Developing Evidence Based Underwriting Guidelines

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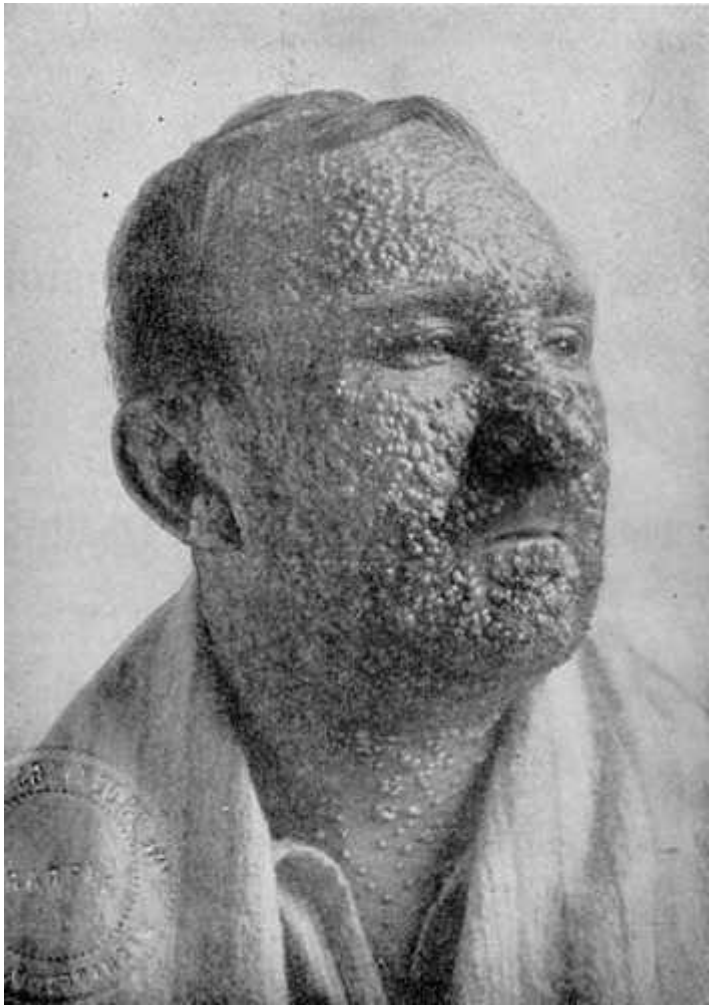
Date May 2013

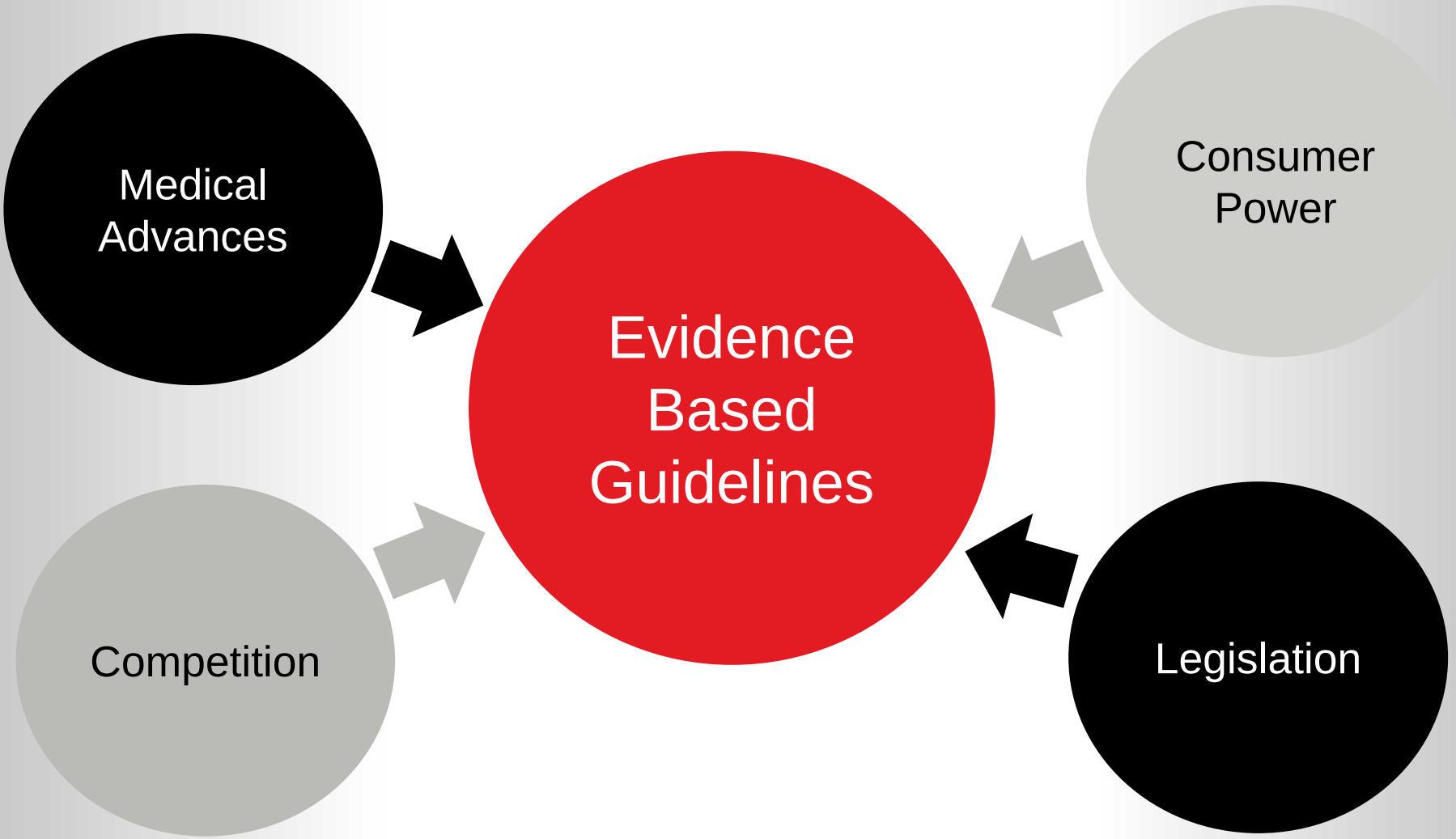
Evidence Based Underwriting

Determine and quantify an applicant's likelihood of premature mortality and/or morbidity, based on objective and reliable statistical data.

HISTORICAL UNDERWRITING



Drivers

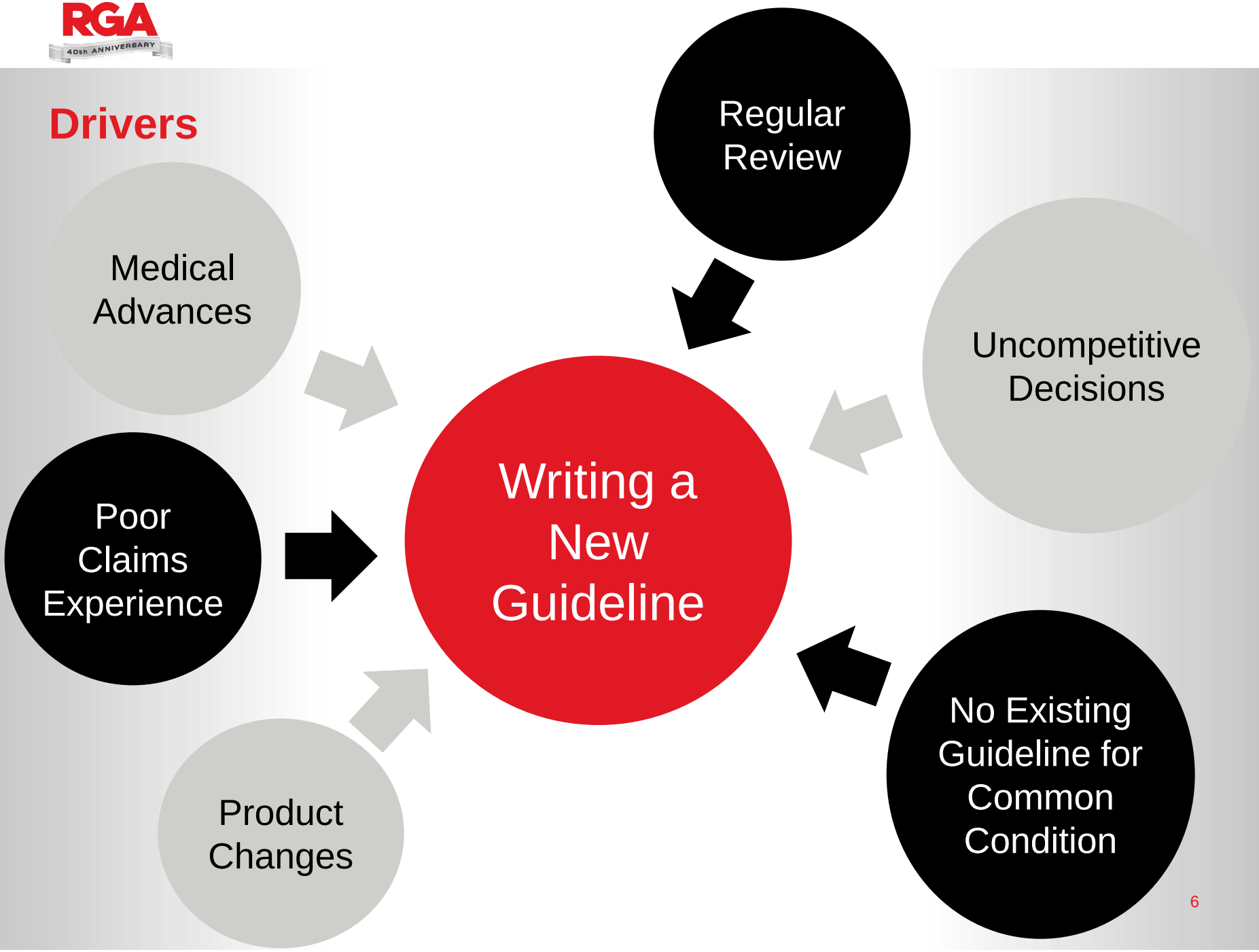

Medical Advances
Consumer Power
Evidence Based Guidelines
Competition
Legislation

Human Rights Act

- The Human Rights Act 1993 makes it unlawful to discriminate in certain areas including the provision of goods and services and “facilities by way of insurance”. Insurers cannot refuse to provide insurance to people, or treat them less favourably, by reason of any of the prohibited grounds of discrimination in s.21 of the Act.

- The Act makes it necessary to provide terms even if outside normal acceptance range and **must also provide data to support.**

Drivers


Regular Review
Medical Advances
Uncompetitive Decisions
Poor Claims Experience
Writing a New Guideline
No Existing Guideline for Common Condition
Product Changes

Process

1. Define the Questions
2. Find the Evidence
3. Critically Appraise the Evidence
4. Incorporate Philosophy
5. Develop Guidelines

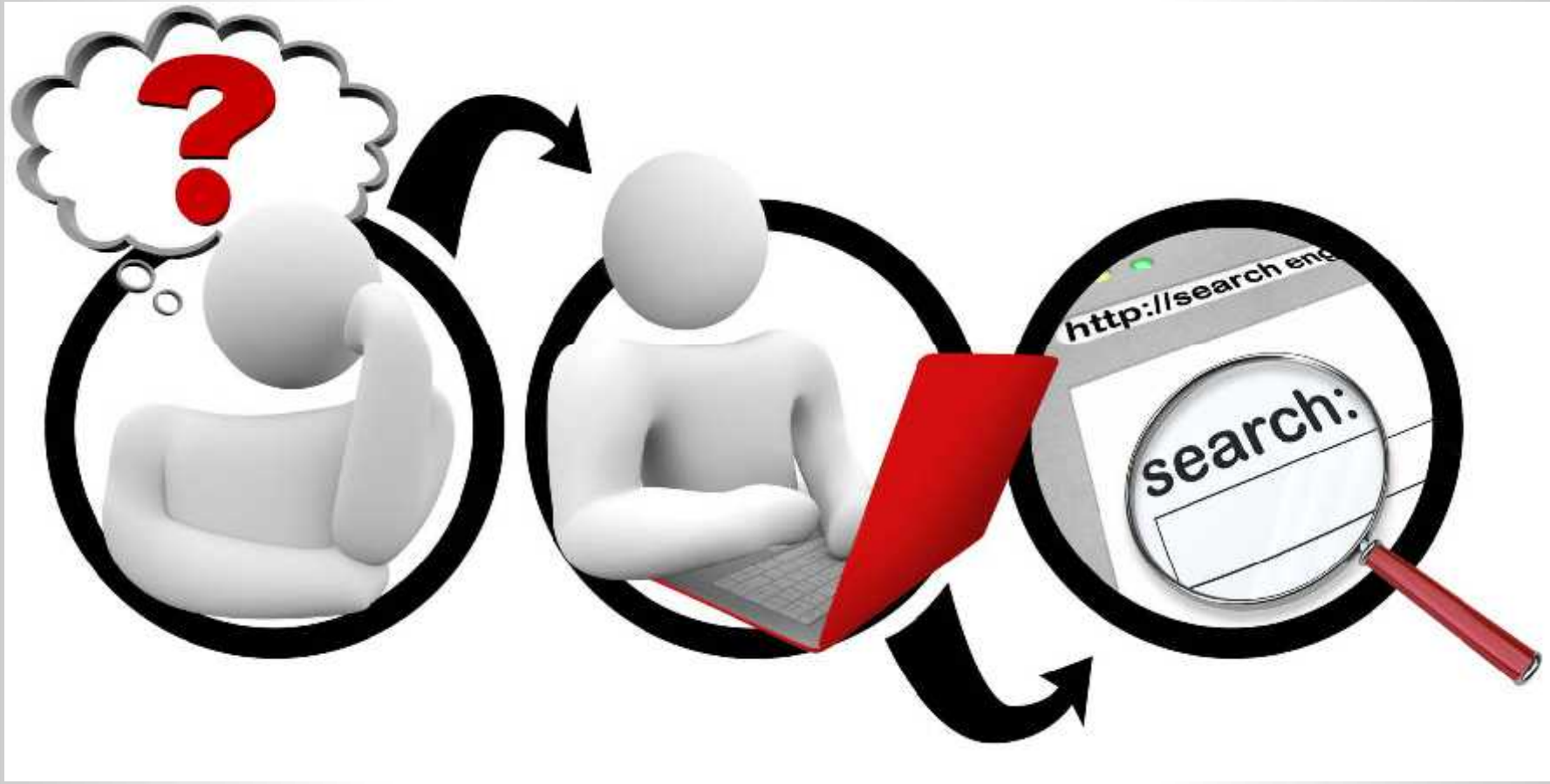
Define the Questions

- Product parameters
- Current state of knowledge
- Likely risk stratification
- Information available at underwriting
- Anti-Selection risk
- Determine specific questions

Find the Evidence

- Text Books
- Search Engines
- Journals
- PubMed
- Public Health Organisations
- Medical Research Institutes
- Actuarial Profession

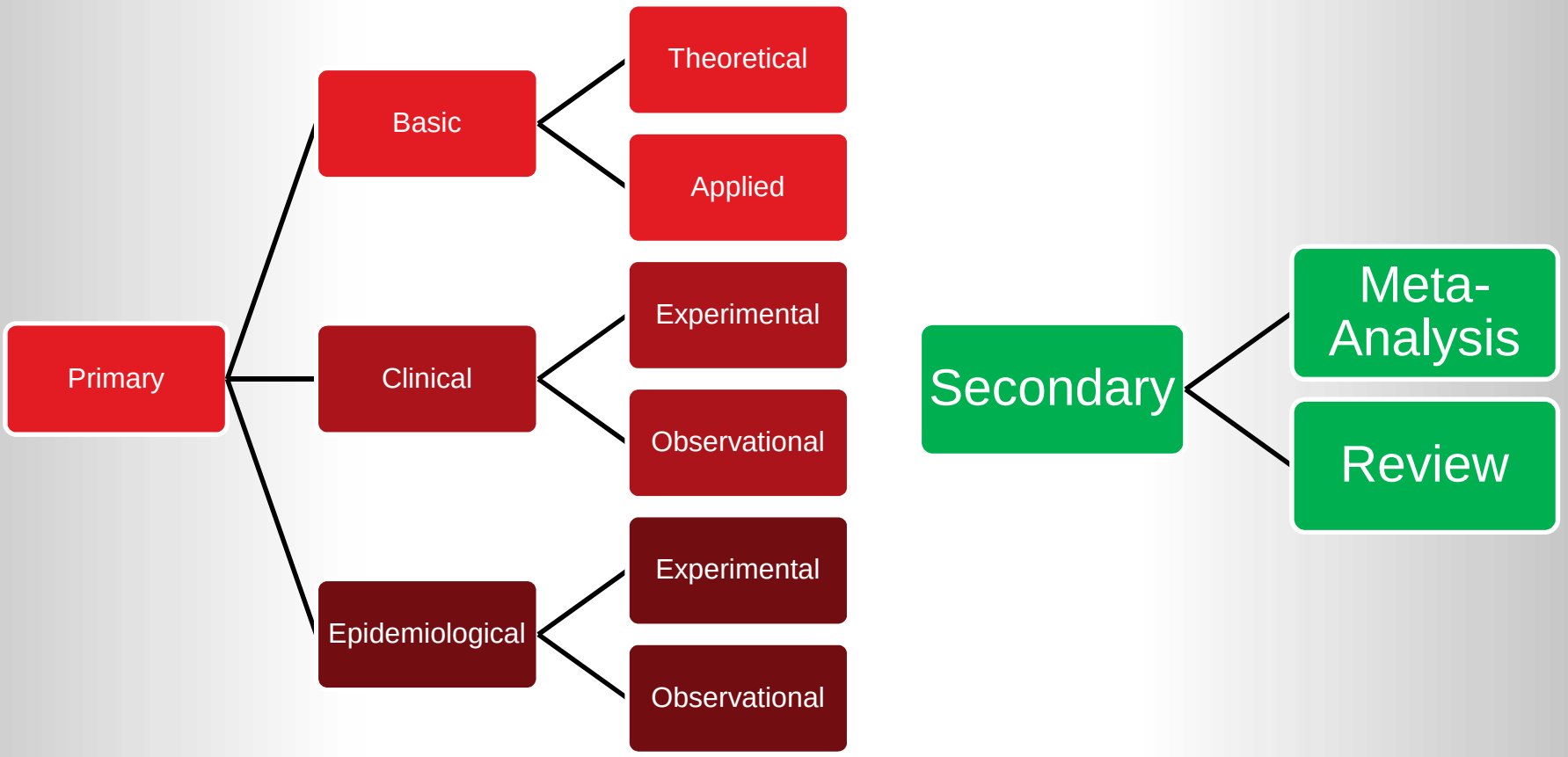
Search Techniques



Critically Appraise the Evidence

- Validity
  - Impact
    - Applicability

Types of Medical Research



Report Type

Full Text

Abstract

Quality

Peer Review

- Impact
- Applicability

Relevance

- What is the study question?
- What type of population was used?
- Where was the study conducted?

Reliability

- Sample Size
- Statistical Significance
- Duration
- Drop Off Rate

Bias

- Selection
- Measurement
- Recall
- Observer/Subject
- Confounding

Bias

- Randomisation
- Blinding
- Verification
- Matching Samples

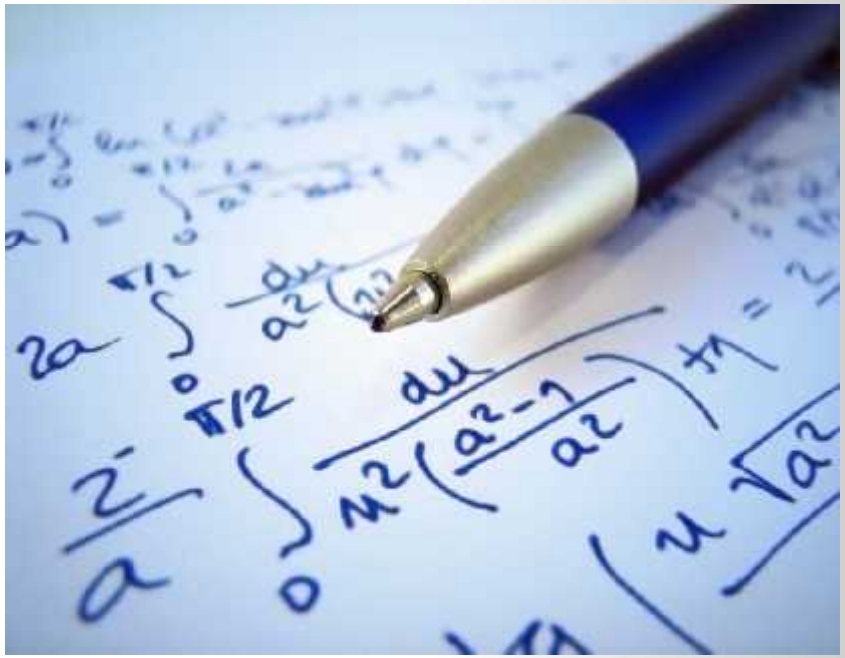
Currency

- Recent

Interpret the Results

Common statistical measures:

- Frequency Distributions
- Ratios, Proportions, Rates
- Morbidity Measures
- Mortality Measures
- Relative Risk/Odds Ratio
- Tests of Significance



Frequency Distributions

Table 1
Distribution of Cases of Hepatitis A by Region
Cityscape, June 2010

Region	Number of Cases
A	37
B	25
C	112
D	12
E	4
Total	190

Ratios, Proportions and Rates

- All frequency measures, all based on:

$$\frac{x}{y} \times 10^n$$

Ratio:	Compares two separate groups
Proportion:	Compares one group to total
Rate:	Includes element of time

Morbidity Frequency Measures

Incidence Rate

- Number of new events in a population in a given period of time

Prevalence Rate

- Proportion of population who have a disease at a point (or over a period) of time

Mortality and Survival Rates

Mortality Rate

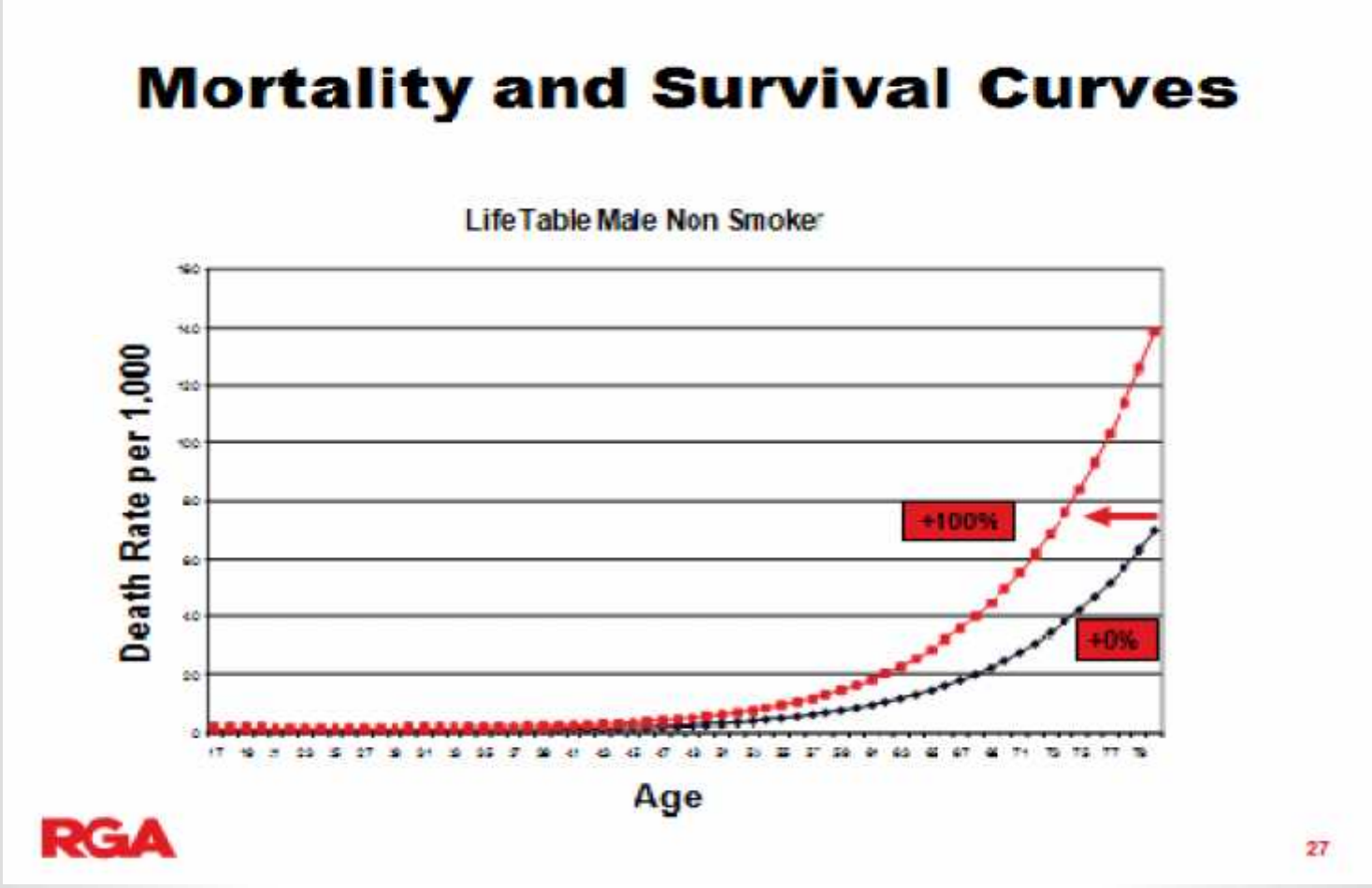
- Frequency of death in a particular population over a particular period

Survival Rate

- 1 – Mortality Rate

Mortality and Survival Curves

Life Table Male Non Smoker



Mortality Ratio

$$\frac{Observed\ Deaths}{Expected\ Deaths} \times 100$$

Excess Death Rate

$$\frac{Observed\ Deaths - Expected\ Deaths}{\quad} \times 1000$$

Relative Risk

- $$\frac{Risk\ for\ Group\ of\ Primary\ Interest}{Risk\ for\ Comparison\ Group}$$

Odds Raito

$$\frac{ab}{bc}$$

Where:

a = with disease and with exposure

b = without disease and exposure

c = with disease and without exposure

d = without disease and without exposure

Tests for Significance

Probability Score

Commonly less than 5%

Expressed as: $p<.05$

Confidence Interval

Commonly 90%, 95% or 99%

Expressed as: 90% CI (-a to a)

Incorporate Philosophy

- Preferences
- Capabilities
- Corporate goals
- Risk appetite
- Regulatory requirements

Case Study

- How did RGA review its Melanoma guidelines?

Research process

- Both local and international clinical research approximately 15 different clinical studies, reports and meta-analyses
- Staging for new guidelines based on American Joint Committee on Cancer (AJCC) staging system 7th Edition which incorporates pathological attributes as well as Breslow depth, Clark level and the presence of ulceration.
- Introduced the relevance of mitotic rate in especially thin melanomas

Major Findings

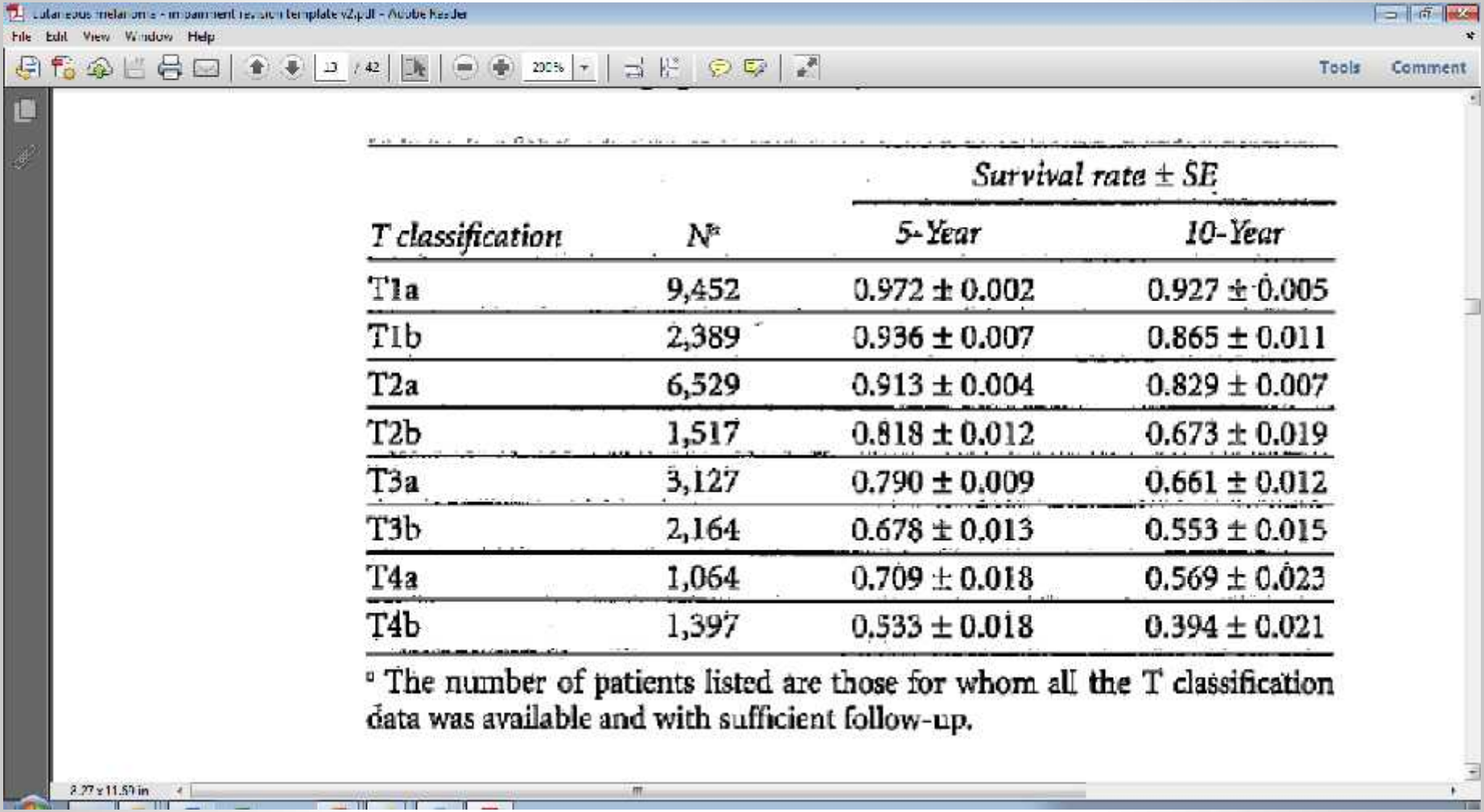
- Prognosis is closely linked to the thickness of the primary tumour, the presence of ulceration or a high mitotic rate, as well as nodal status.
- Thicker tumours, or those with ulceration or a high mitotic rate have been shown to have a worse prognosis.
- Where there is ulceration, the prognosis is equivalent to that of the next tumour thickness category.
- Tumours of upper limbs and shoulders, and those confirmed as superficial spreading melanomas have the best prognosis, with 10 year survival rates of 93% and 95% respectively.

Major Findings

Source: Thompson *et al. Lancet* 2005.

	Age-standardised incidence (10^5/year)	Age-standardised mortality (10^5/year)	Lifetime risk (incidence)	Incidence trend over 10 years	Mortality trend over 10 years	Most common cancers (ranking)
Australia (2001)[3]						
Men	414 (world)	5·1 (world)	1 in 25	22% increase	2% increase (1991–2001)	4th
Women	311 (world)	2·6 (world)	1 in 35	12% increase	0% increase (1991–2001)	3rd
USA (2001)[4,5]						
Men	214 (world)	3·9 (world)	1 in 53	31% increase	0% increase (1991–2001)	5th
Women	138 (world)	1·8 (world)	1 in 78	25% increase	1% decrease (1991–2001)	7th
The Netherlands (1998)[6]						
Men	115 (Europe)	3·1 (Europe)	..	21% increase	24% increase (1989–98)	..
Women	148 (Europe)	2·1 (Europe)	..	11% increase	5% increase (1989–98)	..
UK (2000)[7]						
Men	97 (world)	2·7 (world)	1 in 147	59% increase	20% increase (1991–2001)	12th
Women	112 (world)	1·9 (world)	1 in 117	41% increase	3% increase (1991–2001)	7th

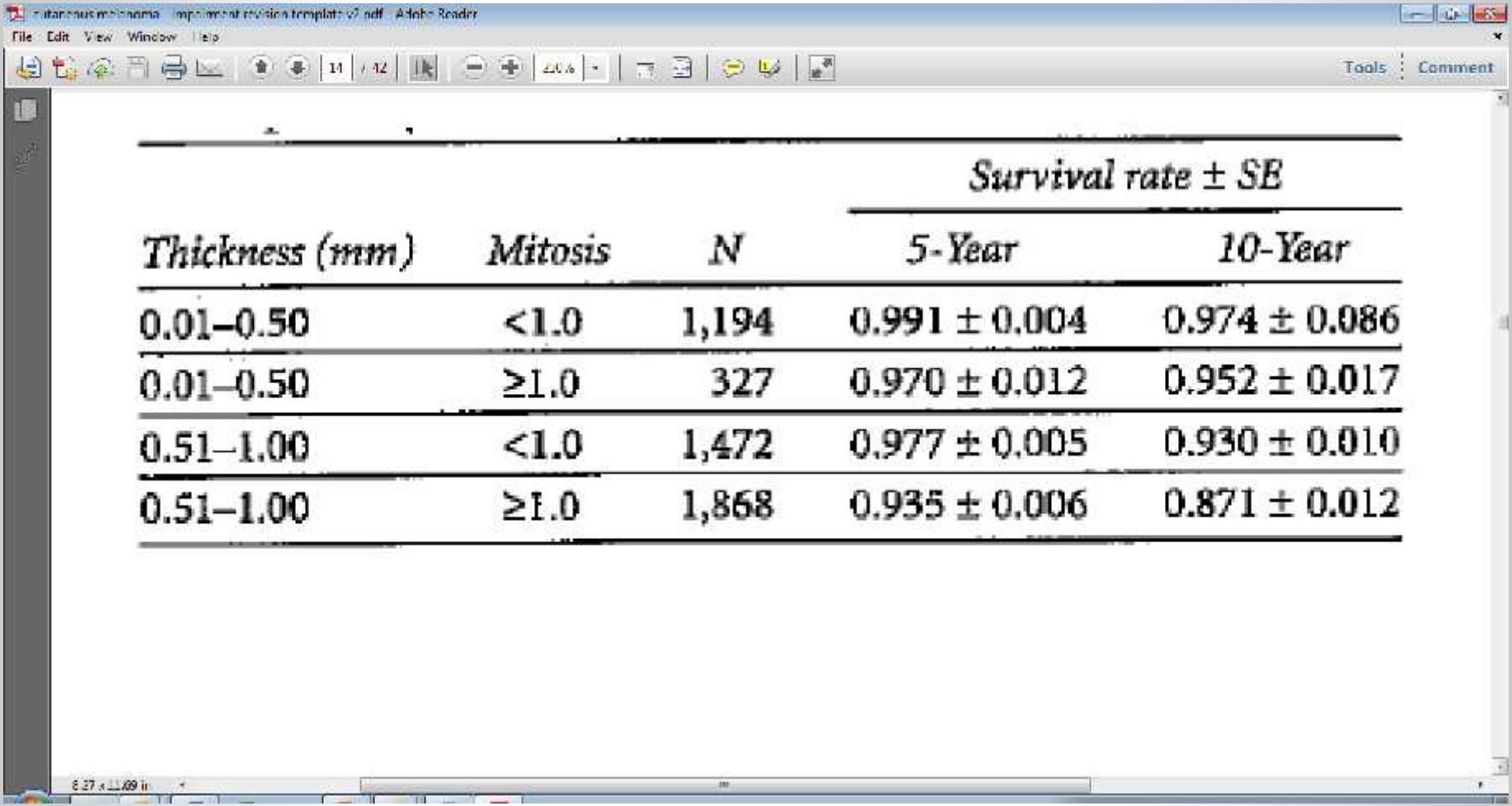
Melanoma Research



T classification	N*	Survival rate ± SE 5-Year	10-Year
T1a	9,452	0.972 ± 0.002	0.927 ± 0.005
T1b	2,389	0.936 ± 0.007	0.865 ± 0.011
T2a	6,529	0.913 ± 0.004	0.829 ± 0.007
T2b	1,517	0.818 ± 0.012	0.673 ± 0.019
T3a	3,127	0.790 ± 0.009	0.661 ± 0.012
T3b	2,164	0.678 ± 0.013	0.553 ± 0.015
T4a	1,064	0.709 ± 0.018	0.569 ± 0.023
T4b	1,397	0.533 ± 0.018	0.394 ± 0.021

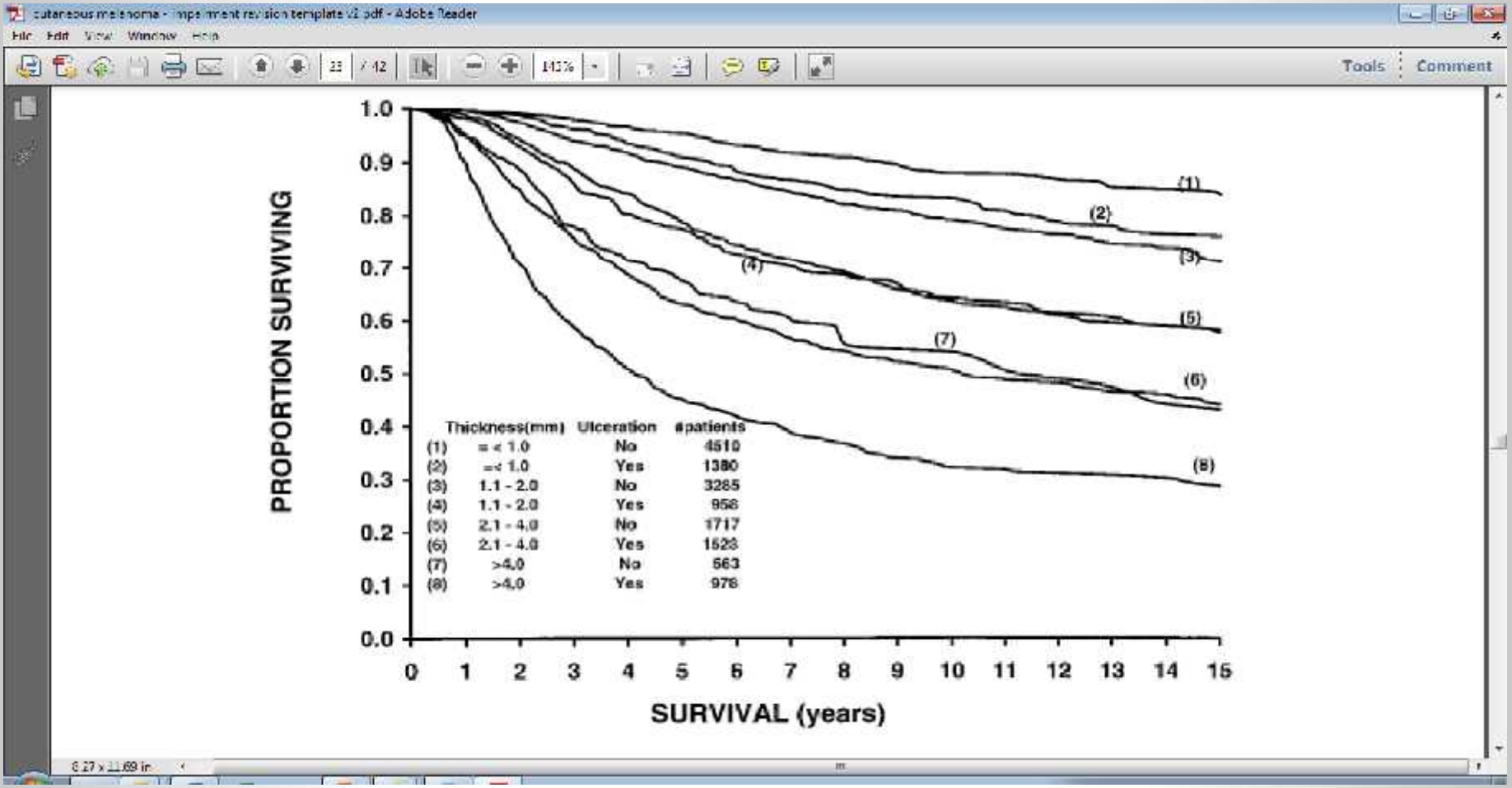
* The number of patients listed are those for whom all the T classification data was available and with sufficient follow-up.

Melanoma Research –

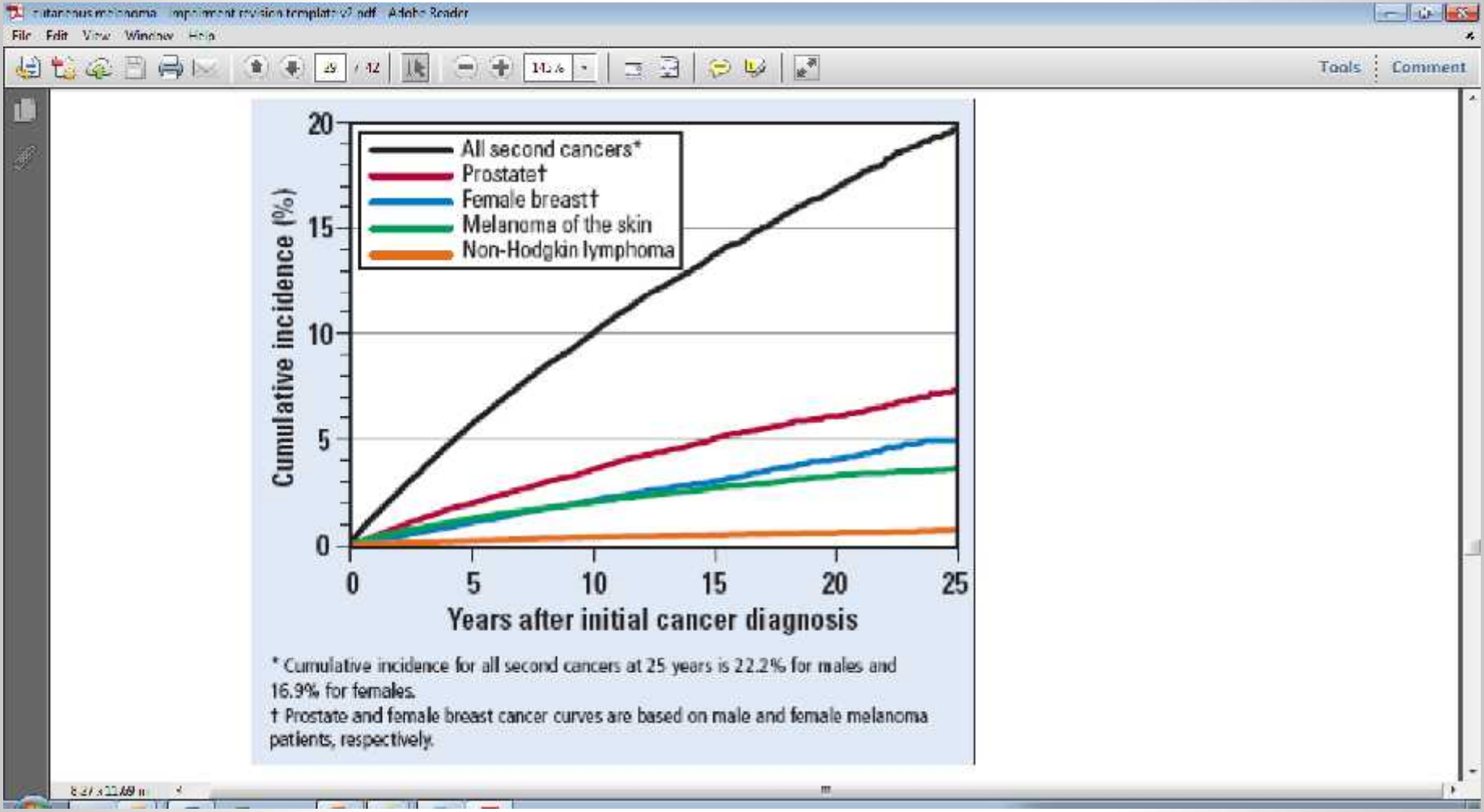


Thickness (mm)	Mitosis	N	Survival rate ± SE 5-Year	Survival rate ± SE 10-Year
0.01–0.50	<1.0	1,194	0.991 ± 0.004	0.974 ± 0.086
0.01–0.50	≥1.0	327	0.970 ± 0.012	0.952 ± 0.017
0.51–1.00	<1.0	1,472	0.977 ± 0.005	0.930 ± 0.010
0.51–1.00	≥1.0	1,868	0.935 ± 0.006	0.871 ± 0.012

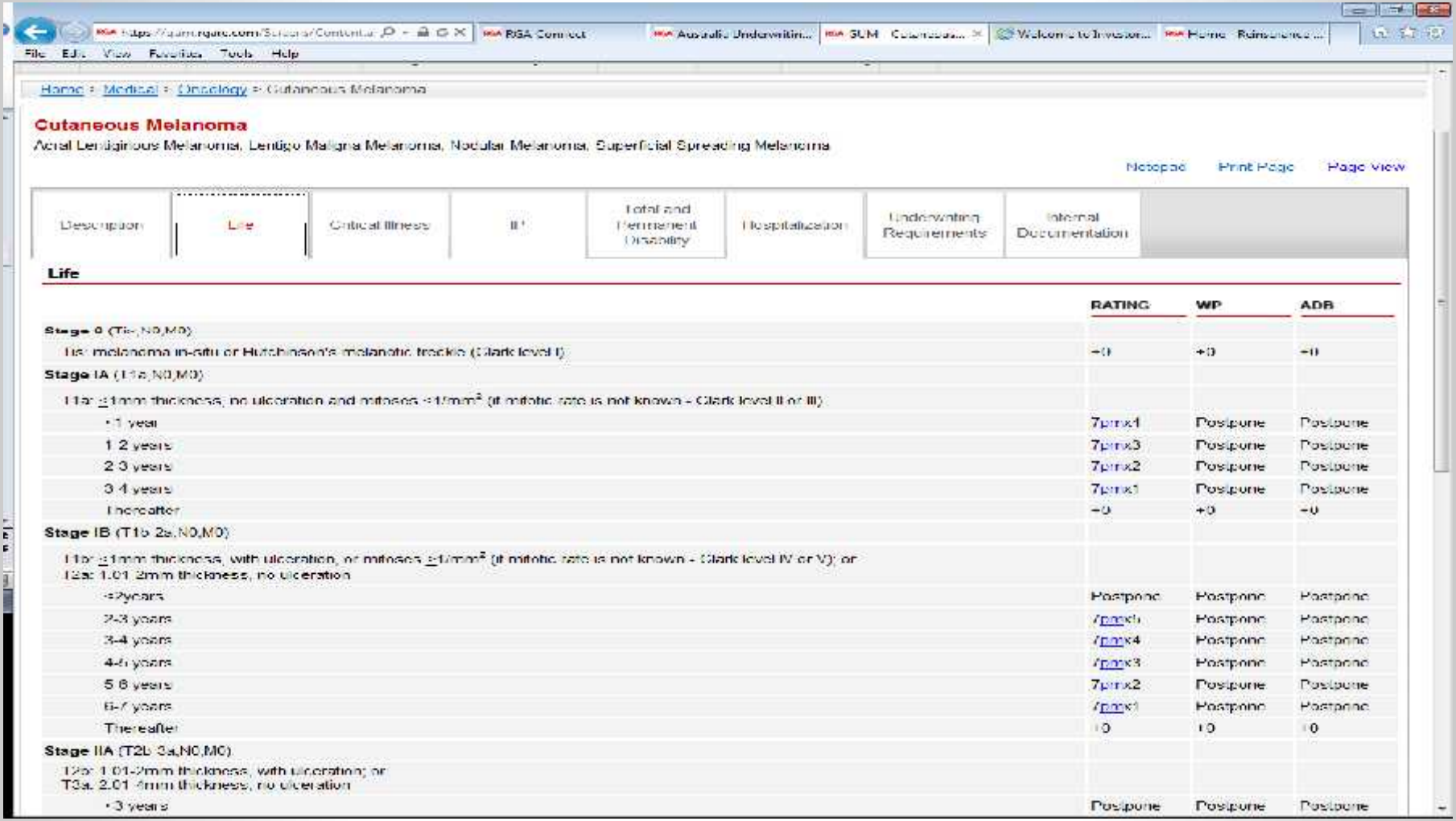
Melanoma Research



Melanoma Research



Temporary Flat Extra



Home > Medical > Oncology > Cutaneous Melanoma

Cutaneous Melanoma

Acral Lentiginous Melanoma, Lentigo Maligna Melanoma, Nodular Melanoma, Superficial Spreading Melanoma

Notepad | Print Page | Page View

Description | Life | Critical Illness | ILP | Total and Permanent Disability | Hospitalization | Underwriting Requirements | Internal Documentation

Life

	RATING	WP	ADB
Stage 0 (Tis, N0,M0)			
Tis: melanoma in-situ or Hutchinson's melanotic freckle (Clark level I)	+0	+0	+0
Stage IA (T1a,N0,M0)			
T1a: ≤1mm thickness, no ulceration and mitoses <1/mm² (if mitotic rate is not known - Clark level II or III)			
<1 year	7pmx1	Postpone	Postpone
1-2 years	7pmx3	Postpone	Postpone
2-3 years	7pmx2	Postpone	Postpone
3-4 years	7pmx1	Postpone	Postpone
Thereafter	+0	+0	+0
Stage IB (T1b,2a,N0,M0)			
T1b: ≤1mm thickness, with ulceration, or mitoses ≥1/mm² (if mitotic rate is not known - Clark level IV or V); or T2a: 1.01-2mm thickness, no ulceration			
<2years	Postpone	Postpone	Postpone
2-3 years	/pmx5	Postpone	Postpone
3-4 years	/pmx4	Postpone	Postpone
4-5 years	/pmx3	Postpone	Postpone
5-6 years	7pmx2	Postpone	Postpone
6-7 years	/pmx1	Postpone	Postpone
Thereafter	+0	+0	+0
Stage IIA (T2b,3a,N0,M0)			
T2b: 1.01-2mm thickness, with ulceration; or T3a: 2.01-4mm thickness, no ulceration			
<3 years	Postpone	Postpone	Postpone

Example

- Melanoma removed from left thigh 2/2010 with re-excision 3/2010 clear - no ulceration - Clark Level II and Breslow Thickness of 0.35mm T1a N0 M0

Example

- Melanoma removed from left thigh 2/2010 with re-excision 3/2010 clear - no ulceration - Clark Level II and Breslow Thickness of 0.35mm T1a N0 M0

- GUM rates as $7 per mille for 3 years for Life cover
- Reinsurer X rates as $5 per mille for 3 years for Life cover
- Reinsurer Y rates as Standard Rates

- Acceptance at Standard Rates implies that there is no excess mortality and this is not backed up by the evidence that is available
- SEER data published in AJCC 7 shows that excess mortality is present
- The survival curve for early stage melanoma starts out flat before sloping downwards with many of the excess deaths not observed until 5 or more years after initial diagnosis
- Need to look at survival curves out beyond 5 years
- There are many late deaths which relate to recurrences within the first 5 years

- GUM utilized survival data based on the results of over 17,000 melanoma patients from several countries around the world and is incorporated in the Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand.
- Whilst it showed that 5 year relative survival is 95.3% it also showed that mortality in the following 5 years (years 6 - 10) is actually worse than in the first 5 years.
- How can Standard Rates be justified?

Questions

Developing Evidence Based Underwriting Guidelines

Appendices

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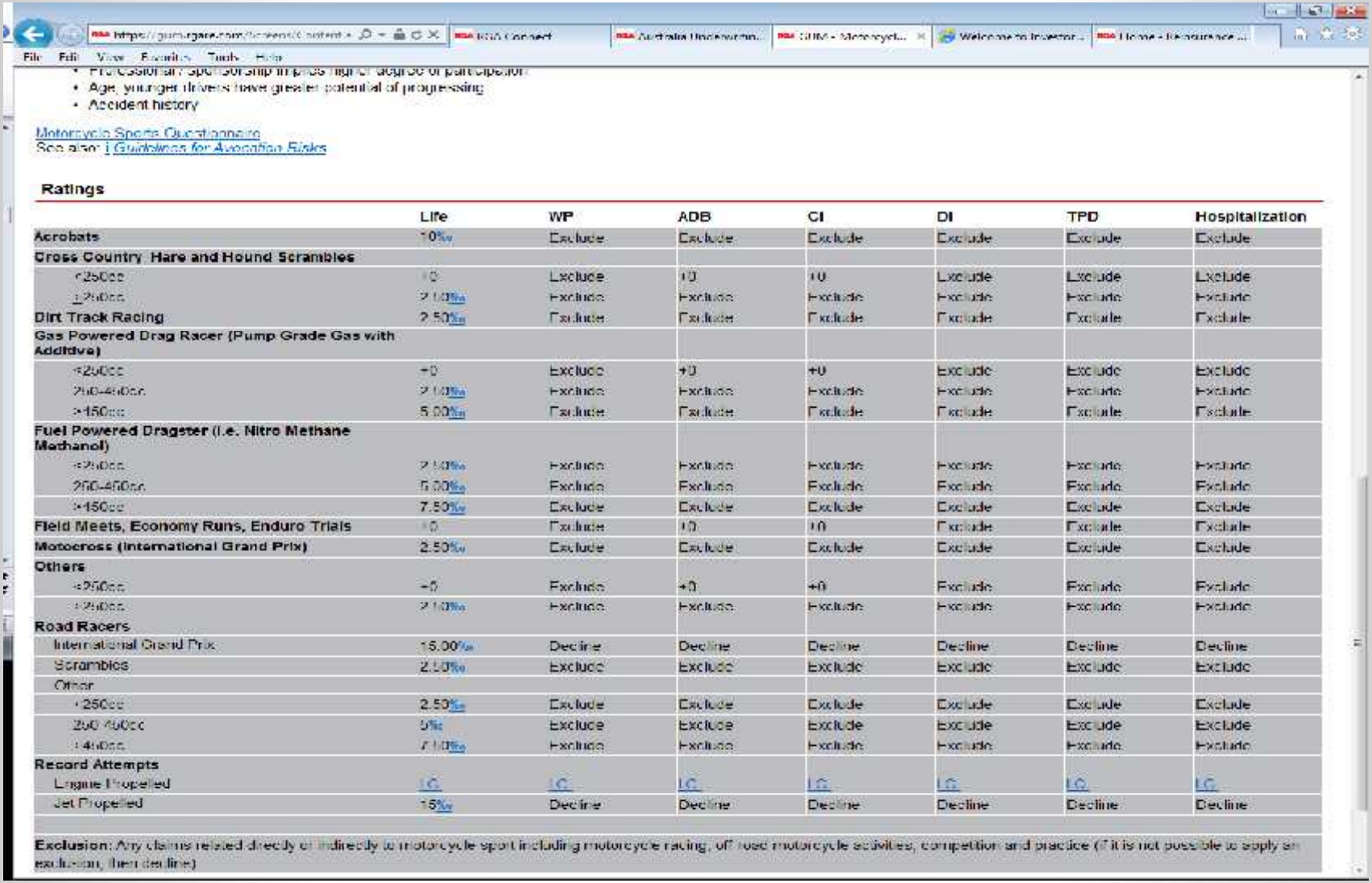
Date May 2013

Rating Method	Mortality Risk Pattern	Applicable for
Permanent Flat Extra	• Level number of extra death	Accident related occupations or avocations
Table Rating	• Level risk • Increasing risk with age	Medical Impairments (hypertension, diabetes)
Temporary Flat Extra	• Decreasing risk	Treated cancer, attempted suicide

Flat Extra Premium



- Professional / sponsorship in cross flight degree of participation
- Age, younger drivers have greater potential of progressing
- Accident history

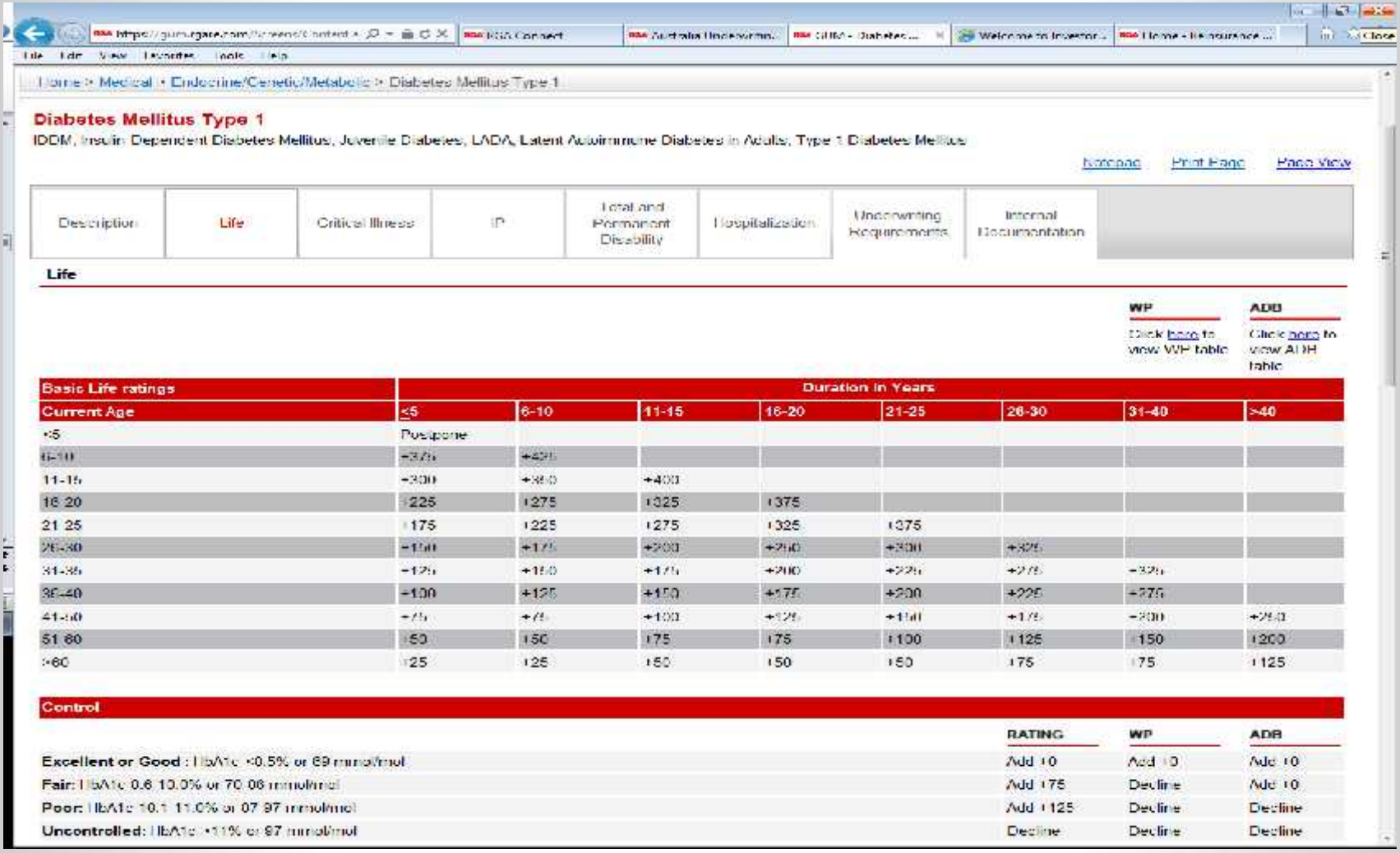
Motorcycle Sports Questionnaire
See also: Guidelines for Avocation Risks

Ratings

	Life	WP	ADB	CI	DI	TPD	Hospitalization
Acrobats	10‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Cross Country, Hare and Hound Scrambles							
<250cc	+0	Exclude	+0	+0	Exclude	Exclude	Exclude
250cc	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Dirt Track Racing	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Gas Powered Drag Racer (Pump Grade Gas with Additive)							
<250cc	+0	Exclude	+0	+0	Exclude	Exclude	Exclude
250-450cc	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
>450cc	5.00‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Fuel Powered Dragster (i.e. Nitro Methane Methanol)							
<250cc	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
250-450cc	5.00‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
>450cc	7.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Field Meets, Economy Runs, Enduro Trials	+0	Exclude	+0	+0	Exclude	Exclude	Exclude
Motocross (International Grand Prix)	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Others							
<250cc	+0	Exclude	+0	+0	Exclude	Exclude	Exclude
250cc	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Road Racers							
International Grand Prix	15.00‰	Decline	Decline	Decline	Decline	Decline	Decline
Scrambles	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Other							
<250cc	2.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
250-450cc	5‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
>450cc	7.50‰	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude
Record Attempts							
Engine Propelled	LC	LC	LC	LC	LC	LC	LC
Jet Propelled	15‰	Decline	Decline	Decline	Decline	Decline	Decline

Exclusion: Any claims related directly or indirectly to motorcycle sport including motorcycle racing, off road motorcycle activities, competition and practice (if it is not possible to apply an exclusion, then decline)

Table Rating



Home > Medical > Endocrine/Genetic/Metabolic > Diabetes Mellitus Type 1

Diabetes Mellitus Type 1

IDDM, Insulin Dependent Diabetes Mellitus, Juvenile Diabetes, LADA, Latent Autoimmune Diabetes in Adults, Type 1 Diabetes Mellitus

Homepage | Print Page | Basic View

Description | Life | Critical Illness | TPD | Total and Permanent Disability | Hospitalization | Underwriting Requirements | Internal Documentation

Life

	WP	ADB
	Click here to view WP table	Click here to view ADB table

Basic Life ratings	Duration in Years							
Current Age	≤5	6-10	11-15	16-20	21-25	26-30	31-40	>40
≤5	Postpone							
6-10	+375	+425						
11-15	+300	+350	+400					
16-20	225	275	325	375				
21-25	175	225	275	325	375			
26-30	+150	+175	+200	+250	+300	+325		
31-35	+125	+150	+175	+200	+225	+275	+325	
36-40	+100	+125	+150	+175	+200	+225	+275	
41-50	+75	+75	+100	+125	+150	+175	+200	+250
51-60	50	50	75	75	100	125	150	200
>60	25	25	50	50	50	75	75	125

Control

	RATING	WP	ADB
Excellent or Good : HbA1c <0.5% or 69 mmol/mol	Add 0	Add 0	Add 0
Fair: HbA1c 0.6-10.0% or 70-86 mmol/mol	Add 75	Decline	Add 0
Poor: HbA1c 10.1-11.0% or 87-97 mmol/mol	Add 125	Decline	Decline
Uncontrolled: HbA1c >11% or 97 mmol/mol	Decline	Decline	Decline

Melanoma Research – why GUM rating was different to other reinsurer and what is the supportive evidence

Table 8 Survival rates for melanoma TNM and staging categories

Pathologic Stage	TNM	Thickness (mm)	Ulceration	No. + Nodes	Nodal Size	Distant Metastasis	No. of Patients	Survival ± SE			
								1-Year	2-Year	5-Year	10-Year
IA	T1a	1	No	0	–	–	4,510	99.7 ± 0.1	99.0 ± 0.2	95.3 ± 0.4	87.9 ± 1.0
IB	T1b	1	Yes or level IV, V	0	–	–	1,380	99.8 ± 0.1	98.7 ± 0.3	90.9 ± 1.0	83.1 ± 1.5
IB	T2a	1	No	0	–	–	3,285	99.5 ± 0.1	97.3 ± 0.3	89.0 ± 0.7	79.2 ± 1.1
IIA	T2b	1.01–2.0	Yes	0	–	–	958	98.2 ± 0.5	92.9 ± 0.9	77.4 ± 1.7	64.4 ± 2.2
	T3a	1.01–2.0	No	0	–	–	1,717	98.7 ± 0.3	94.3 ± 0.6	78.7 ± 1.2	63.8 ± 1.7
IIB	T3b	2.01–4.0	Yes	0	–	–	1,523	95.1 ± 0.6	84.8 ± 1.0	63.0 ± 1.5	50.8 ± 1.7
	T4a	2.01–4.0	No	0	–	–	563	94.8 ± 1.0	88.6 ± 1.5	67.4 ± 2.4	53.9 ± 3.3
IIC	T4b	> 4.0	Yes	0	–	–	978	89.9 ±1.0	70.7 ± 1.6	45.1 ± 1.9	32.3 ± 2.1
IIIA	N1a	> 4.0	No	1	Micro	–	252	95.9 ± 1.3	88.0 ± 2.3	69.5 ± 3.7	63.0 ± 4.4
	N2a	Any	No	2–3	Micro	–	130	93.0 ± 2.4	82.7 ± 3.8	63.3 ± 5.6	56.9 ± 6.8
IIIB	N1a	Any	Yes	1	Micro	–	217	93.3 ± 1.8	75.0 ± 3.2	52.8 ± 4.1	37.8 ± 4.8
	N2a	Any	Yes	2–3	Micro	–	111	92.0 ± 2.7	81.0 ± 4.1	49.6 ± 5.7	35.9 ± 7.2
	N1b	Any	No	1	Macro	–	122	88.5 ± 2.9	78.5 ± 3.7	59.0 ± 4.8	47.7 ± 5.8
	N2b	Any	No	2–3	Macro	–	93	76.8 ± 4.4	65.6 ± 5.0	46.3 ± 5.5	39.2 ± 5.8
IIIC	N1b	Any	Yes	1	Macro	–	98	77.9 ± 4.3	54.2 ± 5.2	29.0 ± 5.1	24.4 ± 5.3
	N2b	Any	Yes	2–3	Macro	–	109	74.3 ± 4.3	44.1 ± 4.9	24.0 ± 4.4	15.0 ± 3.9
	N3	Any	Any	4	Micro/ Macro	–	396	71.0 ± 2.4	49.8 ± 2.7	26.7 ± 2.5	18.4 ± 2.5
IV	M1a	Any	Any	Any	Any	Skin, SQ	179	59.3 ± 3.7	36.7 ± 3.6	18.8 ± 3.0	15.7 ± 2.9
	M1b	Any	Any	Any	Any	Lung	186	57.0 ± 3.7	23.1 ± 3.2	6.7 ± 2.0	2.5 ± 1.5
	M1c	Any	Any	Any	Any	Other visceral	793	40.6 ± 1.8	23.6 ± 1.5	9.5 ± 1.1	6.0 ± 0.9
Total							17,600				

Reproduced from Balch CM, Soong SJ, Gershenwald JE, Thompson JF, Reintgen DS, Cascinelli N et al. Prognostic factors analysis of 17,600 melanoma patients: validation of the American Joint Committee on Cancer melanoma staging system. J Clin Oncol 2001; 19(16):3622–3634.

Mortality Ratio Exercise

Actual Deaths	Expected Deaths	Total Mortality Ratio
14	3.56	393%
69	20.45	337%
159	57.55	276%
104	45.56	228%
346	127.12	272%

Extra Death Rate Calculation Exercise

Actual Deaths	Expected Deaths	Person - Years of Exposure	Mortality Ratio	Extra Death Rate (per 1000)
14	3.56	4,570	393%	
69	20.45	11,820	337%	
159	57.55	14,680	276%	
104	45.56	5,360	228%	
346	127.12	36,430	272%	

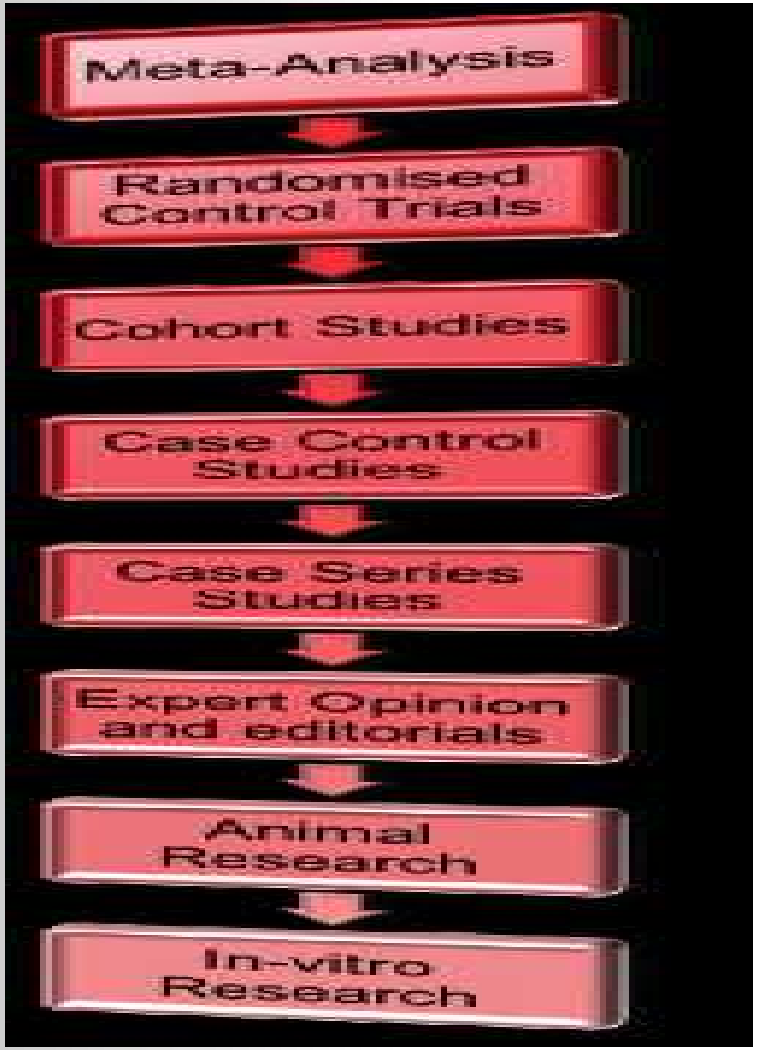
Extra Death Rate Calculation Exercise

Actual Deaths	Expected Deaths	Person-Years of Exposure	Mortality Ratio	Extra Death Rate (per 1000)
14	3.56	4,570	393%	2.28
69	20.45	11,820	337%	4.11
159	57.55	14,680	276%	6.91
104	45.56	5,360	228%	10.90
346	127.12	36,430	272%	6.01

How and from where does RGA conduct its research

- Research is collected that relates to the specific medical condition, occupation or avocation being considered
- Data can be sourced from:
  - publicly available authoritative and reliable sources including providers of health information such as EBSCO, Elsevier etc.
  - journals, libraries, professional associations and Government sources
- Meta-analysis studies are particularly valuable as they aggregate and assimilate the findings of multiple studies
- We try to use evidence that is near the top of the Evidence - Based Medicine hierarchy

What is the Evidence - Based Medicine Hierarchy and its critical factors?



- Study Design – number of affected individuals/selection and classification criteria
- Statistical reliability – confidence levels/sensitivity and specificity/limitations

- Disclosures – conflicts of interests, sponsorship
- Post publication developments - has the study been retracted or withdrawn or have there been any corrections or replies?

What does RGA require from an article or report to be included in its research for analysis?

- It must be pertinent to the question we are trying to answer
- The study population should be similar to individuals who apply for insurance
- Data provided on survival or mortality should be reflective of all-cause mortality and not mix all-cause mortality with disease-specific mortality or morbidity endpoints
- The size of the study should be adequate and the length of follow-up should be sufficient to identify the pattern of mortality associated with the disease being studied