UNDERSTANDING ALBINISM

ALBINISM

Albinism is a group of genetic disorders characterized by a reduction in Melanin Biosynthesis associated with reduced vision that presents in childhood

ALBINISM

Reduced pigmentation compared to other of the same ethnic and racial background.

Ocular Albinism

No detectable loss of pigmentation on skin and hair

Oculocutaneous Albinism

Hypopigmentation of skin and hair

DIAGNOSIS IN IMPORTANT

Avoid concern child will be blind

Delayed visual maturation is common

Nystagmus is often misinterpreted

Albinism is not degenerative

Give advise

It may be limited to the eyes *(Ocular albinism)*

or

Affect Skin, Hair and Eyes (*Oculocutaneous albinism*)

OTHER FEATURES OF ALBINISM

Reduced vision with delayed visual maturation
Nystagmus
Foveal Hypoplasia
Iris globe retinal hypo-pigmentation
Photophobia glare and dazzle due to ocular stray light
Strabismus
Reduced stereo acuity
Refractive error – astigmatism – myopia – hyperopia
Anomalous chiasmal and higher visual pathways
Anomalous auditory pathways
Behavioural problems

Clinical Features

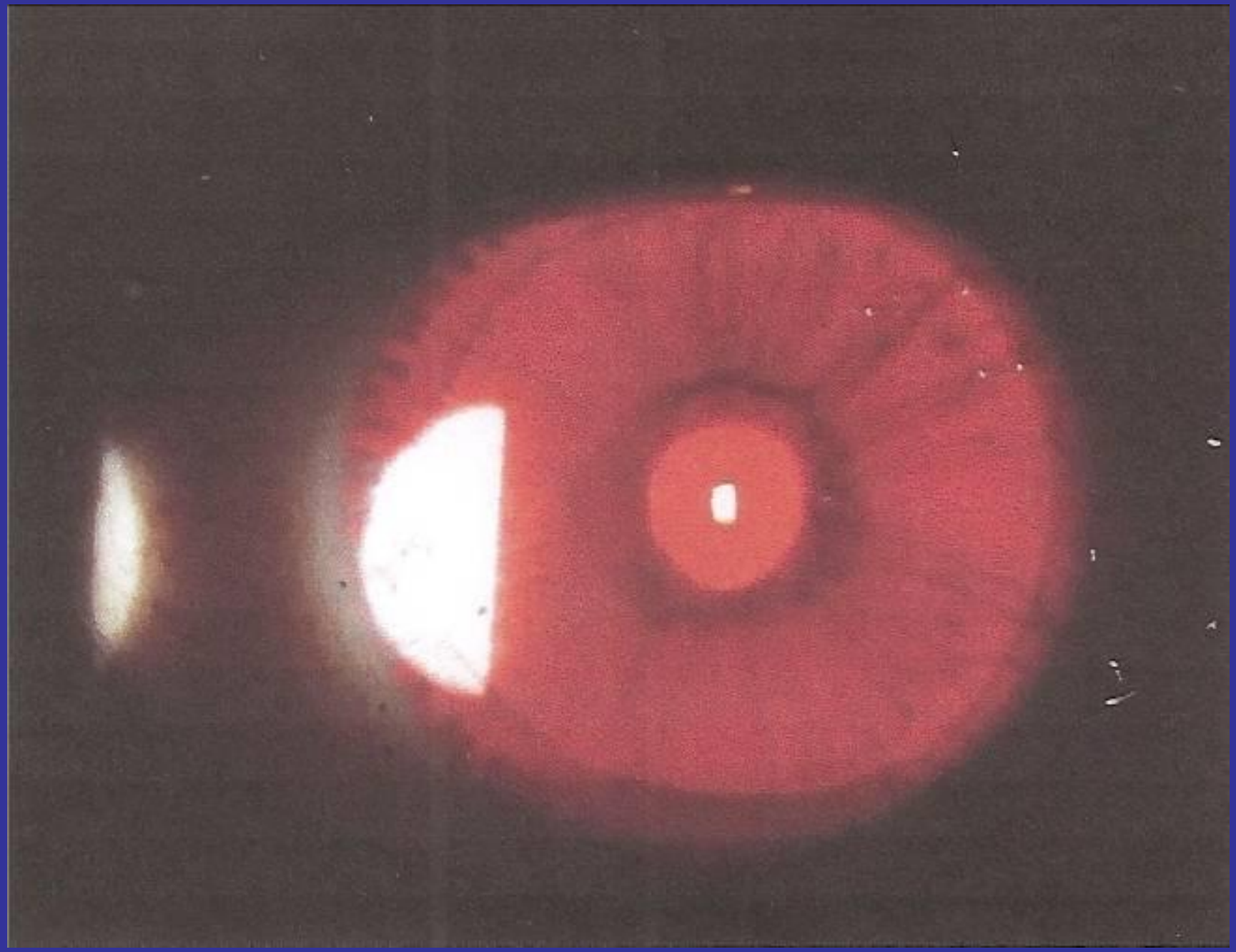
Iris Trans-illumination

Nystagmus

Abnormal Head Posture

Strabismus

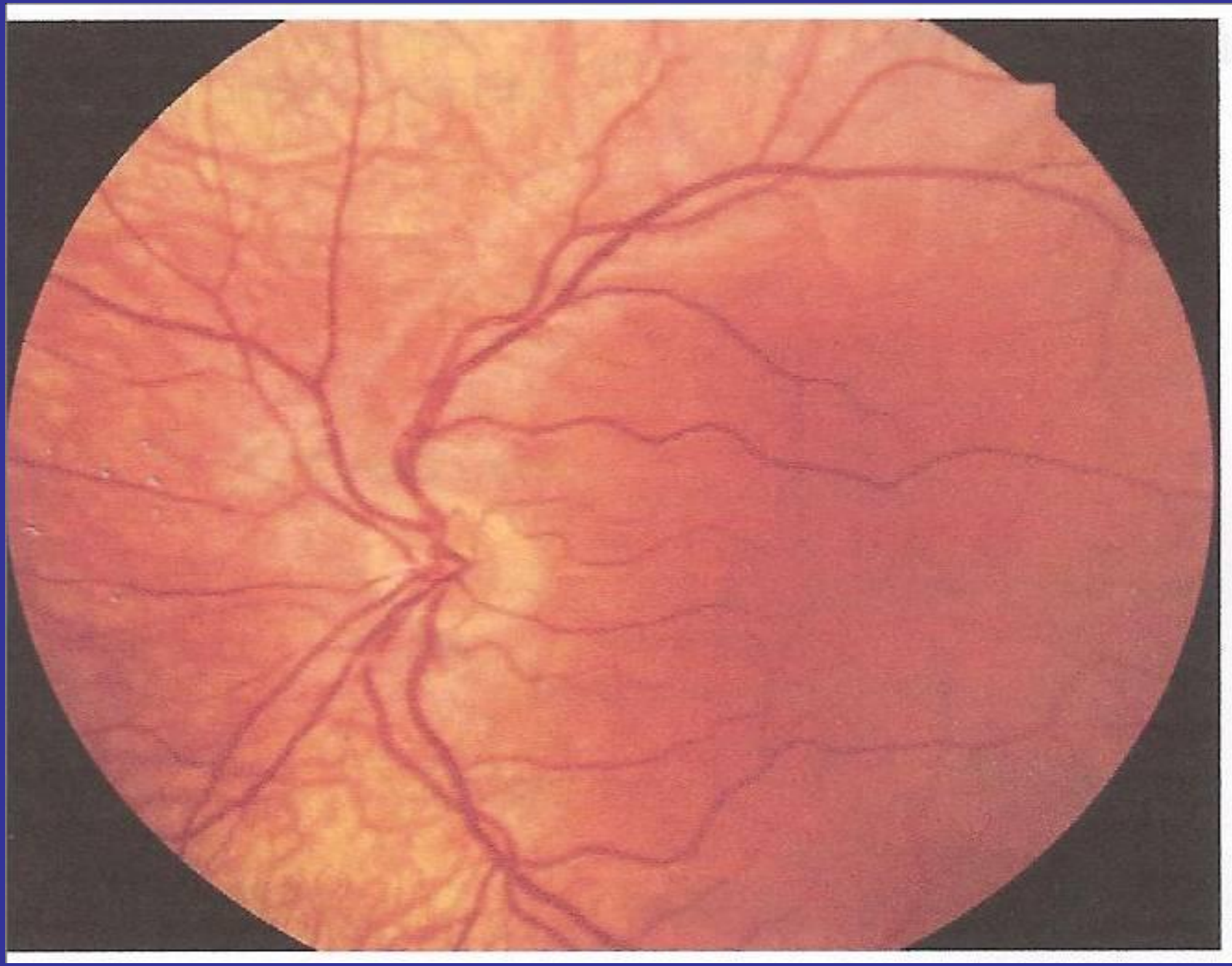
Refractive Errors

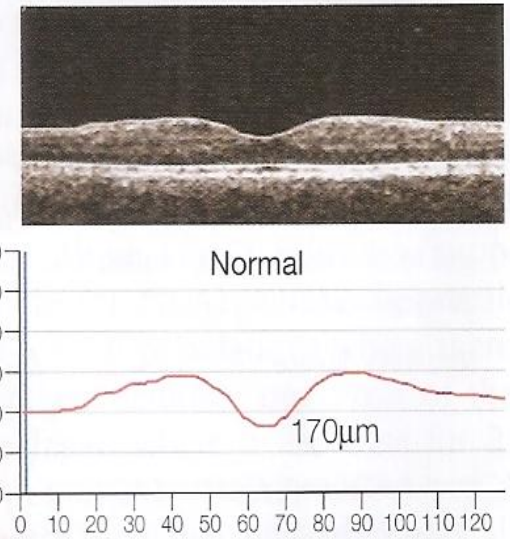


Macular Hypoplasia

Hypopigmentation of Fundus

Abnormal decussation of visual pathway

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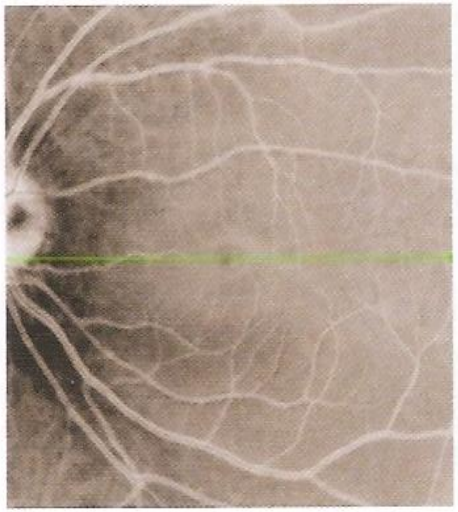

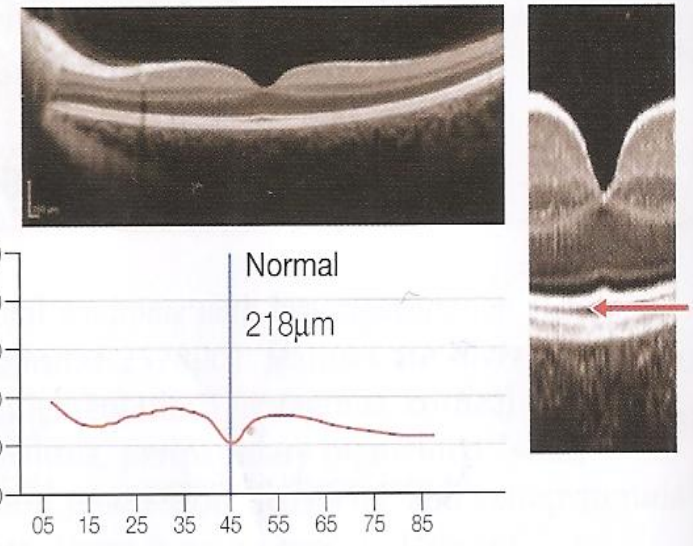
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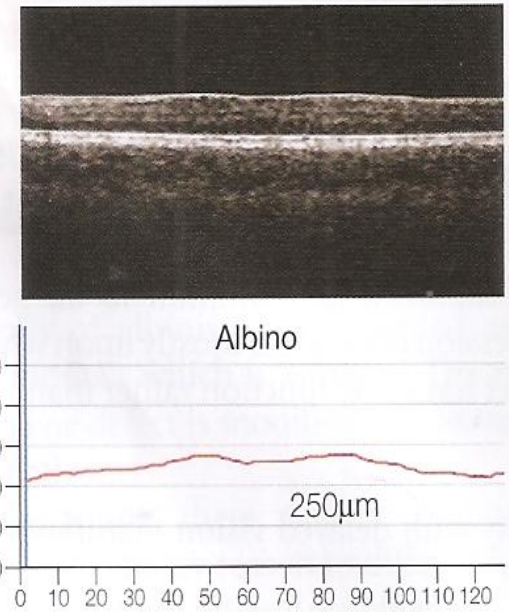
Albino
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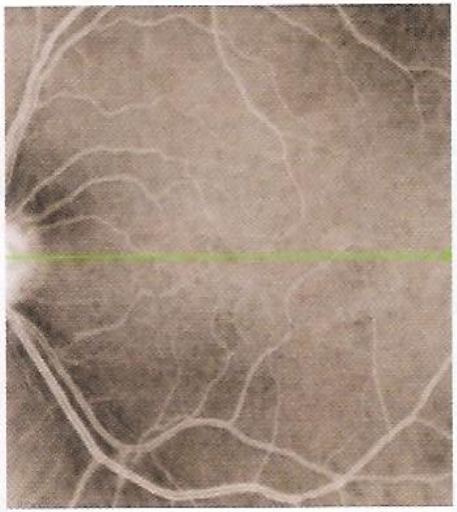

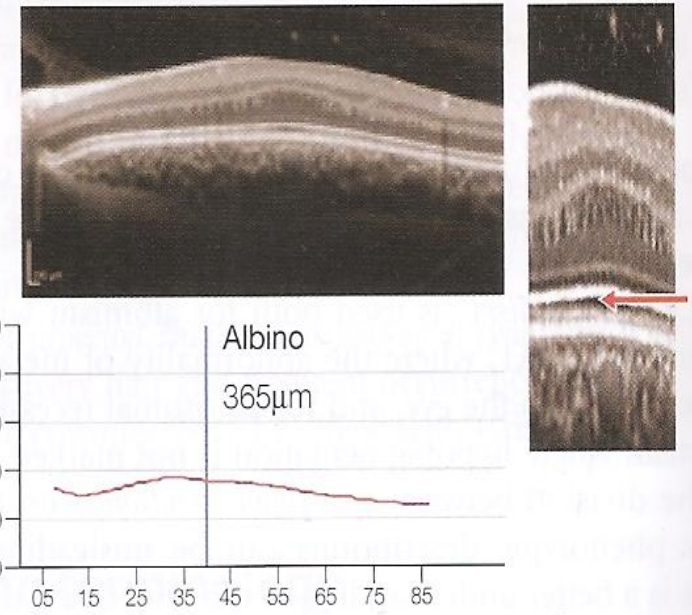
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365µm
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80
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40
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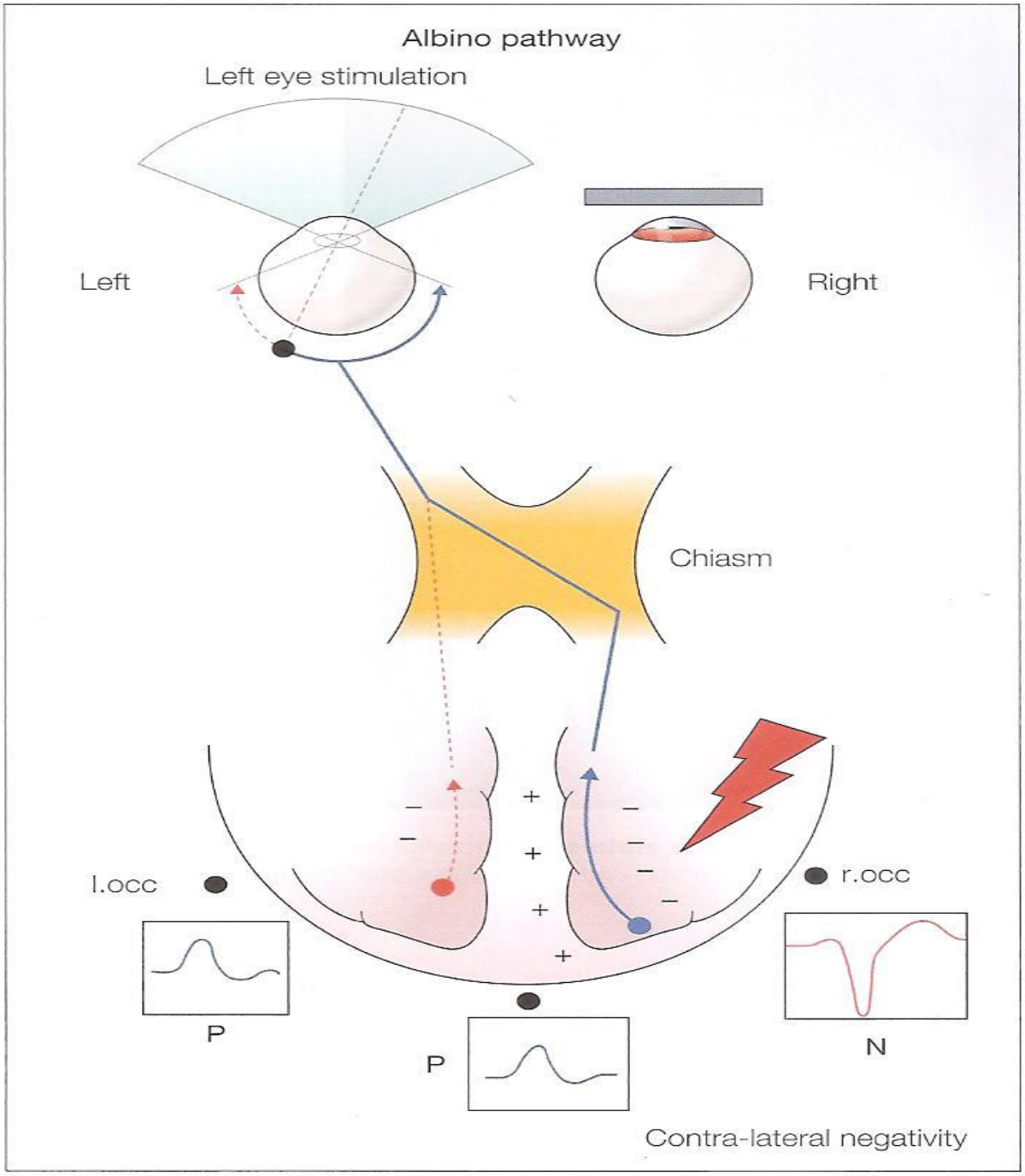
A

B

C


Albino pathway
Left eye stimulation
Left
Right
Chiasm
l.occ
r.occ
P
P
N
Contra-lateral negativity

3 Phases

Birth and Diagnosis

Pre-School

School

Classification

Molecular Genetics

Gene based Nomenclature for OCA - OA

Type 1 OCA Tyrosinase Related

Most common form of OCA
1 – 16 – 20,000 live births

Tyrosinase gene is located on the long arm of Chromosone 11

Autosomal Recessive

4 subtypes: 1A 1B 1MP 1TS

Type 1A OCA

Truly Tyrosinase-negative form

SEVERE

Increased Risk of Cancer

Type 1B

Tyrosinase activity reduced to 7%

Hair can be eventually blond or light brown

Vision decreased nystagmus

Type 1MP OCA is the minimal pigment form
decreased Tyrosinase activity
Hair Blond Skin Nevi
Variability in Iris Trans illumination

Type 1TS OCA temperature sensitive
Production of Tyrosinase varies according to Temperature. Cooler areas of body normal Tyrosinase Activity in warmer areas, activity reduced

Type 2 OCA

This group of disorders is unrelated to Tyrosinase Activity.

The molecular genetic deficit is in the P gene located on the long arm of chromosome 15

Skin colour ranges from white to fair complexion and hair colour can be yellow, red, brown or black

Vision better – less nystagmus

Dominant OCA

Uncommon, Variable expressivity

Xlinked OA 10% of Albinism

More severe poor Vision

Full name	Abbreviation	Type	Gene/protein	Locus	OMIM*	Inheritance
Tyrosine negative	OC1A	OCA	Tyrosinase	11q14-q21	203100	AR
Yellow variant	OCA1B	OCA	Tyrosinase	11q14-q21	606952	AR
Minimal pigment	OCA1MP	OCA	Tyrosinase	11q14-q21	606952	AR
Temperature sensitive	OCA1TS	OCA	Tyrosinase	11q14-q21	606952	AR
Type 2 OCA	OCA2	OCA	P gene	15q11.2-q12	203200	AR
Brown albinism	BOCA	OCA	P gene	15q11.2-q12	203200	
Type 3 OCA	OCA3	OCA	Tyrosinase related protein	9p23	203290	AR
Type 4 OCA	OCA4	OCA	Membrane associated transport protein	5p13.3	606574	AR
Hermansky-Pudlak syndrome	HPS	OA, OCA	multiple	multiple	203300	AR
Chediak-Higashi syndrome	CHS	OCA	LYST	1q42.1-q42.2	214500	
X-linked ocular albinism	OA1	OA	GPR143	Xp22.3	300500	XLr
Piebald trait	PBT	not true albinism	c-kit	8q11	172800	AD

Rare types of Albinism with malfunction of other Lysosomes-related organelles.

Lysosomes-related organelles

They traffic substances, melanosomes, platlet Dense granules, lytic granules

Hermansky-pudlak syndrome

Lightly pigmented skin and iris

Normal or decreased vision

Bleeding diatheses

Pulmonary fibrosis

Chediak-Higashi syndrome

Variable pigmentation

Normal to moderately reduced vision

Recurrent bacterial infection

Congenital dislocation of hips

Neurological dysfunction

Interaction of gene with other genes

Gene defect on long arm of Chromosone 15 in the region of the P gene

Prader-Willi Syndrome

Infantile hypotonia

Hyperphagia – obesity

Hypogonadism – mental retardation

Short stature

Small hands/feet

Translucent irides

Hypopigmented skin

Angelman's syndrome

Developmental Delay

Speech Impairment

Ataxia – microcephaly – seizures

Evidence of Chiasm

Mistrouting without other evidence of Albinism

DIAGNOSIS

Molecular Genetics

Pedigree, examination of Skin, Hair, Eyes

Skin biopsy – visual evoked potential

Molecular Genetics, diagnosis provide the ultimate explanation of the clinical senario

MANAGEMENT

Genetic Counselling

Spectacles

Hand Held Telescopes others

Correct Refractive errors

Education

Strabismus Surgery

Sun block

Gene Therapy

Intellectual and Educational Attainment in Albinism

Temple St. and Dept. of Psychology UCD

1995

The eye features include decreased vision, Photophobia, Nystagmus, Iris Trans-illumination and macular hypoplasia

What about the intellectual and educational abilities?

2 Groups of Children

18 Albino Children compared to a group of demographically matched controls

Intellectual ability was measured using Raven's standard progressive matrices

Educational ability was measured by reading Spelling and arithmetic tests of wide range achievement tests

Albino children had normal intelligence but performed more poorly in reading, spelling and arithmetic ability. Study unable to correlate this to type of albinism or vision

22% of Albino children attended special schools for visually impaired and 6% were in special classes in normal schools

Evaluation of vision–specific quality-of-life in Albinism

University of Minnesota April '09

3 Questionnaires

1. Medical Social Vocational Educational
2. General Health
3. Vision targeted characteristics

19 Males 25 Females in study median age 30.5 years – Range 18-79 mean corrected Vision was 20/80 median 20/80 range 20/20 – 20/320

Mild Visual Impairment 50%

Moderate to Severe visual impairment 20-40%

Study used National Eye Institute visual function questionnaire (NEI-VFQ) to determine The effect of Albinism associated ophthalmic Pathology on quality of life (QOL)

48% were able to drive

Impairment of distance vision

Vision specific health difficulties

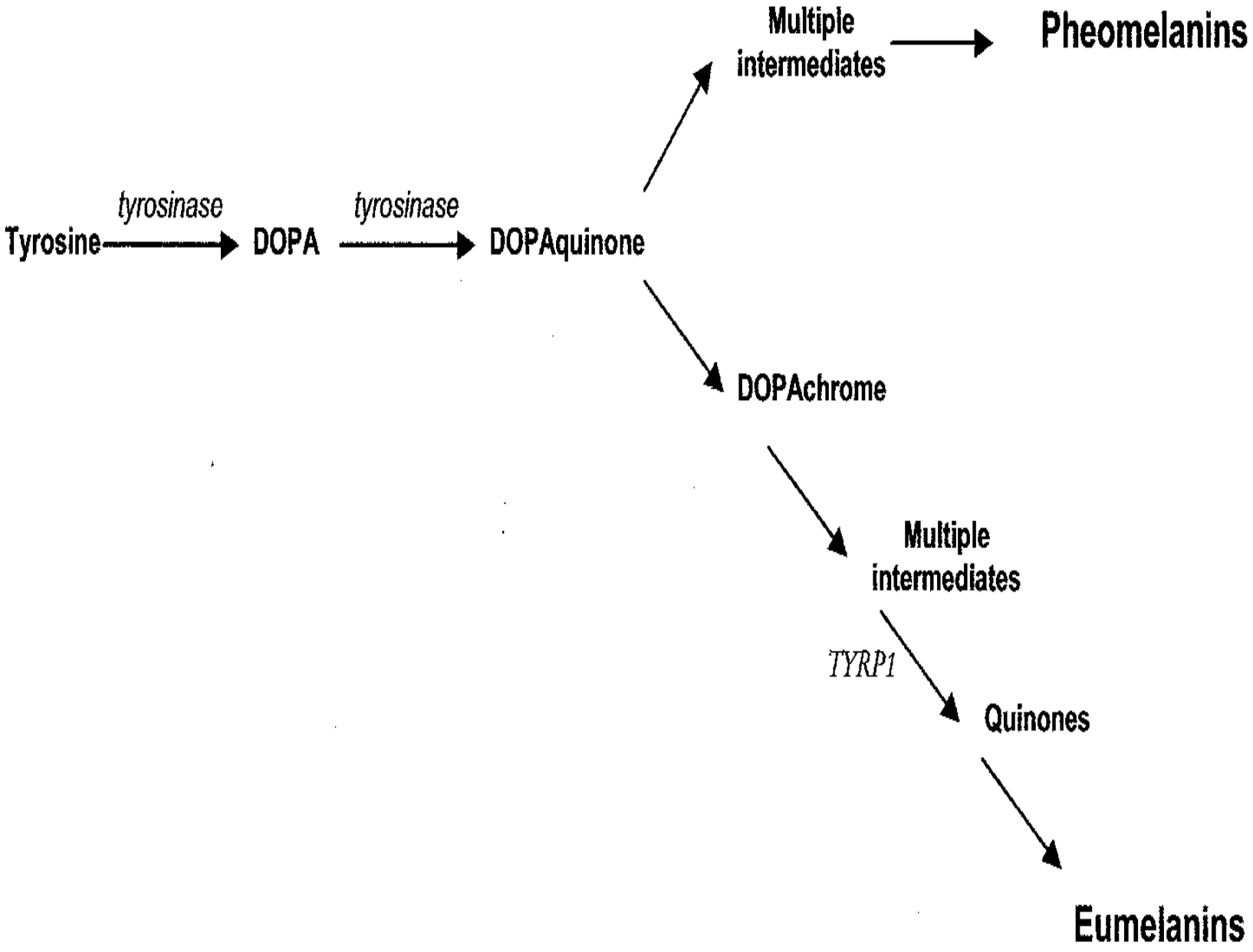
All but one graduated from High School

35 Attended College

At the time of the study all were in college, employed full time or retired from full time employment

Conclusion

Excellent Prognosis for Education Future


Multiple
intermediates
Pheomelanins
tyrosinase
tyrosinase
Tyrosine
DOPA
DOPAquinone
DOPAchrome
Multiple
intermediates
TYRP1
Quinones
Eumelanins