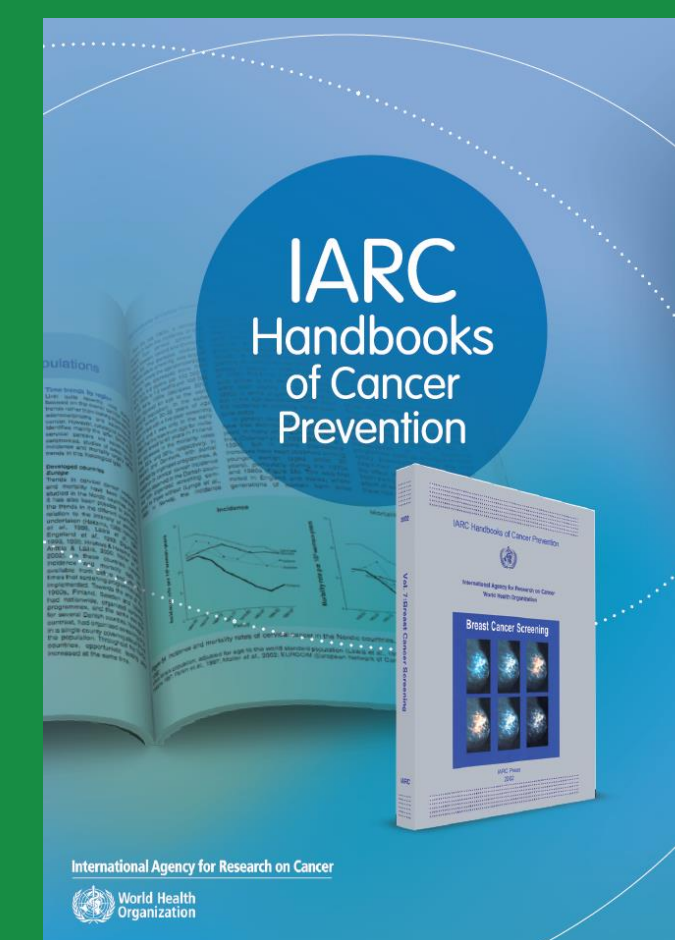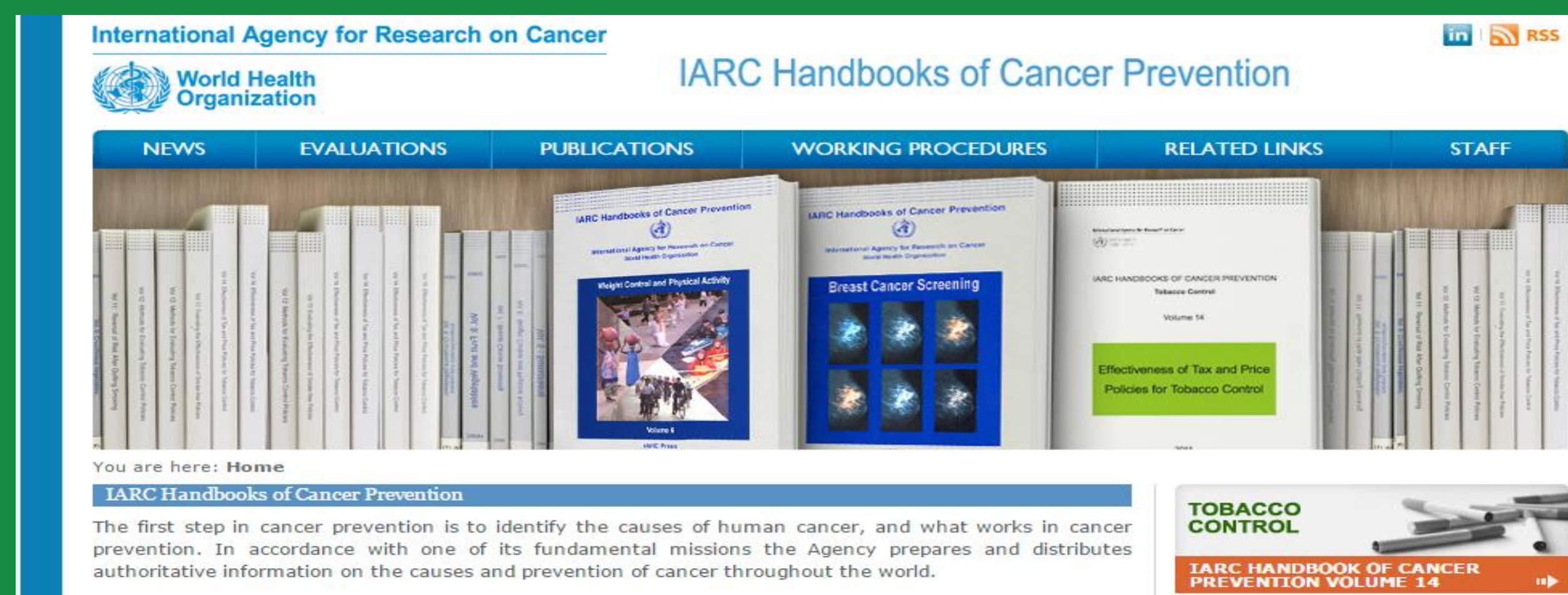# The IARC Handbooks of Cancer Prevention -
Volume 15: Breast Cancer Screening

B. Lauby-Secretan, C. Scoccianti, D. Loomis, F. Bianchini, L. Benbrahim-Tallaa, V. Bouvard, K. Straif
On behalf of the *IARC Handbook* vol. 15 Working Group

The IARC Handbooks of Cancer Prevention Series

✓ Dedicated website @ http://handbooks.iarc.fr

✓ Information about upcoming and recent meetings
✓ Tables of all evaluations from Volumes 1-15
✓ Access to all Handbooks, available freely online as pdfs
✓ Working Procedures and other related documents

✓ Working Procedures updated based on Preamble from *IARC Monographs*
✓ Brochure and flyers for promotion of programme and funding requests

Evaluation of breast cancer screening by physical examination

Intervention	Reduction in breast cancer mortality	Shift in the stage distribution of tumours detected towards a lower stage	Reduction in the rate of interval cancers
Clinical breast examination	*Inadequate*	*Sufficient*	*No data*
Teaching breast self-examination	*Inadequate*	*No data*	*Inadequate*
Practising breast self-examination competently and regularly	*Inadequate*	*No data*	*No data*

Key:

■ Sufficient evidence for a beneficial effect	■ Sufficient evidence for an adverse effect
■ Limited evidence for a beneficial effect	■ Limited evidence for an adverse effect
	■ Inadequate evidence for an effect

Working Group

Members
Benjamin Anderson [unable to attend]
Ahti Anttila, Finland
Bruce K. Armstrong, Australia
Rajendra A. Badwe, India
Ronaldo Corrêa Ferreira da Silva, Brazil
Geertruida H. de Bock, The Netherlands
Harry J. de Koning, The Netherlands
Stephen W. Duffy, United Kingdom
Ian Ellis, United Kingdom
Chisato Hamashima, Japan

Nehmat Houssami, Australia
Vessela Kristensen, Norway
Anthony B. Miller, Canada
Raul Murillo, Colombia
Eugenio Paci, Italy
Julietta Patnick, United Kingdom
You-Lin Qiao, China
Agnès Rogel, France
Nereo Segnan, Italy
Surendra S. Shastri, India
Robert A. Smith, USA
Marit Solbjør, Norway

David B. Thomas, USA
Elisabete Weiderpass, Norway

Invited specialists
Sylvia H. Heywang-Köbrunner, Germany
Martin J. Yaffe, Canada

IARC Participants
David Forman
Larry von Karsa
Rengaswamy Sankaranarayanan

Evaluation of breast cancer screening with mammography

Age range (years)	Reduction in breast cancer mortality	
	Efficacy	**Effectiveness**
40–44	*Inadequate*	*Limited*
45–49	*Inadequate*	*Limited*
50–69	*Sufficient*	*Sufficient*
70–74	*Inadequate*	*Sufficient*
Optimal screening interval	*Inadequate*	*No data*

Possible adverse effects

Mammography screening detects breast cancers that would not have been diagnosed if the women had not been screened (overdiagnosis).	*Sufficient*
The risk of radiation-induced cancer from mammography in women aged 50 years and older is substantially outweighed by the reduction in breast cancer mortality from mammography screening.	*Sufficient*
Having a false-positive mammogram has short-term negative psychological consequences.	*Sufficient*

Cost-effectiveness

There is a net benefit from inviting women aged 50-69 years to service mammography screening.	*Sufficient*
Mammography screening for women aged 50-69 years can be cost-effective in countries with high breast cancer incidence.	*Sufficient*
Breast cancer screening can be cost-effective in low- and middle-income countries.	*Limited*

Evaluation of breast cancer screening with other imaging techniques

Intervention	Reduction in breast cancer mortality	Increase in the detection rate of cancers	Reduction in the rate of interval cancers	False-positive screening outcomes (decrease / increase)	Increase in the radiation dose
Adjunct ultrasound in women with dense breasts and negative mammography	*Inadequate*	*Limited*	*Inadequate*	*Sufficient*	*No data*
Mammography with tomosynthesis (dual acquisition) compared to mammography alone	*Inadequate*	*Sufficient* / Mostly of invasive cancers	*Inadequate*	*Limited*	*Sufficient*

Evaluation of breast cancer screening in high-risk women

High risk	Reduction in breast cancer mortality	Sensitivity (increase / decrease)	Specificity (increase / decrease)	Incremental detection rate	Increase in false-positive outcomes
BRCA1/2 mutation	Adjunct MRI	Adjunct MRI	Adjunct MRI	*No data*	*No data*
High familial risk (no known mutation)	*No data*	Adjunct MRI / Ultrasound ≤ mammo Ultrasound < MRI	Adjunct MRI	CBE (+ adjunct MRI)	*No data*
Personal history of breast cancer	*No data*	Mammography *	Mammography *	Adjunct ultrasound	Adjunct ultrasound * / Adjunct MRI (to mammo + ultrasound) *
LCIS or atypical proliferations	*No data*	Mammography *	Mammography *	Adjunct MRI	Adjunct MRI

*, compared to women without similar high risk
CBE, clinical breast examination; LCIS, lobular carcinoma in situ; MRI, magnetic resonance imaging

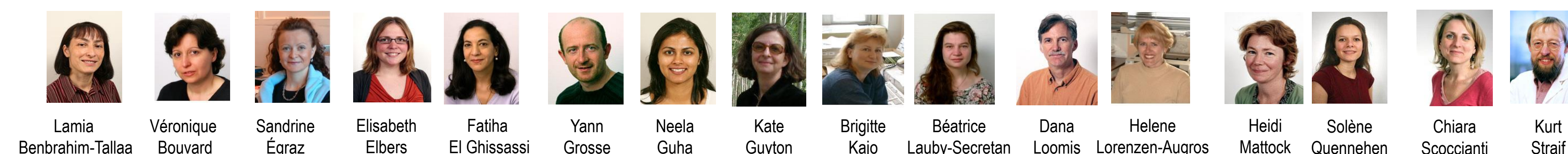**Published as Lauby-Secretan *et al.* (2015) NEJM, 372 (24), 2353-58 – Special Report**

International Agency for Research on Cancer

World Health Organization

Visit our website at
http://handbooks.iarc.fr