Drug-coated balloon angioplasty of femoropopliteal lesions maintained superiority over standard balloon – 2-year results of the randomized EffPac trial

Dierk Scheinert, MD
on behalf of the investigators

Teichgräber U, Aschenbach R, Zeller T, Brechtel K, Thieme M, Blessing E, Treitl M, Lichtenberg M, von Flotow P, Vogel B, Werk M, Riambau V, Wienke A, Lehmann T, Sixt S, **Scheinert D**.

NCT02540018

Teichgräber et al. Trials (2016) DOI 10.1186/s13063-016-1657-x

Teichgräber et al. EuroIntervention (2019) DOI: 10.4244/EIJ-D-19-00292

Teichgräber et al. Radiology (in press) (2020)

Disclosure of Conflict of Interest

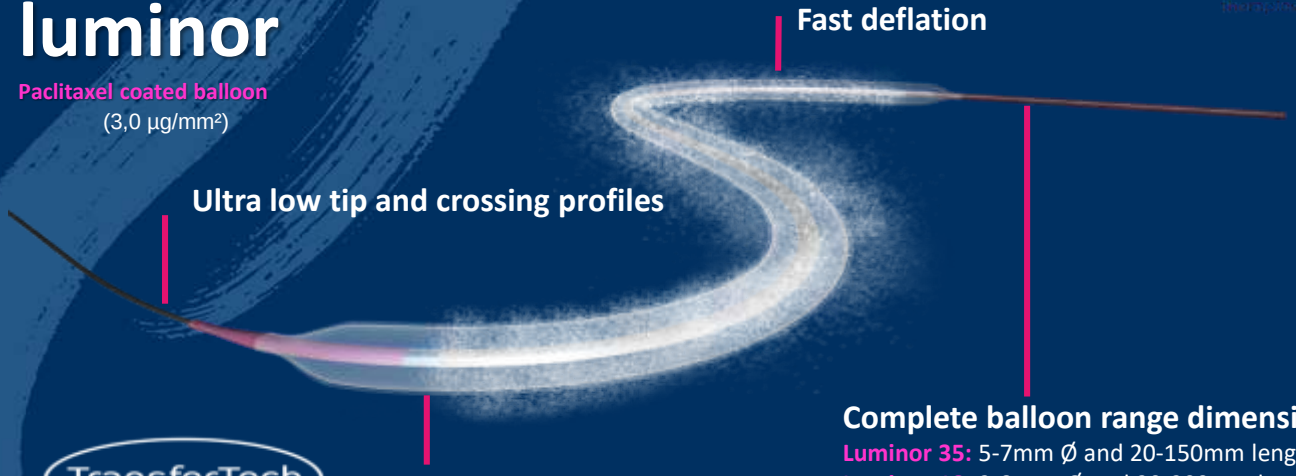
Advisory Board /Consultant:

Abbott, Alvimedica, Bayer, Boston Scientific, Cook Medical, Cardionovum, CR Bard, Gardia Medical/Allium, Medtronic, Philips, Upstream Peripheral Technologies

Study Device

luminor

Paclitaxel coated balloon
(3,0 µg/mm²)



Fast deflation

Ultra low tip and crossing profiles

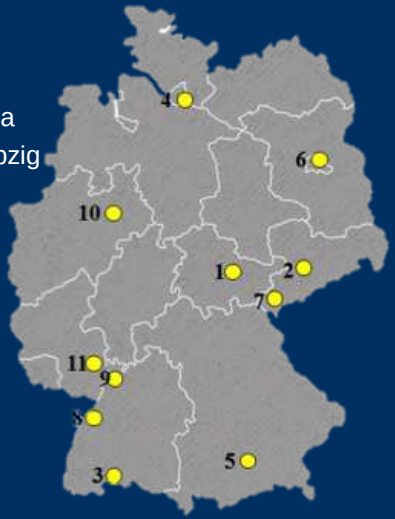
Innovative and UNIQUE nanotechnology coating

Complete balloon range dimensions
Luminor 35: 5-7mm Ø and 20-150mm length
Luminor 18: 2-8 mm Ø and 20-200mm length
Luminor 14: 1.5-4mm Ø and 40-200mm length

Study Design & Participating Sites

Investigator initiated, prospective, multicenter, randomized controlled trial

01 Jena	PD Dr. R. Aschenbach	University Hospital Jena
02 Leipzig	Prof. Dr. Dierk Scheinert	University Hospital Leipzig
03 Bad Krozingen	Prof. Dr. Thomas Zeller	Heart Center
04 Hamburg	Dr. S. Sixt, Dr. S. Brucks	Angiologikum
05 München	PD Dr. M. Treitl	University Hospital
06 Berlin	Prof. Dr. K. Brechtel	„Ihre Radiologen“
07 Sonneberg	Dr. M. Thieme	Medinos Clinic
08 Karlsbad	Prof. Dr. E. Blessing	SRH-Clinic
09 Heidelberg	Dr. B. Vogel, Dr. C. Erbel	University Heidelberg
10 Arnsberg	Dr. M. Lichtenberg	Clinic Arnsberg
11 Kusel	Dr. P. von Flotow	Westpfalz Clinic



Study Endpoints

Primary Endpoint

- LLL at 6 months

Secondary Endpoints

- Binary restenosis
- Primary patency
- Freedom from TLR
- Freedom from TVR
- Rutherford category
- WIQ-score
- ABI
- EQ-5D score

- All-cause mortality
- Target limb amputation

Key Eligibility Criteria

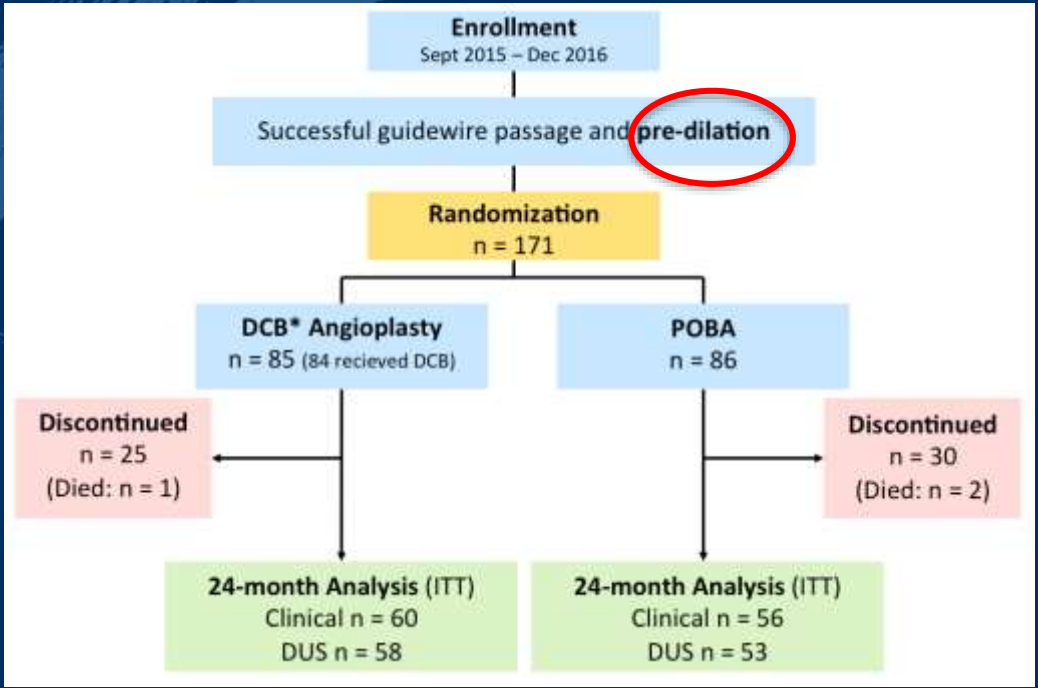
Inclusion

- Rutherford category 2-4
- De-novo stenotic/restenotic or occluded (≥ 70%) SFA/prox. PA lesions
- Lesion length ≤ 150 mm
- 1 lesion/patient
- Successful pre-dilation

Exclusion

- Previous TV surgery
- Major amputation TL
- Severly calcified lesions (PTA resistant)
- In-stent restenosis

Patient Flow



Baseline Patient Characteristics

	DCB n = 85	**POBA** n = 86	P value
Age, years	68.0 ± 7.5	68.1 ± 8.8	p = 0.979
Male, %	60.0	69.8	p = 0.239
Diabetes, %	36.5	40.4	p = 0.681
Hypertension, %	87.1	84.9	p = 0.850
Hyperlipidemia, %	70.7	68.6	p = 0.144
Current smoker, %	40.5	43.0	p = 0.856
Critical limb ischemia, %	3.6	1.2	p = 0.613
ABI	0.73 ± 0.23	0.74 ± 0.23	p = 0.929

Lesion and Procedure Characteristics

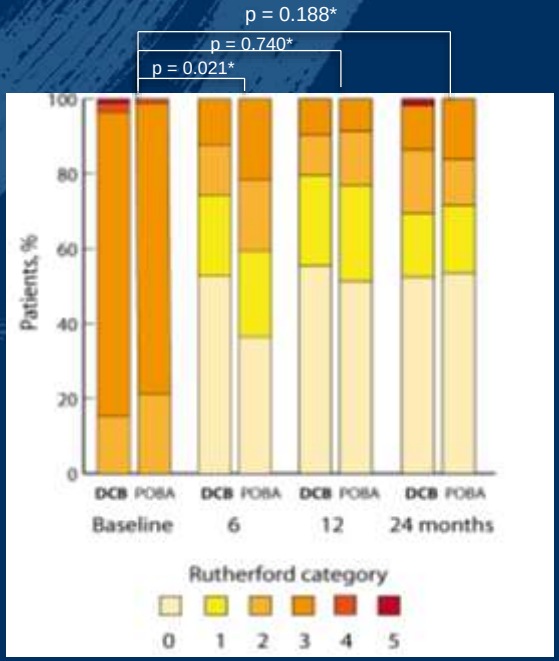
	DCB (n = 85)	**POBA** (n = 86)	P value
Lesion length, mm	59.1 ± 43.4	55.8 ± 39.1	p = 0.732
CTO, %	20.2	25.6	p = 0.492
Calcification, % Severe Moderate	 3.6 42.2	 11.6 44.2	p = 0.232
Mid / dist. popliteal artery, %	18.8	14.0	p = 0.248
Pre-dilation, %	98.8	98.8	p = 0.993
Dissection, %	37.6	40.7	p = 0.801
Bailout stenting, %	15.3	18.8	p = 0.709
Residual DS, % post-angioplasty post-treatment	 15.5 ± 16.7 7.5 ± 9.3	 14.9 ± 16.2 8.3 ± 10.1	 p = 0.807 p = 0.699

Primary Endpoint – 6-Month LLL

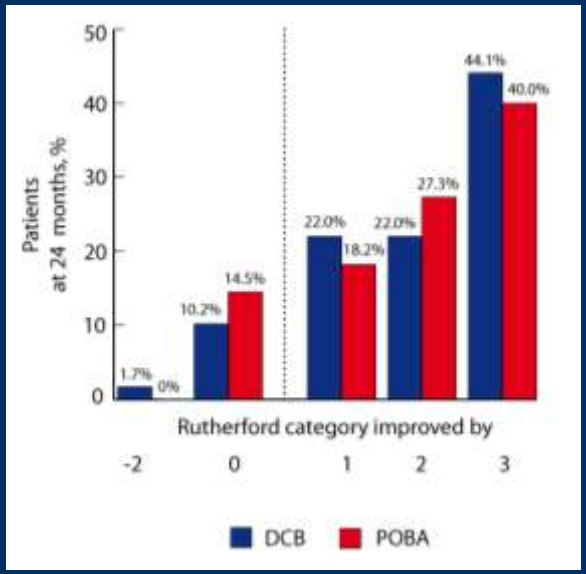
Study	DCB 6-month LLL	Control 6-month LLL	Difference DCB vs POBA (mm)
THUNDER Tepe et al. 2008 Paccocath coating	0.4±1.2	1.7±1.8	-1.3
AcoArt I Trial Jia et al. 2016 Orchid (Acotec)	0.05±0.73	1.15±0.89	-1.1
EFFPAC 2018 Luminor (iVascular)	**0.14** [CI: -0.38; 0.67]	**1.06** [CI:0.54; 1.59]	**-0.92** [CI:-1.364; -0.49] $p < 0.001$
RANGER Bausback et al. 2017 Ranger DCB	-0.16±0.99	0.76±1.4	-0.92
LEVANT I Scheinert et al. 2014 Lutonix (Bard)	0.46±1.13	1.09±1.07	-0.63
BIOLUX P-I Trial Scheinert et al. 2015 Passeo-18 Lux (Biotronik)	0.51±0.72	1.04±1.0	-0.53
FEMPAC Werk et al. 2008 Paccocath DCB	0.5±1.1	1.0±1.1	-0.5
CONSEQUENT 2017 SeQuent Please (B. Braun)	0.35 [CI: 0.19; 0.79]	0.72 [CI: 0.68; 1.22]	-0.37

Clinical Improvement: Change of RBC - 24 mo

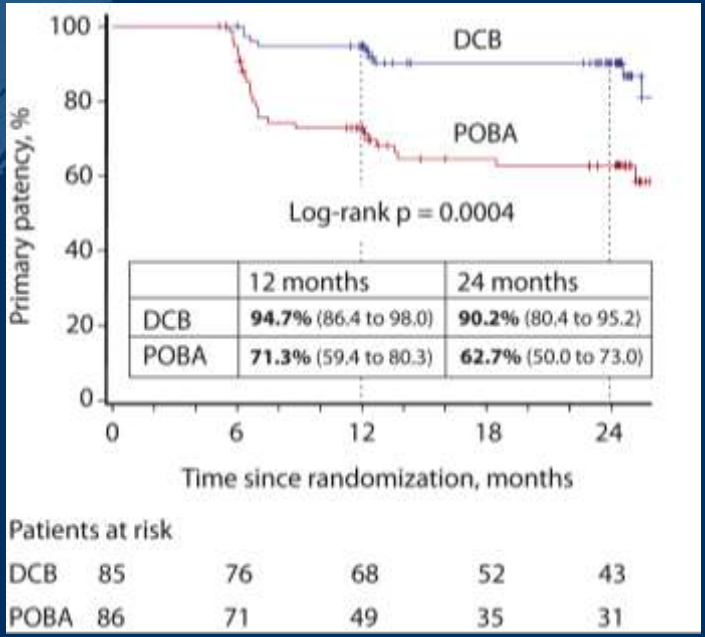
P-value for difference in change from baseline to 24 months between DCB and POBA



Improvement by ≥ 1 Rutherford category
DCB **88.1%** vs. POBA **85.5%** (p = 0.441)

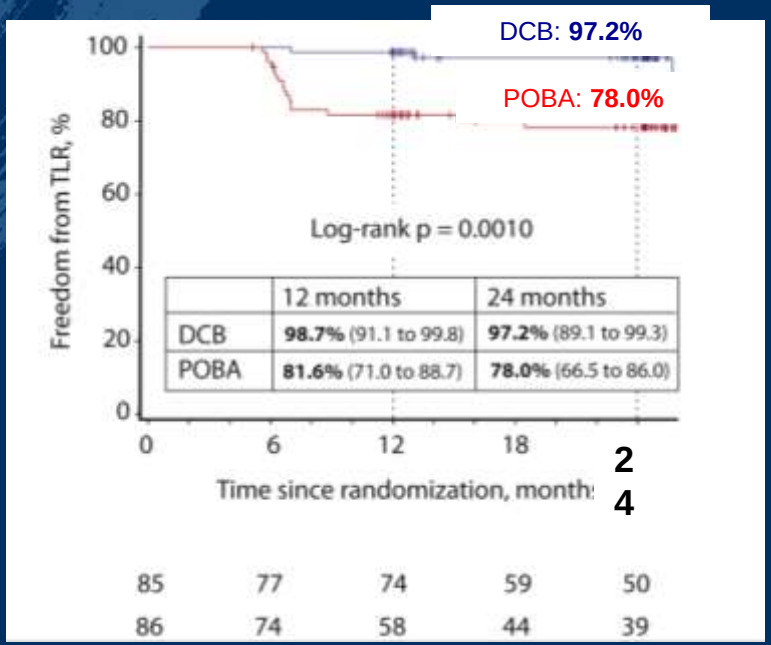


Primary Patency – 24 Months



Primary patency:
Freedom from restenosis (determined by duplex ultrasound PSVR < 2.5) and freedom from TLR

Freedom From TLR – 24 Months



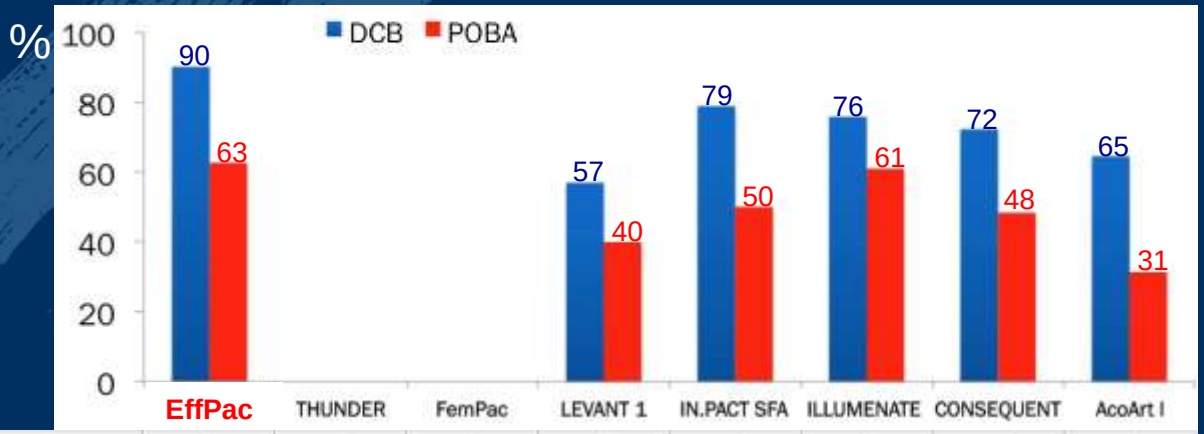
Safety – 24 Months

	DCB	POBA	P value
All-cause mortality, %	1.6* (1/61)	3.4** (2/58)	p = 0.877
Amputation, % Major Minor	 0.0 0.0	 0.0 1.8 (1/56)	 p = 0.972
Binary restenosis, %	20.3 (12/59)	46.7 (28/60)	p = 0.004
TLR, %	4.9 (3/61)	27.1 (16/59)	p = 0.010
Periprocedural complication, % Dissection False aneurysm Thromb. embolization	 37.6 (32/85) 0.0 1.2 (1/85)	 40.7 (35/86) 1.2 (1/86) 0.0	 p = 0.801 p = 1.000 p = 1.000

* One DCB patient died for unknown reason at 9 months
(patient was multimorbid: severe COPD, coronary artery disease, alcoholism)

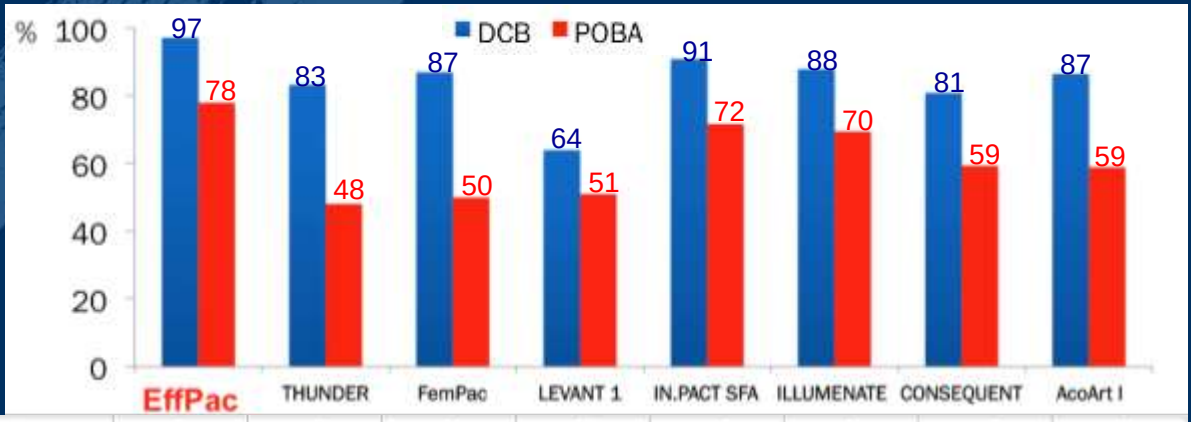
** One POBA patient died of sepsis at 4 months
Another POBA-patient committed suicide at 7 months

Primary Patency – 24 Months



Les. length cm	6/6 DCB/POBA	8/7	4/5	8/8	9/9	7/7	14/12	15/15
CTO %	17/20	27/26	13/19	41/42	26/20	19/19	23/29	57/52
Sev. calc. %	3/10				8/6	13/10		
Bailout stent %	13/16	4/22	9/14	3/16	7/12	15/11	14/19	19/21
Reference	Teichgräber 2019	Tepe 2015	Werk 2008	Scheinert 2014	Laird 2015	Brodmann 2018	Albrecht 2018	Xu 2018

Freedom from TLR – 24 Months



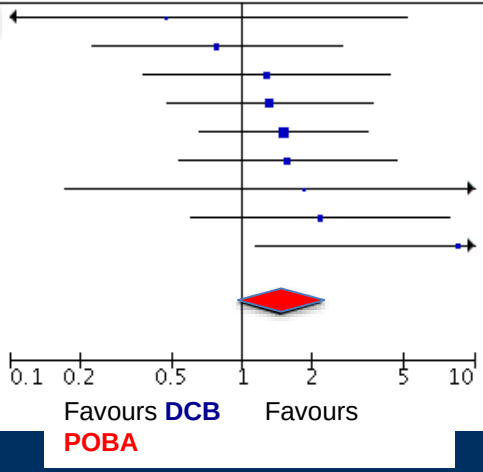
Les. length cm	6/6 DCB/POBA	8/7	4/5	8/8	9/9	7/7	14/12	15/15
CTO %	17/20	27/26	13/19	41/42	26/20	19/19	23/29	57/52
Sev. calc. %	3/10				8/6	13/10		
Bailout stent %	13/16	4/22	9/14	3/16	7/12	15/11	14/19	19/21
Reference	Teichgräber 2019	Tepe 2015	Werk 2008	Scheinert 2014	Laird 2015	Brodmann 2018	Albrecht 2018	Xu 2018

All-Cause Mortality – 24 Months

Study or Subgroup	DCB Events	DCB Total	POBA Events	POBA Total	Weight	Risk Ratio M-H, Random, 95% CI
EffPac	1	61	2	58	3.1%	0.48 [0.04, 5.10]
LEVANT I	4	42	5	41	11.2%	0.78 [0.23, 2.71]
ILLUMENATE EU	13	199	3	59	11.6%	1.28 [0.38, 4.36]
AcoArt I	8	96	6	95	16.6%	1.32 [0.48, 3.66]
LEVANT II	21	278	7	140	25.0%	1.51 [0.66, 3.47]
THUNDER	7	48	5	54	14.8%	1.57 [0.53, 4.64]
CONSEQUENT	2	70	1	65	3.1%	1.86 [0.17, 20.00]
FemPac	7	45	3	42	10.4%	2.18 [0.60, 7.88]
INPACT SFA	16	198	1	106	4.3%	8.57 [1.15, 63.70]
Total (95% CI)		**1037**		**660**	**100.0%**	**1.47 [0.97, 2.23]**
Total events	79		33			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 5.53$, df = 8 (P = 0.70); $I^2 = 0\%$

Test for overall effect: Z = 1.83 (P = 0.07)



Overall effect: Z = 1.89, p = 0.07

Conclusions

At 2 years, DCB angioplasty (Luminor-35®) of medium length SFA/PA lesions resulted in

- a significant clinical and hemodynamic improvement from baseline
- a significantly lower incidence of binary restenosis compared to POBA
- significantly less need for TLR

DCB angioplasty (Luminor-35®) was safe through 2 years (RR<1)

Drug-coated balloon angioplasty of femoropopliteal lesions maintained superiority over standard balloon – 2-year results of the randomized EffPac trial

Dierk Scheinert, MD
on behalf of the investigators

Teichgräber U, Aschenbach R, Zeller T, Brechtel K, Thieme M, Blessing E, Treitl M, Lichtenberg M, von Flotow P, Vogel B, Werk M, Riambau V, Wienke A, Lehmann T, Sixt S, **Scheinert D**.

NCT02540018

Teichgräber et al. Trials (2016) DOI 10.1186/s13063-016-1657-x

Teichgräber et al. EuroIntervention (2019) DOI: 10.4244/EIJ-D-19-00292

Teichgräber et al. Radiology (in press) (2020)