Metabolic conditions: (PKU)

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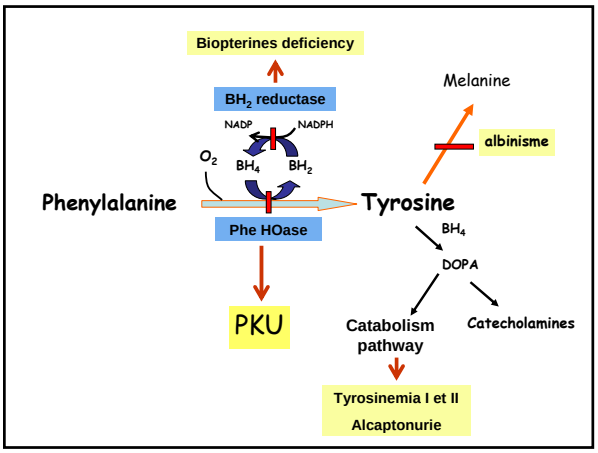

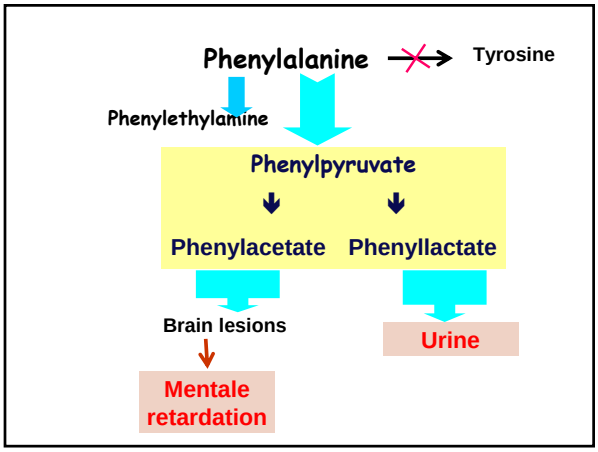

The History of PKU

- **1934** Dr Asbjorn Folling firsts describes PKU
- 1937 Dr George Jervis identifies a mutated enyzyme as the cause of PKU
- 1951 Professor Horst Bickel develops the first effective treatment of PKU
- 1957 Dr. Willard Centerwall develops "The Diaper Test"
- **1958** Dr. Robert Gurthrie develops "The Guthrie Test"
- 1966 The Guthrie Test becomes standard medical practice across the world
- 1992 Dr Savio Woo identifies the gene for the mutated enzyme which causes PKU
- 1993 A Medical Research Council report recommends that PKU patients should maintain a low protein diet for life

The History of PKU

1934: First PKU patient studied by Dr. Asbjörn Fölling

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Phenylpyruvic acid in urines

Phenylpyruvic oligophrenia

The History of PKU

Dietary management of PKU

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Diet and recipes. In: Lyman FL, ed. *Phenylketonuria.* Springfield, IL: Charles C. Thomas; 1963:318

Contrast: untreated and treated phenylketonurics. The 11-year-old boy is severely retarded, whereas his 2 1/2-year-old sister, diagnosed in early infancy and promptly treated with the mind-saving diet, is normal

The History of the PKU Neonatal Screening (PNS)

- **1958-1961**: **Robert Guthrie** - blood on paper
- **1962**: PNS program in Massachusetts
- **1967**: PNS in France
- **1973:** Adoption of the program by 43 states of US.
- **1972 - 1980**: "Association Française pour le Dépistage et la Prévention des Maladies Métaboliques et des Handicaps de l'Enfant"

The History of PKU in Morocco

- 1990 : Hyperphenylalaninemia - Pharmacy Thesis n° - 1990-Rabat
- 1990: Selected urinary screening of PKU - Pharmacy Thesis n° -1990 - Rabat
- 1993: Selected screening of PKU using TLC of plasma amino-acids - Pharmacy Thesis n° -1993 - Rabat
- 1994: Initialization of clinical and biochemical management of patients.
- 1996: First report of Moroccan PKU cases - Medicine Thesis n° - 1996 Rabat.
- 2000: First case managed by adequate diet early after birth (collaboration with SHS).

Review of literature

Congenital hyperphenylalaninemias

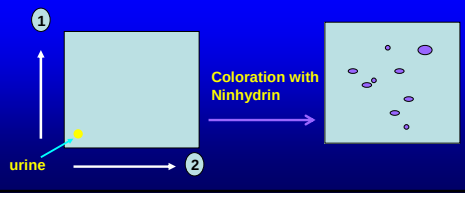
The objective of the Thesis

Prepare a document in French to allow Students and physicians to learn about these unknown pathologies because of unavailability of biochemical means of their diagnosis and follow up

Preparation of the oriented screening

Urinary study of amino acids

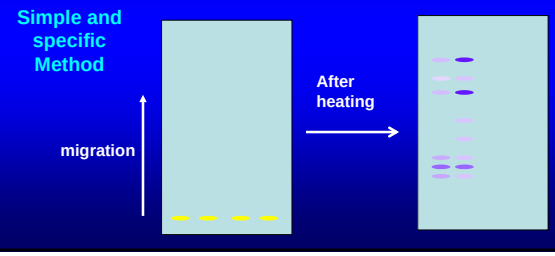
Tin layer Chromatography



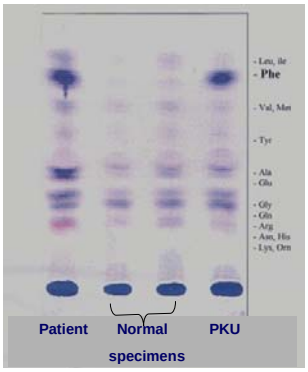
Preparation of the oriented screening

Study of plasma amino acids

Tin layer Chromatography



Example of chromatogram



Selected screening of PKU

- Application of TLC and measurement of plasma Phe using fluorimetric method to screen patients selected on clinical symptoms.
- Application to screen newborn in families at risk.
- Application to screen patients in centers of mentally retarded persons.

Results

- 1991 to 2006: 75 cases of PKU (2140 patients aged of 1 week to 17 years were screened)
- Newborn screened (first week of life): 2 cases of PKU et 2 normal newborns.
- Biopterin deficiency 1 case
- Center for mental retarded: 3 cases of PKU (only one center)

Total: 75 cases of PKU (57 families)
1 case of Biopterin deficiency

Attending National and International Congress and Meeting

- 1ère Journée franco-marocaine sur les Maladies héréditaires du métabolisme, SMCC, Rabat 5 Décembre 1992
- 30ème Congrès de l'association des Pédiatres de langue française, Marrakech 19-23 Mai 1993.
- 9th International Neonatal Screening Symposium and second meeting of the International Society for Neonatal Screening, Lille, September 13-17, 1993
- Third International Meeting of International Society for Neonatal Screening, Boston, October 21-24, 1996

Attending National and International Congress and Meeting

- 9th Arab Congress of Clinical Biology, 3rd Moroccan Meeting of Clinical Chemistry, Rabat, May 3-6, 2000
- VIII International Congress of Inborn Errors of Metabolism, Cambridge, UK, 13-17 September 2000
- Second Franco-Moroccan Meeting on IEM, Rabat, 18-19 December 2003
- Third Franco-Moroccan Meeting on IEM, Rabat, 25-26 March 2005
- SSIEM 42nd Annual symposium , Paris 6-9 September 2005
- The 6th Meeting of the ISNS, Awaji, Japan, 16-19 September 2006

Example of PKU patients "without" treatment

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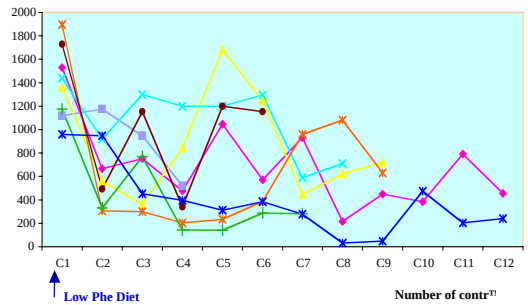
Phenylalanine levels of patients



Example of PKU patient diagnosed at birth

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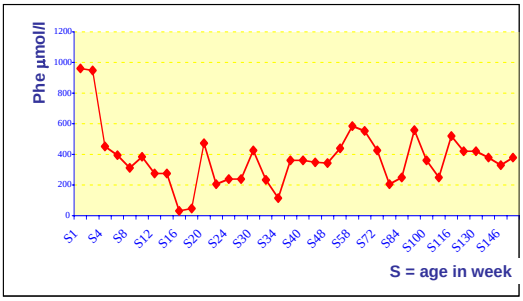
Plasma Phenylalanine levels during treatment of patient SOUKAINA



Infant at 10 mounts of age managed by XP Analog (SHS)

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Infant at 3 years of age managed by XP-Maxamaid (SHS)

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Child with her Sister and Brother which are no treated PKU patients

Photos have been removed for privacy and confidentiality purposes.

Conclusion

- **PKU is frequent in Morocco: Public Health Problem**
- **Patients were diagnosed lately**
- **Difficulties to access to the treatment**
- Should we Screen for PKU in Morocco?
- Should we screen for other diseases: CH? CAH? SCD?....
- If yes how could we act???

Acknowledgments

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- Dr. Monique Mathieu
- Dr. Priscille Divry