Color Atlas of Vascular Tumors and Vascular Malformations
Color Atlas of
Vascular Tumors and
Vascular Malformations

Odile Enjolras, MD
APHP, Consultations
des Angiomes,
Hôpital Lariboisière,
Service de Neuroradiologie;
and Hôpital d'Enfants
Armand Trousseau,
Service de Chirurgie
Maxillofaciale et de
Chirurgie Plastique
(Paris, France)

Michel Wassef, MD
APHP, Hôpital Lariboisière,
Service d'Anatomie
Pathologique,
Université Paris 7 Faculté
de Médecine
(Paris, France)

René Chapot, MD
Service de
Neuroradiologie
Hôpital Universitaire Dupuytren
(Limoges, France)
This Atlas is dedicated to our much-loved patients and their families, who trusted us through exceptionally difficult times.
Contents

Acknowledgments page ix
Introduction: ISSVA Classification 1

PART I: INVESTIGATIONS AND RADIOLOGICAL TOOLS 13

Conventional X-Rays 15
Ultrasonography in Combination with Doppler 15
Computed Tomography (CT) 16
Magnetic Resonance Imaging (MRI) 16
Conventional Vascular Imaging 17

PART II: VASCULAR TUMORS 19

II.A Infantile Hemangioma (IH) 21

II.B Other Vascular Tumors 78
II.B.1 Congenital Hemangiomas: RICH, NICH, and Missing Links 78
II.B.2 Tufted Angioma, Kaposiform Hemangioendothelioma, Kasabach–Merritt Phenomenon (KMP) 101

PART III: VASCULAR MALFORMATIONS 123

III.A Capillary Malformations (CM) 125
III.A.1 Common Capillary Malformations: Port-wine Stains (PWS) 125
III.A.2 Capillary Malformations and Associations 127
III.A.3 Syndromic Capillary Malformations 128
III.A.4 Telangiectasia and Syndromes with Telangiectasia 133
III.A.5 Angiokeratomas 135

III.B Venous Malformations (VM) 168
III.B.1 Common Venous Malformations 168
### CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.B.2 Syndromic Venous Malformations, Nosology</td>
<td>173</td>
</tr>
<tr>
<td>III.C Lymphatic Malformations (LM)</td>
<td>224</td>
</tr>
<tr>
<td>III.C.1 Common Lymphatic Malformations</td>
<td>224</td>
</tr>
<tr>
<td>III.C.2 Syndromic Lymphatic Malformations and Lymphedemas</td>
<td>227</td>
</tr>
<tr>
<td>III.D Arteriovenous Malformations (AVM)</td>
<td>255</td>
</tr>
<tr>
<td>III.D.1 Common Arteriovenous Malformations</td>
<td>255</td>
</tr>
<tr>
<td>III.D.2 Syndromic Arteriovenous Malformations</td>
<td>258</td>
</tr>
<tr>
<td>PART IV: CONCLUSION</td>
<td>287</td>
</tr>
<tr>
<td>Index</td>
<td>291</td>
</tr>
</tbody>
</table>
Acknowledgments

Figures were provided by:

- Consultation des Angiomes, Department of Neuroradiology and Department of Pathology, Hôpital Lariboisière, Assistance Publique Hôpitaux de Paris, Faculté de Médecine Denis Diderot, Université Paris 7, France.
- Consultation des Angiomes, Department of Orofacial and Plastic Surgery, Hôpital d’Enfants Armand Trousseau, Assistance Publique Hôpitaux de Paris, Faculté de Médecine Pierre et Marie Curie, Université Paris 6, France.
- Department of Dermatology, Hôpital Tarnier/Cochin, Assistance Publique Hôpitaux de Paris, Faculté de Médecine René Descartes, Université Paris 5, France.

We also thank colleagues who provided illustrations and contributed to patient care:

- Our colleagues from the Multidisciplinary Team for Vascular Anomalies, APHP Lariboisière Hospital at Pr Jean-Jacques Merland — Neuroradiology Department, Université Paris 7, 75010 Paris, France: Dr. Annouk Bisdorff (Interventional Radiologist), Dr. Françoise Lemarchand-Venencie (Dermatologist and Laser Surgeon), Dr. Benoit Faucon (ENT and Plastic Surgeon), Dr. Didier Salvan (ENT and Plastic Surgeon), Dr. Michel Borsik (ENT and Plastic Surgeon), Dr. Dominique Deffrennes (ENT and Plastic Surgeon), Dr. George-Marie Brevière (Cardiologist and Pediatrician), Professor Ludovic Drouet (Hematologist), Mrs. Maya Malet (Psychologist).
- Our colleagues from the Multidisciplinary Pediatric Vascular Clinics, APHP Armand Trousseau Children’s Hospital at Pr Marie Paule Vazquez — Orofacial and Plastic Department, Université Paris 6, INSERM U714, 75012 Paris, France: Dr. Véronique Soupre (Orofacial and Plastic Surgeon), Dr. Jacques Buis (Orofacial and Plastic Surgeon), Dr. Virginie Fayard (Dermatologist and Laser Surgeon), Dr. Arnaud Picard (Orofacial and Plastic Surgeon),
ACKNOWLEDGMENTS

Dr. Frédéric Zazurca (Orofacial and Plastic Surgeon), Dr. Patrick Diner (Orofacial and Plastic Surgeon), Dr. Sonia Ariche-Maman (Radiologist), Mrs. Pascale Gavelle (Psychologist).

In addition we thank:

- Professor John B. Mulliken (Plastic Surgeon, Children’s Hospital, Harvard Medical School, Boston, USA); Dr. Patrice Josset (Pathologist, APHP-Armand Trousseau Children’s Hospital Paris 75012, France); Dr. Claude Laurian (Vascular Surgeon, Department of Vascular Surgery, Hôpital Saint Joseph, Paris); Dr. E. Mazoyer (Hematologist, Department of Hemobiology, Hôpital Avicenne, APHP Paris, France); Dr. Gilles Roger (ENT and Plastic Surgeon, APHP-Armand Trousseau Children’s Hospital, Paris 75012, France); Dr. C. Chiron (Department of Pediatric Neurology, Necker-Enfants Malades Hospital, APHP, Paris); Dr. Didier Bessis (Dermatologist, Saint Eloi Hospital, CHU Montpellier, France); Professor Catherine Adamsbaum (Radiologist, APHP Saint Vincent de Paul Hospital, Paris 75014, France); Dr. M. Pelisse (Dermatologist, Tarnier-Cochin Hospital, APHP Paris, France); Dr. Paul Rieu (Pediatric Surgeon, Department of Pediatric Surgery, St. Radboud Hospital, Nijmegen, The Netherlands); Professor Metin Tovi (Neuroradiologist, Karolinska Institute, Stockholm, Sweden); Professor Maureen Rogers (Pediatric Dermatologist, Westmead Children’s Hospital, Sydney, Australia); Dr. Eulalia Baselga (Pediatric Dermatologist, Hospital de la Santa Creu I San Pau, Barcelona, Spain); Professor Susan B. Mallory (Dermatologist, Washington University School of Medicine, St. Louis, USA); Dr. Aicha Salhi (Dermatologist, Ain Nadja Hospital, CHU Alger, Algeria).