assure an effective chain of custody, admissible evidence is evidence which can be brought in the court of law and is acceptable, with people demonstrating that the evidence is authentic and that it has been protected to ensure that the integrity is retained.

Impact of forensic evidence toward fair justice; Forensic evidence is of much greater value in direct reflection on criminal cases; especially in revealing hidden suspects and solving cold cases, Sexual violence cases, drug abuse cases for instance cases of poisoning, unidentified substances and suspected murder.

Forensic databases: computerizing evidence is a good practice for securing evidence; such as forensic DNA database and fingerprint database though there are many others such us footprint database. They are greatly important, such as To identify suspects in violent criminal cases, DNA or fingerprint may be the only evidence present lacking any suspect and DNA database can provide a match to the real offender without any other leads, Make associations between unsolved cases across different jurisdiction, Locating missing persons, and for an issue that raise to twins about same DNA, fingerprint Database can help.

Scientific evidence are very important on both sides under disputes, to the prosecutor to reveal any fact that is linking the suspect to the crime and prove the guilty whilst the defender is searching for alibi and leak the case or is trying to prove his/her innocence. As recommendation, our country is still in need of fixing standard procedure in common for approaching the crime scene; increase of trainings especially to first respondents to crime scenes, establishment of forensic databases, and the increase of collaboration with neighbor countries and oversees.

CpG for ID: Molecular Techniques for DNA Methylation Profiling In Forensic Caseworks

Abdul Karim Uzabakiriho
Soon Chun Hyang University, Forensic Science Department, Asan City/South Korea
E-mail: abuzabak7@gmail.com

With few exceptions, all cells in a person's body have the same DNA and genes. As cells divide and grow, different genes are expressed; resulting in different cell types. Therefore, investigating the DNA obtained from biological samples is the first step to clarify DNA profiling.

However, there are other heritable changes in gene functions that occur without causing any changes in DNA sequence. One of them is DNA methylation. It is one of the epigenetic mechanism used by cells to control gene expression. It involves the addition of methyl group (-CH_3) to the 5th position of Cytosine ring in CpG dinucleotides by DNA methyltransferases (DNMTs) enzymes using a S-adenosylmethionine (AdoMet or SAM) donor. Methylation of DNA occurs in the promoter region of genes, which is the area that initiates replication of the gene. These changes can involve hypomethylation and/or hypermethylation that lead to cell differentiation and growth disorders.

In recent decades, researchers have linked abnormal DNA methylation to human diseases such as lupus, muscular dystrophy and cancer. In addition to that, the forensic scientists have made discoveries about DNA methylation status on biological samples in forensic casework such as authentication of DNA samples, differentiating monozygotic twins, identifying the tissue sources and age prediction.

For this extent, we discuss the molecular techniques for DNA methylation analysis with potential applications in forensic casework.

Prospective Study of Twins Zygosity DNA Testing Using Genetic Analyzer 3500: Cases from National Police College Forensic Laboratory

Eric Dushimimana[4], Samuel Mashyaka[3], Aimable Ndungutse[2], Leon Mutesa[1]
[1]College of Medicine and Health Sciences, University of Rwanda
[2]Rwanda Forensic Laboratory
[3]National Police College Staff (Rwanda)
[4]National Police College (NPC), Forensic Science Bachelor's Degree Candidate
E-mail: ericodushime@gmail.com, samuelshkz@gmail.com

Although appearance can sometimes give a clear indication of the relationship between twins, appearance alone is not always a scientific sound method for knowing whether twins are monozygotic (identical) or dizygotic (fraternal). Twin zygosity testing can be done by older methods including ABO blood group typing, analysis of various other proteins and enzymes, or using human leukocyte antigen (HLA). However, DNA testing became the only formal and exact method for the twins zygosity testing now. The present case report aimed at Comparing monozygotic (MZ or identical) twins and dizygotic (DZ or fraternal) twins to evaluate the degree of genetic and environmental influence on a specific trait and assessing whether the test can be applied as scientific method for Forensic evidence.

Buccal swabs (DNA samples) were collected from Twins and their parents that implied different cases. Global filerTM Amplification kit and Capillary electrophoresis were used to genotype individual's DNAs, and Gene Mapper® ID-X and GenoProof® software were used in Short Tandem Repeats analyses as well as execution of biostatic calculations for kinship analysis of twins and their parents. Area of application GenoProof® is able to perform a complete raw data analysis comprising peak identification, size and allele calling.

Fast proprietary and confidential genetic profiling of the identical twins is 99.999% probability/accuracy of results. Combined Probability of dizygosity (CDZ) obtained was 98.9986361513% for the first case; Combined Probability of dizygosity obtained was 98.7852400868% for the second case. Combined Probability of dizygosity was 99.7099661551% for third case; 99.9999999592% for fourth case; 99.9999999592%

for fifth case; 99.9725276375% for sixth case of full siblings; while 99.996763340 8% was for seventh case of full siblings.

The techniques used to examine the provided twin's DNAs resulted in designation between monozygotic (identical) and dizygotic (fraternal) twins, and also showed that fraternal Twins are the same as full siblings. The contribution of such test to Forensic evidence will be discussed during presentation.

Forensic Determination of the Degree of Similarity between Monozygotic and Dizygotic Twins' Fingerprints

Thomas Akimana[3], A. Kabbatende[2], Leon Mutesa[1]

[1]College of Medicine and Health Science (CMHS), University of Rwanda

[2]Rwanda Forensic Laboratory, RFL

[3]National Police College, (NPC), Forensic science Bachelor's Degree candidate

E-mail: thomasmugabea@gmail.com

When humans touch objects with their hands they often leave behind evidence in the form of fingerprints which are essentially small lines, called friction ridges that are found on the tips of our fingers. Everybody's friction ridge pattern is unique, permanent and unchanging, unless altered by injury or disease which is why forensic scientists use them to identify individuals. In twins more especially, monozygotic twins who share nearly all features even their genetic DNA, exist the similarity in their fingerprints. The similarity between twins' prints is critical to establish the reliability of fingerprint identification.

The objective of this research is to determine the degree of similarity between monozygotic and dizygotic twins' fingerprints.

The research focused on six pairs of monozygotic twins and dizygotic twins recently collected using both level 1 and level 2 features. Inking and rolling method were used to collect volunteers' fingerprints. At the laboratory, the patterns of fingerprints were analyzed using Adobe Photoshop CS Middle east version.

3 pairs of monozygotic twins (2 males and one female) and 3 pairs of dizygotic twins (all females) were analyzed and the results were as follows: 97 % class similarity was found in monozygotic twins while 66.7% class similarity was found in dizygotic twins. Details comparison found 83,3% similarity in monozygotic twins and 33.3% similarity in dizygotic twins.

Essentially, the study correlated a high similarity in monozygotic twins' fingerprints than in dizygotic twins' fingerprints hence clearly demonstrates the absolute need for fingerprint collection and analysis techniques; to eliminate possibilities of mistrials of twins with closely linked fingerprints.

Prospective Study of Paternity Testing with paternal Grandparents using Genetic Analyzer 3500

Eric Ndacyayisenga[2], Silas Habimana[2], Leon Mutesa[1]
[1]Center for Human Genetics, College of Medicine and Health Sciences,
University of Rwanda
[2]Forensic DNA Laboratory - National Police College (NPC)
E-mail: ndacyayisengaeric04@gmail.com

DNA testing can be taken as the form of proving or disproving the biological relationships, it involves the analysis of genetic material between more than one individual. From grand parentage DNA testing we can determine whether a child is your biological grandchild or not by comparing the DNA profiles of paternal grandparents with that of grandchild.

DNA profiling was first reported by an English geneticist named Alec Jeffreys in 1985. He found that certain regions of DNA contained DNA sequences that were repeated over and over again next to each other. He also discovered that the number of repeated sections present in a sample could differ from individual to individual.

The experimental work was done basing on 15 individuals who were grouped in 6 cases and the samples were taken through the consent of the participants. Global filerTM Express PCR Amplification kit was used to amplify 23 STR (Short tandem repeat) autosomal loci but the analysis was conducted on 21STR Loci.

This was generated by GenoProof®3 software, for the case 1 and case 2 where the DNA profiles of paternal grandparents, grandchild, and mother of child were available; the probability were 99.999999412% and 99.9999992927% respectively. For the case 3 and case 4 we considered the DNA profiles of paternal grandparents and grandchild only and the probability were 99.99984486O9% and 99.9999900466% respectively. For case 5 and 6, sample analyzed were from the paternal grandparents and grandchild and we got the probability of 99.9362701935% for case 5 and 99.9528307309% for the case 6.

For the first 4 cases because the probability was found above the required of 99.99%; the paternity was practically proven. For the cases 5 and 6 the probability was found below 99.99% and the paternity was practically excluded.

The determination of grand parentage is based on whether or not alleles are shared between the child and the alleged father when a number of genetic markers are examined. In the absence of mutation, the child receives one allele matching each parent at every genetic locus examined. For these tests, we can recommend testing samples from both alleged paternal grandparents and the mother's sample whenever possible to achieve results of greatest accuracy.

Study of Poisonous Plants of Rwanda: A Comprehensive Approach to Forensic Botany and Toxicology

Justin N. Kabera
Chemistry Division, Rwanda Forensic Laboratory (RFL), Rwanda
E-mail: jukabe5@gmail.com / justin.kabera@rfl.gov.rw

Hundreds of cases of human and animal poisonings by plants occur every year. Garden flowers, ornamental shrubs, and houseplants as well as common species in the wild can all contain toxic phytochemicals. In Western countries, toxic plants rank third in causes of calls to poison control hotlines after medicines and household chemicals

Traditionally, plants are unique capable to produce secondary metabolites (phytochemicals) used in Alternative, Complementary and Traditional medicine either in crude form or after proper processing. These secondary metabolites may have both medicinal and toxic properties.

Botanical resources for forensic evidence remain underutilized because of many factors among them the lack of knowledge of most people involved in criminal investigations.

Thus, this project aims to combine different skills in forensic botany, phytochemistry and plant molecular biology to aid in the identification and authentication of plant material as evidence in criminal casework in Rwanda.

The objective is to create poisonous a plants database for reference during different investigations for criminal justice purposes.

A survey will be conducted across the country using interviews and questionnaire prepared prior field work. The targeted group to provide needed information will be tradi-

tional healers or herbalists; but any potential source such any experienced people or literature review will be considered. Ten (10) persons in each district will be surveyed either by interview or by filling the questionnaire.

Surveyed plants will be collected, analysed botanically, chemically and genetically by different methods such as systematics, phytochemical screening and DNA barcoding.

Experts in plant phenotypes will be consulted for their expertise in other techniques of authentication.

Interested students will be contacted to help in survey, some will conduct their research dissertation within the project in order to speed up the establishment of toxic plants database.

(1) List of poisonous plants of Rwanda with their scientific names, ecology and their chemical constituents
(2) Database of Plant profiles to serve as reference during forensic investigations.

Studying poisonous plants of Rwanda or medicinal plants in general requires a significant compendium of information gathered together in order to help in the identification of botanical material. In Rwanda, since the practices of traditional medicine using plants are popular and common, with possible intoxications, it is essential to set up a reference database of toxic plant sample profiling that will be taken into consideration during investigation where botanicals are suspected to be the physical evidence in criminal casework.

Cancer amongst Ugandans is Associated with Increased Pb and Cd Contamination in Food and Drinking Water

Keneth Iceland Kasozi1 and ChemTox[1, 2]
[1]Faculty of Biomedical Sciences, Kampala International University Western Campus, Bushenyi, Uganda
[2]Chemical hazard and Toxicarcinogenesis Research Group, Kampala International University Western Campus, Bushenyi, Uganda
E-mail: kicelandy@gmail.com

Cancer in Africa has received low priority thus leading to increased morbidity and mortality following its rise in sub Saharan countries. The scarcity of information on risk factors which predispose Africans to Cancer created a rationale for the study.

This was an observational two phase study conducted in southwestern Uganda with an emphasis on beef, milk (phase 1) and drinking water (phase 2). Laboratory analysis was conducted (atomic absorbance spectrophotometry) for Lead (Pb), Zinc (Zn), Cadmium (Cd), Copper (Cu), and Iron (Fe) on milk (N =40), beef (N = 40) and georeferenced drinking water (N= 40) i.e. boreholes (BHW), springs (SW), open wells (OW), bottled (BtW), and tap water (TW) samples. In addition, the study modelled the estimated daily intake (EDI) and incremental lifetime cancer risk (ILCR) as measures of risk to the Ugandan population by making comparisons against WHO, USA, EU and UNBS standards.

In milk samples, heavy metals were highest in the order of Zn > Fe > Pb > Cu while in beef, heavy metals were in the order of Zn > Pb > Fe > Cu and no Cd was detected in both samples. Beef had significantly higher ($P<0.05$) Pb and Fe concentrations than milk showing that dairy products are not safe for children to consume in Uganda. In drinking water, heavy metals were present in the following order: Fe > Zn >Pb > Cu > Cd, respectively, while Cr was not detected. Fe was the primary water heavy metal in the order of OW > BHW > TW > SW > BtW. This was followed by Zn levels in the order of TW > BtW > SW > BHW > OW. All compounds were within international water safety standards except Pb and Cd posed the highest cancer risk for adults.

In all studies, Pb and Cd were identified as the major pollutants which predispose Ugandans to cancer demonstrating a need for authorities to strengthen food and water monitoring systems to minimize on the general public exposure to carcinogenic compounds, thus reducing on the strain in the healthcare systems.

Qualitative and Quantitative Analysis of Hydrogen Cyanide from Manihot Esculenta Crantz (Cassava plant)

Gerard Niyonzima1, Justin N. Kabera[2]

[1]National Police College, Rwanda

[2]Chemistry Division, Rwanda Forensic Laboratory (RFL), Rwanda

E-mail: niyonzimagerard012@gmail.com

Cassava plant (manihot esculenta crantz) it has two classes: bitter and sweet one, this plant contains cyanide poisonous in its roots tubers and leaves. Which is able to kill or cause damage to human being after its consumption of fresh ones cyanide in the digestive system directly targeting hemoglobin in red blood cell to affect respiration system, this can be used by individuals for criminal purpose. The present study was based on the qualitative and quantitative determination of hydrogen cyanide for forensic interests. Different materials were used: analytical balance, spatula, filter paper etc and reagents such as Methanol, sodium hydroxide, potassium hydroxide and ammonium, and other materials for screening and titration methods.

The results of screening method show color change from white to blue due to the presence of hydrogen cyanide in the container. And by titration method we found that in 10.72 ml from stock solution there is 21 mg of hydrogen cyanide. Based on the experiment of Boorsma (1905) cyanide can be lethal to humans and the acute dose is 1 mg/kg body weight. These methods can be used during investigation of poisoning cases, by analyzing the remaining recovered at the scene of crime (forensic examinations).

Low Concentrations of Probiotics (Yoba®) are Safe in Male Drosophila melanogaster

Keneth Iceland Kasozi[1], Aisha Bukenya[2], Ejike Daniel Eze[1], Josephine Kasolo[3], Dickson Stuart Tayebwa[4], Fred Ssempijja[5], Joy Suubo[1], Andrew Tamale[4], Isaac Echoru[5], Ibrahim Ntulume[6], Sarah Kemuma Onkoba[6], Lisa Nkatha Micheni[6], Emmanuel Tiyo Ayikobua[1], Oscar Hilary Asiimwe[7], Muhamudu Kalange[1]

[1]Department of Physiology, Faculty of Biomedical Sciences, Kampala International University Western Campus, Bushenyi, Uganda | [2]School of Pharmacy, Kampala International University Western Campus, Bushenyi, Uganda | [3]Department of Physiology, College of Health Sciences, Makerere University, Kampala, Uganda | [4]College of Veterinary Medicine Animal Resources and Biosecurity, Makerere University, Kampala, Uganda | [5]Department of Anatomy, Faculty of Biomedical Sciences, Kampala International University Western Campus, Bushenyi, Uganda | [6]Department of Microbiology, Faculty of Biomedical Sciences, Kampala International University Western Campus, Bushenyi, Uganda | [7]Department of Biochemistry, Faculty of Biomedical Sciences, Kampala International University Western Campus, Bushenyi, Uganda

E-mail: kicelandy@gmail.com

Human consumption of probiotics is gaining significant momentum, however, information on their safety is scarce. The aim of this study was to evaluate the effects of Yoba® on basic physiochemical properties in male Drosophila melanogaster.

Male W1118 Drosophila melanogaster were fed on a diet supplemented with Yoba® at 1%, 3%, 6%, and 12% as well as a control group, followed by experiments on motor function, total protein, catalase activity, and hydrogen peroxide scavenging activity and lifespan which were conducted.

Yoba® at high concentration increased locomotor activity in Drosophila melanogaster. Total protein, catalase, and hydrogen peroxide scavenging activity were significantly higher at 1% Yoba® concentration compared to 3%, 6%, and 12% concentration Yoba®. Since total protein includes replaceable (enzymes) and non-replaceable (structural) proteins, findings from this study showed that 1% of Yoba® was nutritionally beneficial and safer than higher concentrations of Yoba®. Furthermore, lifespan was significantly higher in Drosophila melanogaster consuming 1% Yoba® than in higher concentrations demonstrating the role of Yoba® diet at low concentrations in the modulation of aging.

Probiotics exert their health benefits at low concentrations since high concentrations were associated with toxicological effects in body tissues.

The Medico-legal Approach to Child Abuse

Jan P. Sperhake
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf,
Hamburg, Germany
E-mail: sperhake@uke.de

Although the perception of child abuse is inconsistent in different countries and cultures, it certainly is a world-wide problem that has been repeatedly addressed by the United Nations and the Worls Health Organization. Physical abuse, sexual exploitation, neglect, child labour, as well as the recruitment of child soldiers are phenomena that need to be recognized, prevented, and – where necessary – punished. Legal Medicine can play a crucial role in the multi-professional fight against child abuse. What are the typical injury patterns caused by physical abuse? What can we expect to find in cases of sexual abuse? What kind of medical evidence must be taken? How do we document the findings of an examination? It shouldn't be forgotten that the professional examination of the youngsters demands a careful approach and a gentle manner in order to not re-traumatize the affected child.

Use of Forensic Evidence in Identification of Child Sexual Abuse Cases

Francois Xavier Hakizimana[1], Clementine Abimpuhwe[2]
[1]Medical legal Doctor, Kacyiru Hospital
[2]Forensic scientist, Rwanda National Police
E-mail: abimpuhwecl@gmail.com

Child Sexual abuse cases happen worldwide. The evidence from these cases may be physical, psychological and biological evidences. The usually used biological evidence include but are not limited to semen, blood and saliva. The objective of forensic evidence is to prove or disprove physical connection between suspects and crime scenes. The aim of this research is to analyzing evidence obtained from child sexual abuse cases reported at Kacyiru Isange One Stop Center.

In Rwanda, we are still encounter problem in acquisition and prosecution of evidence from child sexual abuse. This study demonstrates reliable forensic evidences that court might take into consideration while accusing, convicting or exonerating suspected offenders of child sexual abuse.

This research focused on all cases reported at Kacyiru Isange one stop center in December 2017. Data collection forms were used to record all victim's information related to the reported sexual assault cases. Before collecting any evidence, the victim's body was the most important source of physical evidence forensic medical examination was performed on each victim. Then, four vaginal swabs and underwear were collected and taken to Kigali Forensic Laboratory for lab analysis.

The techniques used include UV light at 450nm wave length to locate potential semen stains on all 14 underwears, Phosphatesmo KM to determine the presence semen, color test for blood, RSID and SERATEC PSA for semen as confirmatory tests. The results shown that females were 100% sexually abused at the age between (13-17) years. out of 14 cases, 14(100%) revealed nothing in microscopy, 8(57%) cases for underwear and 11(71.4%) cases for vaginal swabs were positive, all positive cases were confirmed having semen. For detection of blood 4(14.3%) cases were positive.

This research definitively answers the question regarding child sexual abuse, because forensic medical examinations are an important part of a comprehensive response to the prosecution of alleged child sexual abuse, both to assure appropriate care for the child and to support legal decision making. Further study is needed to attend crime scene where child sexual abuse happens at home and collect all relevant forensic evidence.

Book of Abstracts: Workshops

The Medico-legal Approach to Child Abuse

Maria Casagrande, Eileen Bigdon
Clinic of Ophthalmology, University Medical Centre Hamburg-Eppendorf
E-mail: m.casagrande@uke.de, e.bigdon@uke.de

All mammals have an eye build on the same principle. Therefore, the bovine or pig's eye resembles the human eye. However, the bovine eye is about 2 times the size of the pig's eye.

The first part of the workshop is a theoretical presentation to explain how a perforating keratoplasty is performed. The first step is to trephine the donor and afterwards the host cornea in full thickness. The donor graft replaces the cut-out host cornea. Sutures are placed in radial fashion to attach graft and host together.

The workshop is designed for every member to trephine a cornea und suture it with 10-0 Nylon sutures in single knot fashion into a host cornea.

External Examination and Autopsy Techniques

Antonia Fitzek, Alexandra Ron
Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Germany
E-mail: A. Fitzek@uke.de, a.ron@uke.de

Medico-legal post-mortem examination includes an external and internal examination of the corpse (autopsy). An autopsy serves to determine the manner of death (natural vs. unnatural death) and the cause of death (e.g. disease, injury or intoxication). In some cases, it is used to identify the deceased person and in criminal cases, cases of suicide, or accidents to reconstruct the circumstances of death and to answer questions of interest to the investigative authority. The procedure of medico-legal post-mortem examination is described.

Interventions to Address the Mental Health Consequences of Abuse

Vincent Sezibera[1], Ingo Schäfer[2]

[1]Centre for Mental Health, College of Medicine and Health Sciences/University of Rwanda, Rwanda

[2]Department for Psychiatry and Psychotherapy, Center for Psychosocial Medicine, University Medical Center Hamburg-Eppendorf, Germany

E-mail: v.sezibera@ur.ac.rw, i.schaefer@uke.de

Physical and sexual abuse is a major public health problem worldwide and has numerous negative mental health consequences, including anxiety, depression, suicide and posttraumatic stress disorder. These mental health consequences of abuse have to be adequately addressed by appropriate interventions. This workshop aims at increasing the ability to support individuals affected by physical and sexual abuse. The participants will learn definitions of abuse, its prevalence in society and its consequences on an individual's mental health. A special focus will be given to the intergenerational transmission of abuse and neglect. The participants will learn basic rules about how to recognize abuse and to develop confidence in responding to disclosures of abuse, including the provision of appropriate support and referral to services. We will also discuss and practice mental health interventions to cope with the mental health difficulties resulting from the abuse.

Forensic Anthropology – Identification of Human Remains, Determination of Gender, Age and other Features

Eilin Jopp-van Well, Oliver Krebs

Institute of Legal Medicine, University Medical Centre Hamburg-Eppendorf, Hamburg, Germany

Email: e.jopp@uke.de, oliver.krebs@uke.de

Forensic anthropology is the application of the science of anthropology and its various subfields, including forensic archaeology and forensic taphonomy, in a legal setting.

A forensic anthropologist is trained specifically in human osteology, recovery of human remains, securement of evidence at the site of discovery, and can assist in the identification of deceased individuals whose remains are decomposed, burned, mutilated or otherwise unrecognizable, as might happen e.g. in a plane crash. In those cases it is useful to have a forensically trained anthropologist at the scene to work with the crime scene crew to get all the necessary information before the context of the find will be disturbed. Therefore the investigators do not only have a detailed documentation of the scene, but also some questions can probably be answered right away thus expediting the investigation.

Forensic anthropologists are also instrumental to the investigation and documentation of genocide and mass graves. Thus it is an important field of investigation for Rwandan scientists, especially for the determination of the post mortem interval and identification of the victims.

In this laboratory based workshop we use a donated skeletal Collection from Germany. The workshop is designed for individuals interested in learning forensic anthropological methods for developing a biological profile, establishing positive identification, and interpreting bone trauma. Topics include digging techniques, human versus non-human osteology, skeletal inventory, estimation of biological characteristics (age, sex, and stature), securement of evidence for DNA analysis, identification methods, and trauma interpretation. Participants will gain hands on training by examining human remains during the course.Forensic Anthropology –

DNA-Workshop Summer School 2019

Aimable Ndungutse1, Oliver Krebs2
[1]Kigali Forensic Laboratory Analyst/Biology Section
[2]Institute of Legal Medicine , University Medical Center Hamburg-Eppendorf, Germany,
E-mail: naimable80@gmail.com, aimable.ndungutse@rfl.gov.rw, oliver.krebs@uke.de

A short introduction of the basics of forensic DNA-typing will be given and cases will be presented, that show the power of the technology but also its limitations.

You wi ll learn about the principles of forensic DNA-analysis, which will cover subjects like

- Analysis of STR-Systems via PCR amplification and capillary electrophoresis
- Methods to detect semen, blood and saliva traces
- Methods to extract DNA from different sources (biological traces and touched items)
- How to interprete electropherograms in simple cases
- Interpretation of kinship cases

The DNA-workshop will be held as a seminar with exercises of interpretation of cases and some hands-on parts.

Thank you to everybody for participating in the 2019 Forensic Summer School in Kigali/Rwanda

We are looking forward to meeting you again in 2020!

Notes

Notes

Universitätsklinikum
Hamburg-Eppendorf

Institute of Legal Medicine, University Medical Center
Hamburg-Eppendorf/Germany (UKE)
Phone: 0049 40 7410 - 52130
FAX: 0049 40 7410 - 59383
Internet: www. uke.de/institute/rechtsmedizin
Email: oliver.krebs@uke.de
pueschel@uke.de