



## Research Article

### PREPARATION OF ABHRAK BHASMA AND ITS EVALUATION ON MODERN PARAMETERS

Sule Hareshwar<sup>1\*</sup>, Dani Mayuri<sup>1</sup>, Belge Raman<sup>2</sup>

<sup>1</sup>M.D.(Ayu) Scholar, <sup>2</sup>Professor & HOD, Department of Ras shastra & Bhaishajya Kalpana, Shree Ayurved Mahavidhyala, Nagpur, Maharashtra, India.

#### ABSTRACT

*Bhasma* is an ash obtained through incineration; raw material are processed for purification and this process involves incorporation of some other minerals and/or herbal extract which leads to various reactions in processed material. *Bhasma* are important in maintaining optimum alkalinity for good health, neutralizing harmful acids that lead to illness; because *Bhasma* do not get metabolized so they don't produce any harmful metabolite, rather it breakdowns heavy metals in the body. In today's era, standardization is utmost necessary to confirm its identity and to determine its quality, purity, safety, effectiveness and acceptability of the product. But the most important challenges faced by Ayurvedic formulations are the lack of complete standardization by physiochemical parameters. *Abhrak Bhasma* having various therapeutic uses has been used since long in *Ayurveda*. Present study deals with pharmaceutical procedures like *Shodhan*, *Dhanyaabhrak Nirman*, *Maran* of *Abhrak*. To assure the quality of *Bhasma*, *Rasa shastra* quality control tests like *Nischandratva*, *Varitaratva*, *Rekhapurnatva*, etc., were used then the *Bhasma* was analyzed using modern parameters like LOD, LOI, Estimation of Iron, Aluminium, Magnesium, silica, XRD and SEM analysis. XRD study of *Abhrak bhasma* shows various peaks which shows presence of Mica, FeSO<sub>4</sub>, Fe<sub>2</sub>O<sub>3</sub> in it. SEM study shows the presence of nanoparticles in which particle size ranges from 1 to 200 micron which is an invention of this new era.

**KEYWORDS:** *Abhrak Bhasma*, *Maran*, *Shodhan*, Standardisation, XRD, SEM.

#### INTRODUCTION

Medicinal preparations such as *Bhasma* are unique to the *Ayurveda*, a traditional system of medicine. *Bhasma* involves the conversion of metal into its mixed oxide of higher oxidation state. These are generally prepared by repeated incineration of metals and minerals with medicinal herbs decoctions or juices so as to eliminate their harmful effects and are taken along with honey, milk, butter, or ghee (a preparation from milk). Herbo-mineral formulations of *Ayurveda*, constituting *Bhasma* as an ingredient, are the superior forms of administration of nano-medicine. *Abhraka Bhasma*, a herbo-mineral product of Ayurvedic pharmaceutical, acts on both the *Doshas* (bodily humors) and the disease to arrest the pathogenesis. It has held a tremendous sway on the *Rasavaidyas* (alchemists) and practitioners for centuries. *Abhraka Bhasma* is like supreme ambrosia; it destroys *Vata* (air), *Pitta* (fire), and disease *Ksaya* (phthisis). It has been used for several chronic diseases like tuberculosis, breathing problems like dyspnoea, asthma, piles, and skin diseases. Arthritis etc<sup>[1]</sup>. Important steps involved in the formation of *Abhrak Bhasma* are

a) *Shodhan* (purification) with different media like cow-milk, decoction of *Triphala* pieces of dry fruits *Haritaki* (*Embllica officinalis*), *Vibhitaki* (*Terminalia bellirica*) & *Amalaki* (*Terminalia chebula*), cow- urine and decoction of *Badari* (*Zizyphus jujuba*) are frequently used as medium<sup>[2]</sup>. Among them *Nirvapa* process (heating to red hot stage and immediately quenched in liquid medium) for seven times is most acceptable for *Shodhan* of *Abhrak*<sup>[3]</sup>.

b) *Marana* i.e., trituration of metal or mineral with *Eranda patra swaras* & *Guda* for several hours & then repeated incineration and calcinations at high temperature in a *Putra* system of heating<sup>[4]</sup>.

#### MATERIALS AND METHODS

##### Pharmaceutical processing of *Abhrak*

Raw *Abhrak* (Biotite) and ingredients were procured from local market, Nagpur, India and all the materials were thoroughly screened by *Rasashastra* experts based on the *Grahya Lakshanas* (characteristics) mentioned in the classics. Pharmaceutical and Analytical study was conducted at Shri Ayurved Mahavidyalaya, Nagpur. However, the SEM was carried out at Diya Labs, Mumbai, XRD study at VNIT, Nagpur.

*Shodhan* of *Abhrak patras* 500gm was carried by *Nirvapa* process (Heating & Quenching in liquid media) with the help of *Triphala kwath*<sup>[5]</sup> (Decoction of *Triphala*) for 7 times<sup>[6]</sup>, each time fresh *Kwath* 2 lit., was used for quenching, average temperature of at the Red hot stage of *Abhraka* - 739.00°C. After *Shodhan* process, *Shodhit Abhrak*, 450 gm was processed with 1600gm of *Dhanya* (Unhusked rice) and *Kanji*<sup>[7]</sup> 5 lit., were mixed together, taken in a jute bag and made *Pottali* of it. The Jute bag was then immersed in a big stainless steel vessel containing *Kanji* and kept immersed in *kanji* for 3 days (72 hours). On 4th day the jute bag was opened and was vigorously rubbed in same liquid media with both the hands till all *Abhrak* will come out through pores of jute bag. It was allowed to settle down, *kanji* was decanted from vessel and *Abhraka churna* 390gm was collected and used for

*Abhraka marana*. This process is known as *Dhanyabhraka Nirman*.<sup>[8]</sup>

Semi fine powder of *Shuddha Abhrak* 250 gm, was levigated in *Khalva Yantra* (Mortar & Pestle) with *Swaras* (liquid extract) of *Eranda patra* & *Guda* (jaggery) in equal quantity by weight i.e. 100 gm. for at least 6 hrs till a homogeneous paste was formed, From which pellets were made of uniform size & shape. These pellets were then transferred to an earthen crucible covered with a lid and sealed with sealing clay, and then subjected to *Gajaputa* (Incineration). The mean temperature attained during

each *Putra* was about 800°C. This was attained half hour after igniting the *Putra* and was constant for 2-3 hours. Then temperature gradually reduced to normal 8 hours after ignition of each *Putra*, material was allowed to cool by itself. Each *Putra* step was followed by *Bhavana* step and this combination was repeated 20 times till completion of *Abhrak Bhasma* preparation. Final *Abhrak Bhasma* 200gm was collected in fine powder form and subjected to analytical tests. The observations during *Maran* process were noted and given below in table.

**Table 1: Showing Observations during Maran Process of Abhrak Bhasma**

Putra No.	Initial Quantity of Abhraka	Cow dung cakes used	Color & Chandrika	Other observations
1 <sup>st</sup>	250gm	85	Color changes from black to Brick red color <i>Chandrika</i> ++++	Typical ' <i>Kut</i> ' sound heard after first <i>Putra</i> which was absent.
2 <sup>nd</sup>	246gm	85	Brick red color gradually increased <i>Chandrika</i> ++++	Particles becomes fine than before. Pallets becomes hard after <i>Putra</i>
3 <sup>rd</sup>	243gm	80	Color same as above <i>Chandrika</i> ++++	Particles becomes fine than before. Pallets were soft than before.
4 <sup>th</sup>	240gm	80	Color same as above <i>Chandrika</i> ++++	Particles becomes fine than before
5 <sup>th</sup>	238gm	80	Color same as above <i>Chandrika</i> ++++	Pallets were still hard to touch. Particles becomes <i>Sukshma</i> in touch which passes ' <i>Rekhapurnatwa</i> ' <i>Pariksha</i> . but <i>Chandrika</i> 's were present.
6 <sup>th</sup>	235gm	75	Color same as above <i>Chandrika</i> +++	Same as above
7 <sup>th</sup>	230gm	75	Color same as above <i>Chandrika</i> +++	Same as above
8 <sup>th</sup>	226gm	70	Color same as above <i>Chandrika</i> +++	Colour Maintained, <i>Bhasma</i> became more softer than before <i>Chandriaka</i> 's merely present
9 <sup>th</sup>	224gm	70	Color same as above <i>Chandrika</i> +++	Same as above
10 <sup>th</sup>	221gm	70	Color same as above <i>Chandrika</i> +++	Same as above
11 <sup>th</sup>	219gm	65	Color same as above <i>Chandrika</i> ++	<i>Bhasma</i> was about 50% <i>Varitar</i>
12 <sup>th</sup>	216gm	65	Color same as above <i>Chandrika</i> ++	<i>Varitaratwa</i> increases gradually after each <i>Putra</i> . Softness and colour was maintained.
13 <sup>th</sup>	214gm	60	Color same as above <i>Chandrika</i> ++	Same as above
14 <sup>th</sup>	212gm	60	Color same as above <i>Chandrika</i> ++	Same as above

15 <sup>th</sup>	210gm	50	Color same as above <i>Chandrika</i> ++	<i>Bhasma</i> becomes more soft, <i>Sukshma</i> , <i>Shlaksna</i> . Pallets were soft in touch
16 <sup>th</sup>	208gm	50	Color same as above <i>Chandrika</i> +	<i>Bhasma</i> was soft, <i>Nishchandra</i> , <i>Sukshma</i> but <i>Varitaratwa pariksha</i> not passed.
17 <sup>th</sup>	205gm	50	Color same as above <i>Chandrika</i> +	Same as above
18 <sup>th</sup>	202gm	40	Color same as above <i>Chandrika's</i> merely visible	<i>Varitaratwa</i> increases than before.
19 <sup>th</sup>	200gm	40	Color same as above <i>Chandrika</i> absent	Same as above
20 <sup>th</sup>	200gm	40	Color bright brick red <i>Chandrika's</i> were Absent	<i>Bhasma</i> was about 90% <i>Varitar</i> , and passes all other Ayurvedic parameter hence finalized for <i>Kalpa</i> preparation

### EVALUATION PARAMETERS & RESULTS

#### Physical Parameters of *Abhrak Bhasma*

Table 2: Results of Organoleptic Tests<sup>[10]</sup>

Test	Analysis of <i>Abhrak Bhasma</i>
Appearance ( <i>Rupa</i> )	: Fine powder
Colour ( <i>Varna</i> )	: Brick red
Touch ( <i>Sparsha</i> )	: Smooth
Smell ( <i>Gandha</i> )	: Not Specific

Table 3: Results of Alchemical Tests

S.No.	Parameters	Observation of <i>Abhrak Bhasma</i>
1.	<i>Rekhapurnatva</i> (should enter furrows of finger)	Passed
2.	<i>Varitaratva</i> (should float on still water)	Passed
3.	<i>Nishchandravta</i> (free from glittering particles)	Passed
4.	<i>Mridutva</i> and <i>Slakshnatva</i> (softness and smoothness on touch)	Passed
5.	<i>Apunarbhava</i> (should not regain its initial metallic lustre)	Passed
6.	<i>Gatarasatva</i> (should retain its tastelessness)	Passed
7.	<i>Visistavarnotpothi</i> (specific colour)	Passed

Table 4: Results of Physicochemical Tests<sup>[11,12,13]</sup>

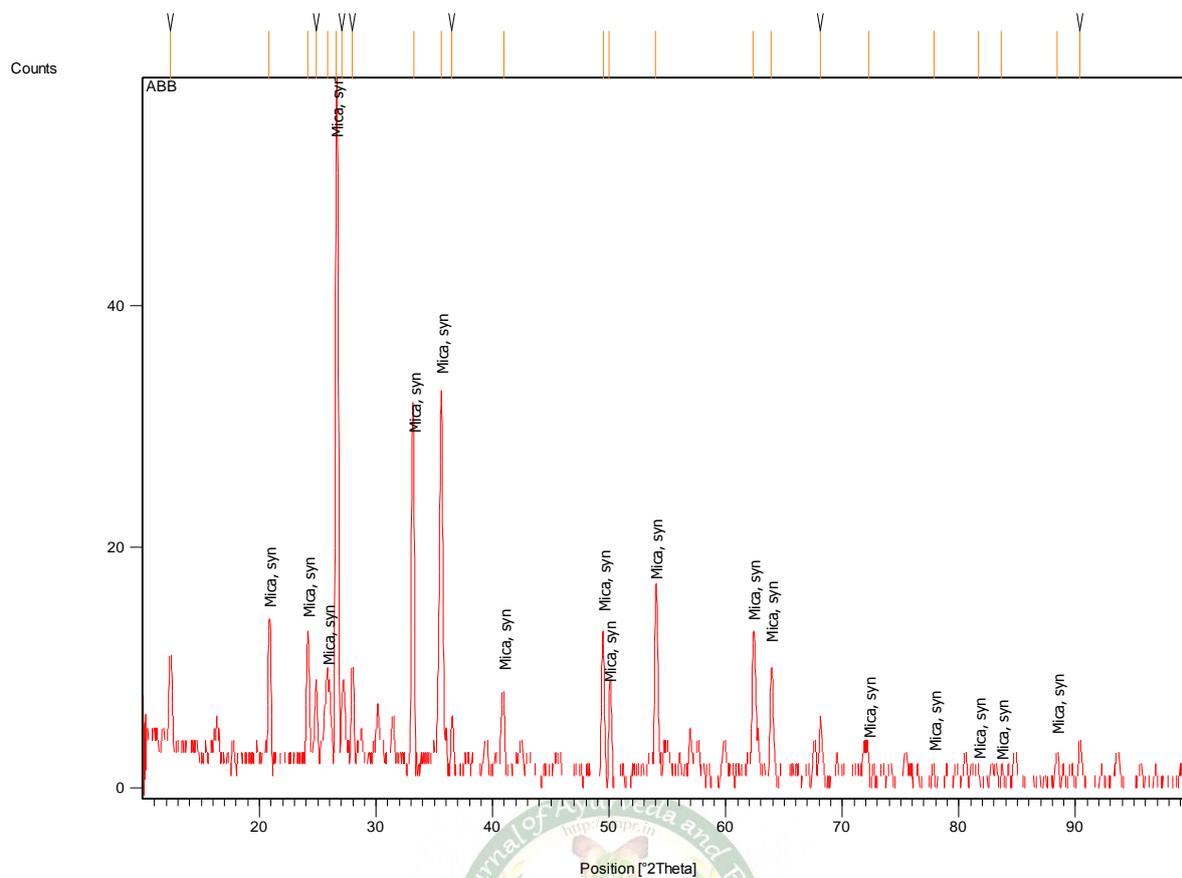
S. No.	Parameters	<i>Abhrak Bhasma</i>
1.	pH of 1% and 10% suspension	7.4
2.	Loss on drying (L.O.D)	1.87% w/w
3.	Loss on Ignition	8.93%w/w

Table 5: Quantitative Estimation in Various samples<sup>[14,15,16,17]</sup>

Sr. No.	Sample	% of Iron (Fe <sub>2</sub> O <sub>3</sub> )	% of Aluminium (Al <sub>2</sub> O <sub>3</sub> )	% of Magnesium (MgO)	% of Silica (SiO <sub>2</sub> )
1.	<i>Ashuddha Abhrak</i>	19.55%	11.48	14.32	0.13
2.	<i>Shuddha Abhrak</i>	17.31%	12.49	17.17	0.17
3.	<i>Abhrak Bhasma</i>	21.16%	13.76	03.69	0.79

#### XRD study

X-ray diffraction techniques was performed to reveal information about the crystallographic structure, chemical composition, and physical properties of materials. Various peaks were observed in XRD study which shows chemical composition in the *Bhasma*<sup>[18]</sup>.



**Peak List:**

Pos. [°2Th.]	Height [cts]	FWHM [°2Th.]	d-spacing [Å]	Rel. Int. [%]
12.3157	7.42	0.3840	7.18109	14.62
20.8139	11.41	0.3360	4.26431	22.46
24.1628	10.54	0.3360	3.68033	20.76
24.8738	5.90	0.3360	3.57672	11.61
25.8758	6.65	0.5760	3.44045	13.09
26.5807	50.78	0.3840	3.35079	100.00
27.0629	4.85	0.3840	3.29217	9.55
27.9345	7.69	0.3360	3.19140	15.14
33.2330	25.84	0.3360	2.69369	50.89
35.6053	30.74	0.3840	2.51947	60.53
36.4570	3.70	0.3360	2.46253	7.28
40.9198	6.20	0.4320	2.20368	12.22
49.4803	12.11	0.3360	1.84060	23.85
49.9870	6.25	0.3840	1.82313	12.31
53.9671	14.70	0.3360	1.69769	28.94
62.3467	11.34	0.3840	1.48813	22.33
63.9086	9.52	0.3840	1.45547	18.75
68.1297	4.94	0.4800	1.37521	9.72
72.2658	1.55	0.3360	1.30634	3.04
77.8254	1.53	0.2880	1.22633	3.01
81.7139	0.84	0.3840	1.17752	1.66
83.6251	0.73	0.3840	1.15540	1.44
88.4194	2.89	0.3840	1.10471	5.69
90.3902	3.91	0.4800	1.08568	7.70

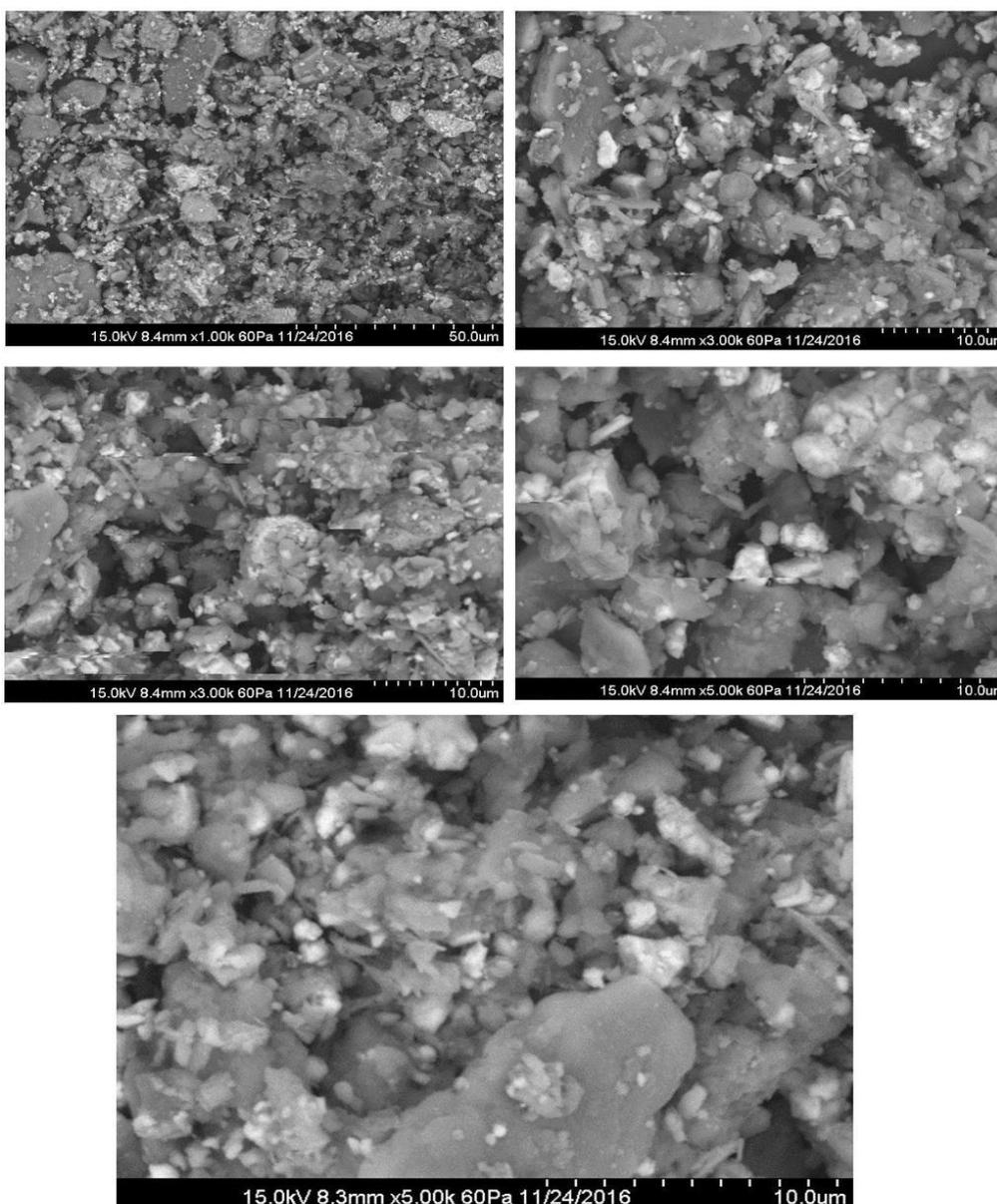
**Pattern List**

Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	01-071-1885	Unmatched Strong	Mica, syn	-0.193	1.944	K Mg <sub>2.75</sub> Si <sub>3.5</sub> Al <sub>0.5</sub> O <sub>10</sub> F <sub>2</sub>

**SEM Study**

In the present study, SEM was used to find out particle size of *Bhasmas* and also to aid EDAX for elemental analysis. Images were captured at different magnifications ranging from 300X to 10000X. The image generated gives an idea about the sample surface topography. These images have shown the presence of micro fine particles of *Bhasmas* in this preparation<sup>[19]</sup>. *Abhraka Bhasma*, mixture of different powder was observed, small particle found to be deposited on larger particle, particle of irregular shape observed, particle size found to be from 1 to 200 micron could be visualized. Finer particles could not be visualized as the images were unclear beyond the magnification of 10000X.

**SCANNING ELECTRON MICROSCOPY IMAGES OF ABHRAK BHASMA—AT VARIOUS MAGNIFICATIONS**

**DISCUSSION**

During *Shodhan* process, *Abhraka patra* gets separated and turned to silvery golden in color when red hot on gas stove. Typical hissing sound was heard when it was dipped in *Triphala kwatha*. Gradually silver tinge of *Abhraka* was disappeared and turned to black color.

*Abhraka* was soft with each *Nirvapan* process, but it was needed to be more softer for further *Marana* process. Hence, *Dhanyabhrak nirman* process was carried out. After complete process *Abhrak* was soft and semi fine particles. A Brick red colored, lustreless *Abhraka bhasma* with all the

properties mentioned in Ayurvedic texts was obtained after 20 *Gajaputa*'s. The prepared *Bhasma* was tested on Ayurvedic parameters like *Rekhapurnatwa*, *Varitaratwa*, *Nishchandrata*, *Nirdhooma*, *Varnya* etc. Physico chemical tests were performed on some of the raw materials, intermediate product as well as prepared *Bhasma* to check the quality of product. *Ashuddha Abhraka* 19.55%, *Shuddha Abhraka* 17.31%, *Abhrak Bhasma* 21.16%, contains Iron in Ferric oxide form. Ferric oxide form of iron is easily absorbable by human body and has proven beneficial effects over human body in various disease conditions. Which is found to be more in *Abhrak Bhasma* which make is a useful in many diseases. X-ray Diffraction study was performed on *Abhrak Bhasma*, shows various peaks shows crystallographic structure, chemical composition, and physical properties of materials in *Bhasma*, *Abhraka Bhasma* shows peaks of Mica, FeSO<sub>4</sub>, Fe<sub>2</sub>O<sub>3</sub>, SEM study of *Abhraka Bhasma* suggest that, it is a mixture of different powder, small particle found to be deposited on larger particle, particle of irregular shape observed, particle size found to be from 1 to 200 micron could be visualized.

### CONCLUSION

The present study illustrate the significance of *Shodhan* process and *Maran* process in the preparation of *Abhrak Bhasma*. Results also revealed that there is much difference in the physico chemical properties of raw material, *Ashuddha Abhrak Shuddha Abhrak* and *Abhrak bhasma*, which may be ultimately credited to beneficial result of pharmaceutical processes of *Rasa Shastra*. Besides this, analytical tools also reveals that the chemical constituent of *Abhrak Bhasma* is combination of iron, aluminium, silica, magnesium, potassium and zinc. XRD and SEM study supports the chemical and structural composition of *Abhrak Bhasma* and its Nano structure which is invention of current era.

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#### \*Address for correspondence

**Dr. Sule Hareshwar**

M.D.(Ayu) Scholar,  
Department of Ras shastra &  
Bhaishajya Kalpana, Shree Ayurved  
Mahavidhyala, Nagpur.  
Email: [dr.hpsule@gmail.com](mailto:dr.hpsule@gmail.com)  
Mobile: 09021411511

### Study Photographs

