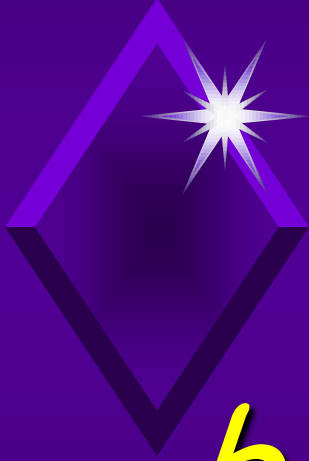




*Fixed versus removable  
prosthetics:  
higher costs,  
but higher benefit?*



*Asbjørn Jokstad  
Institute of Clinical Dentistry  
University of Oslo*

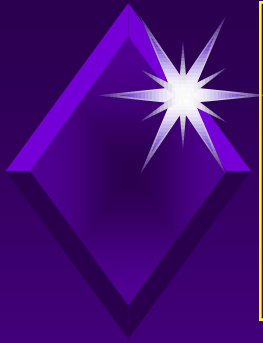


# Three questions

1. How has clinical evidence of the two treatment methods been demonstrated?
2. Have economic aspects been included in clinical studies?
3. Have these economic aspects been included in comparative studies with the two treatment methods?



*What is health  
economics and cost-  
benefit analysis?*

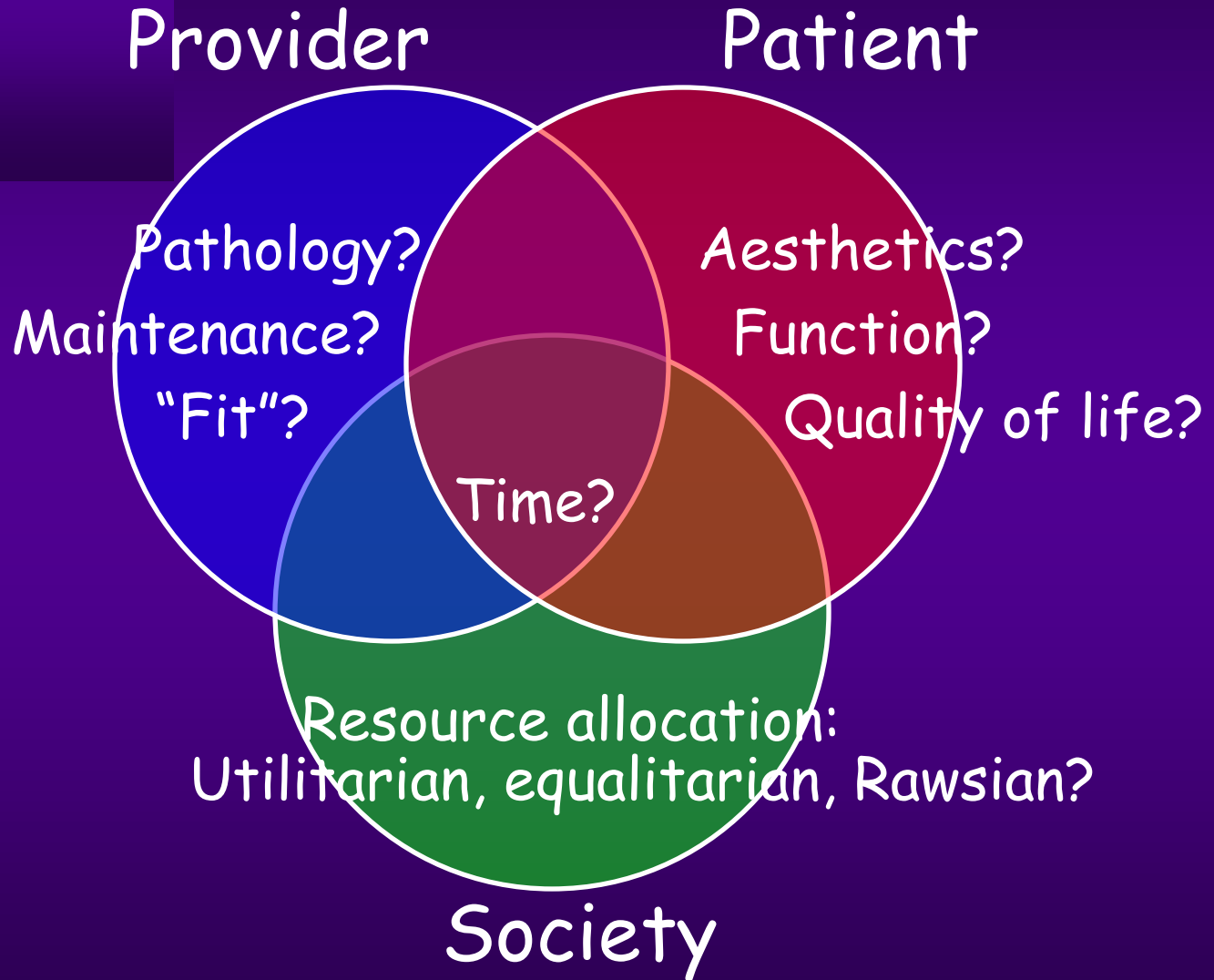


# *Methodological issues in cost-benefit considerations*

1. From whose perspective should therapy effectiveness be assessed?

# Whose perspective?

1. From whose perspective should therapy effectiveness be assessed?





# *Methodological issues in cost-benefit considerations*

1. From whose perspective should therapy effectiveness be assessed?
2. Which indicators should be used to describe health and treatment outcomes, and how can values be assigned to the different indicators?

# *Which indicators?*

1. From whose perspective should therapy effectiveness be assessed?
2. Which indicators should be used to describe health and treatment outcomes, and how can values be assigned to the different indicators?

- ◆ Aesthetics?
- ◆ Functional measures?
- ◆ Patient satisfaction?
- ◆ Time?
- ◆ Adverse effects on remaining oral tissues?
- ◆ Longevity?
- ◆ Quality of life?





# *Methodological issues in cost-benefit considerations*

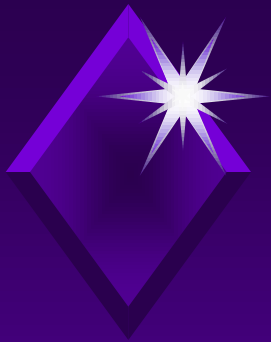
1. From whose perspective should therapy effectiveness be assessed?
2. Which indicators should be used to describe health and treatment outcomes, and how can values be assigned to the different indicators?
3. What is the quality of the data available for appraisal?

1. From whose perspective should therapy effectiveness be assessed?
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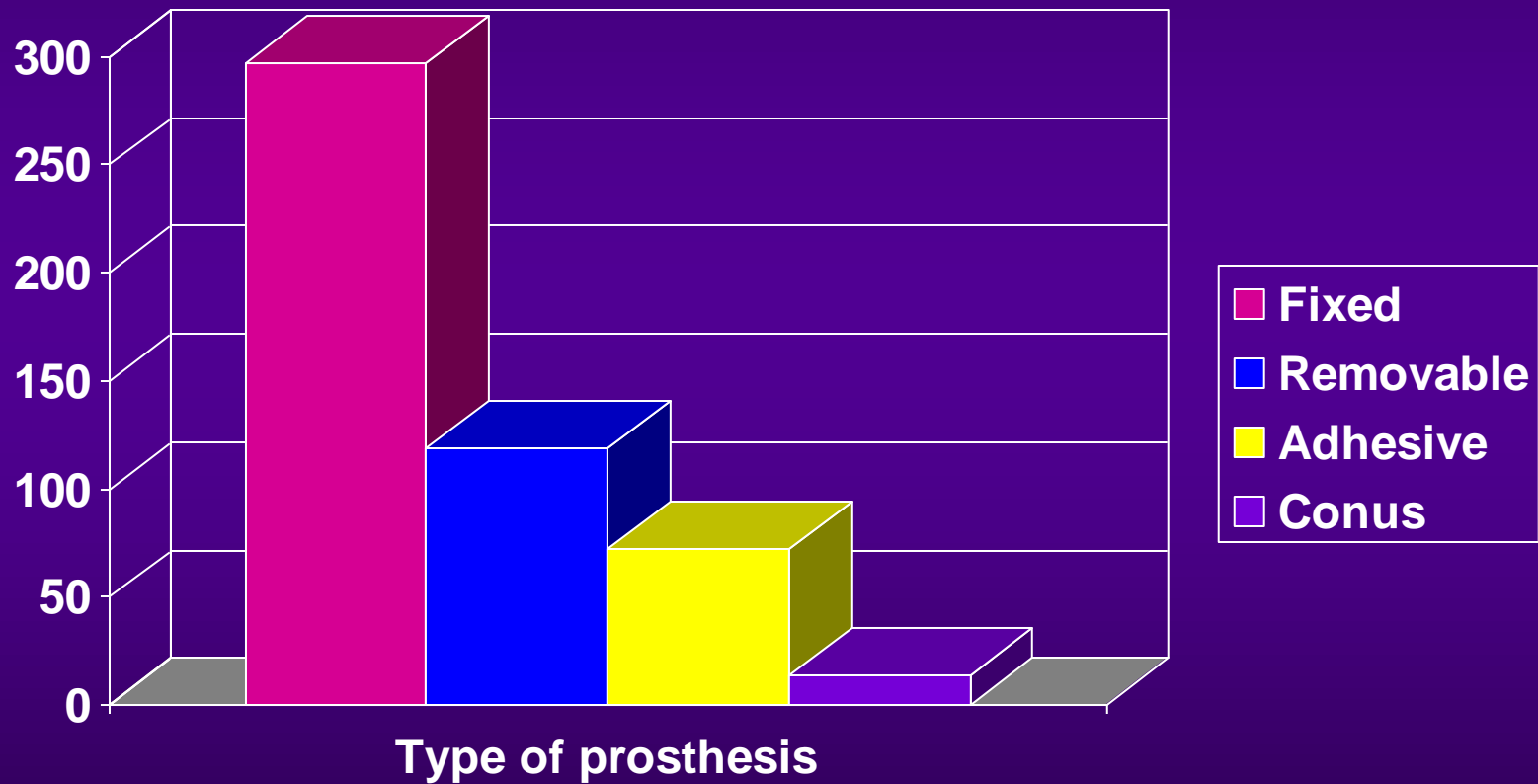
# Appraisal of effectiveness: appropriate study designs

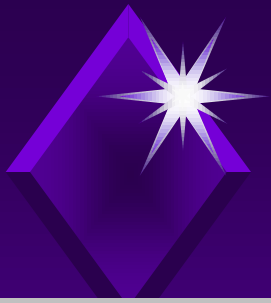
(From CEBM: <http://cebm.jr2.ox.ac.uk/docs/levels.html>)

- 1 **Systematic review (RCTs)**  
Individual RCTs (narrow confidence interval)
- 2 **Systematic review of cohort studies**  
Individual cohort study (and low quality RCTs)
- 3 **Systematic review of case-control studies**  
Individual case-control study
- 4 **Case-series and poor quality cohort and case-control studies**
- 5 **Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"**



# *Clinical studies, partial tooth loss, (n=490)*





# *Study design terminology = tower of Bable?*

**analytical study**

**case control study (89)**

**case serie**

**case study, case report**

**cause-effect study**

**clinical trial (79)**

**cohort study (89)**

**cohort study with**

**historical controls**

**controlled clinical trial (95)**

**cross-sectional study (89)**

**descriptive study**

**diagnostic meta-analysis**

**diagnostic study**

**double blind randomized  
therapeutical trial with  
cross-over design**

**ecological study**

**etiological study**

**experimental study**

**explorative study**

**feasability study (79)**

**follow-up study (67)**

**historical cohort study**

**incidence study**

**intervention study**

**longitudinal study (79)**

**N=1 trial**

**non-randomized trial with  
contemporary controls**

**non-randomized trial with  
historical controls**

**observational study**

**prevalence study**

**prospective cohort study**

**prospective follow-up study,  
observational or experimental**

**prospective study (67)**

**quasi-experimental study**

**randomized clinical trial, RTC**

**randomized controlled trial, RCT(89)**

**retrospective cohort study**

**retrospective follow-up study**

**retrospective study (67)**

**surveillance study**

**survey, descriptive survey**

**therapeutic meta-analysis**

**trohoc study**



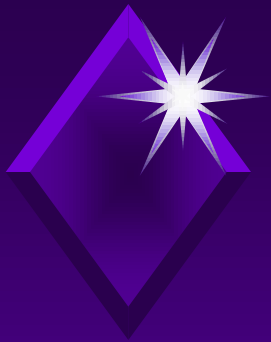
# *Study designs- contemporary terms*

- (Case study/series)
- Case-Control Study
- Cohort Study
- Cross-Sectional Survey
- Randomised Controlled Trial

# Clinical studies, Int J Prosthodont 1989-1999, design characteristics

	Number of cohorts			Observation period	Size		
	1	2	>2	span	average	span	average
<b>Prospective (n=44)</b>	39	2	3	48 days - 23 years	4.7 years	4 -300	56
<b>Retrospective (n=17)</b>	13	1	3	2 - 20 years	7.2 years	24 - 273	95
<b>Case series (n=15)</b>	15	-	-	3 mths - 13 years	4.4 years	8- 344	88
<b>RCT (n=10)</b>	-	7	3	14 days - 4 years	< 1 year	14-85	43

	Size	
	span	average
<b>Cross-sectional (n=25)</b>	13- 879	202
<b>Experimental (n=34)</b>	1 -79	22
<b>Case-controll (n=10)</b>	8- 250	95



# *Why so few RCTs - and thereby basis for economic analysis?*

- ◆ Ethical issues - RCT vs uncertainty
  - ◆ dentist preference
  - ◆ patient preference
- ◆ Similar arms in RCT studies?
  - ◆ patient satisfaction
- ◆ Complex - and never identical - treatment considerations:



# *Costs considerations in prosthetic therapy*

- ◆ Fees
- ◆ Survival
- ◆ Yearly expenditures
- ◆ "Worst-case"- scenario

Costs =

Biological - Economical - Psychosocial



## *Choice of therapy ?*

### Patient information:

- pain region 44-45
- would like a better chewing situation in 4. quadrant



### Findings:

- 35: mesially tipped
- 36: caries distally, bifurcation involvement, interference 25/36
- 47: root remains

Upper jaw front: aesthetics



Findings:

42, 41, 31, 32: attachment loss, mobile

44: periapical lesion

45: caries distally, fractured reamer

47: ankylosis



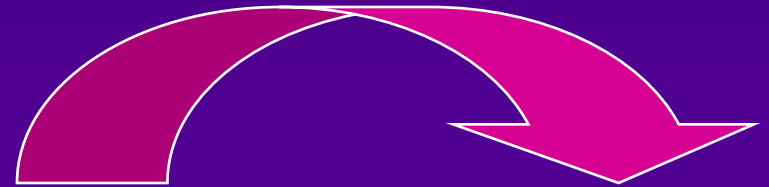
# *Choice of therapy - possibilities*

Possible technical solutions

Material properties



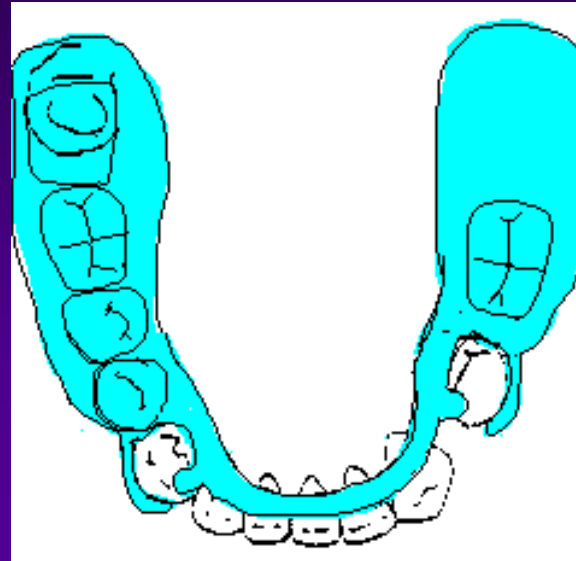
Dentist / technician-  
knowledge & capabilities



Iatrogenic  
damage?  
= biologic cost



# Acrylic partial denture



Fee: NOK 4.000-6.000

## Considerations:

Dental vs lingual bar?

Extraction front teeth?

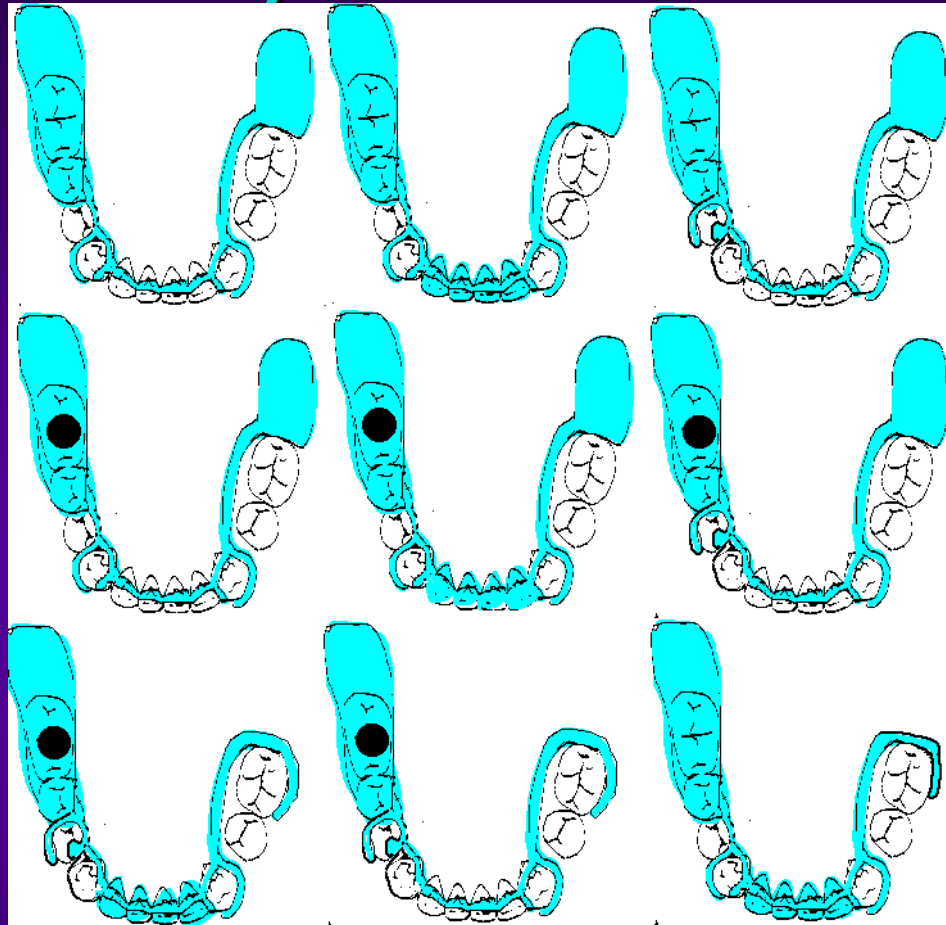
Extraction 36 mesial root?

Clasps 33 or 35?

Extraction 44 and/or 45?

Extraction 47?

# Cast partial denture



Fee: NOK 7.000 - 17.000

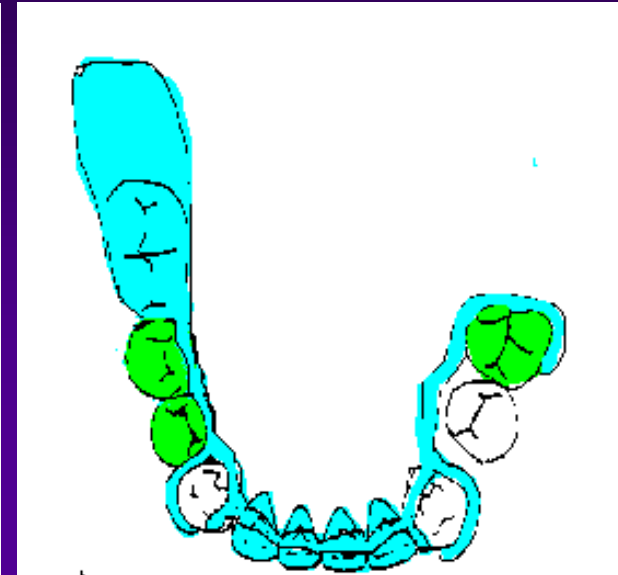
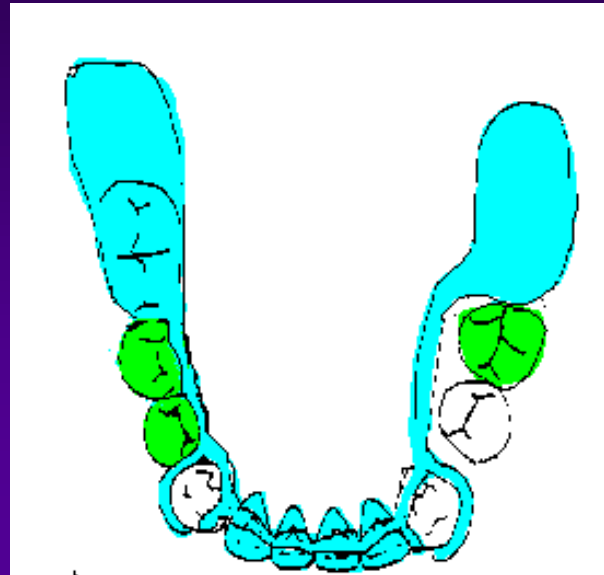
Additional Considerations

saddle 3. quadrant?

clasp 43 or 44 or 45?

47: attachment or gold coping or extraction?

# Cast denture + crowns



Fee: NOK 16.000-26.000

Additional considerations

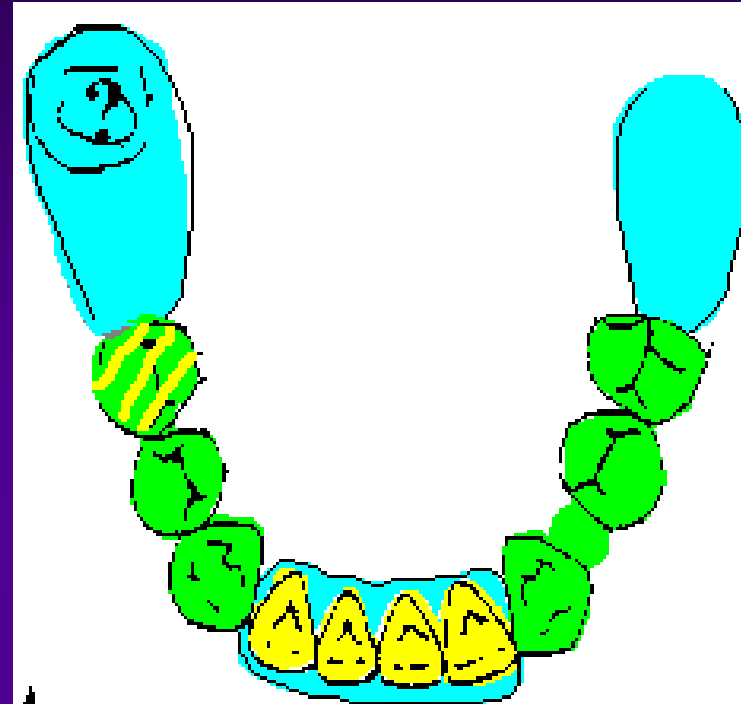
soldered 44 and 45?

36 extraction or crown?

Milled crowns?

Intra- or extracoronal attachments?

# Conus bridge



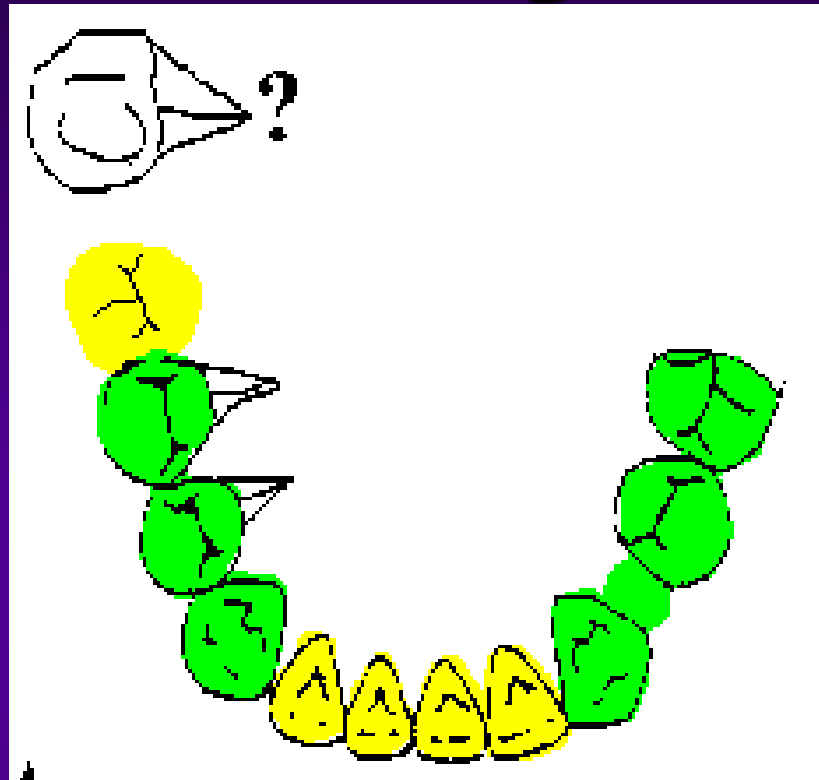
Fee: NOK 30.000-35.000

## Considerations:

47, 36, 45: extraction or gold coping or attachment?

43/44/45: separation?

# Fixed bridge



Fee: NOK 30.000-35.000

## Considerations

Conventional alloy or titan-ceramic or gold acrylic?

Znphosphat or GIC or resin cement?

Bridge extention 46? 46+47 ?





# *Choice of therapy - preferences*

Patients differ regarding views and choice of values -  
i.e. "personality profile"

Håkestam, Söderfeldt: 3 groups: health - appearance -  
longevity

Lutz: 5 groups: Orally: functional - presentable - healthy  
- beautiful - metal-free

Reflected by statements on e.g.

- ◆ Total rehabilitation or minimal solution?
- ◆ Demand for longevity e.g. 1year --- 30 year?
- ◆ Demand for fixed removable prosthetic solutions?
- ◆ Expectance of treatment?
- ◆ Risk attitude to iatrogenic damage, i.e. future prognosis of tooth?
- ◆ Patient economy.



Cost-benefit evaluations must be individual



# *Choice of therapy - aims*

1. Technical solutions

2. Patient views and choice of values

Individually aimed cost-benefit evaluations

3. Realistic aims with different technical solutions?

◆ Restore function?

◆ Change appearance?

◆ Prevent future problems?

= psychosocial values/costs

+

◆ Level of, or risk for, iatrogenic damage?

= biologic costs



# *Choice of therapy - costs*

1. Technical solutions
2. Patient views and choice of values  
Individually aimed treatment planning
3. Realistic aims with different technical solutions?
4. Alternative technical solutions  
Economic costs  
+  
Prognosis = biological costs  
psychosocial costs  
economic costs



# *Economic costs over time*

- ◆ Initial fee

- ◆ Prognosis

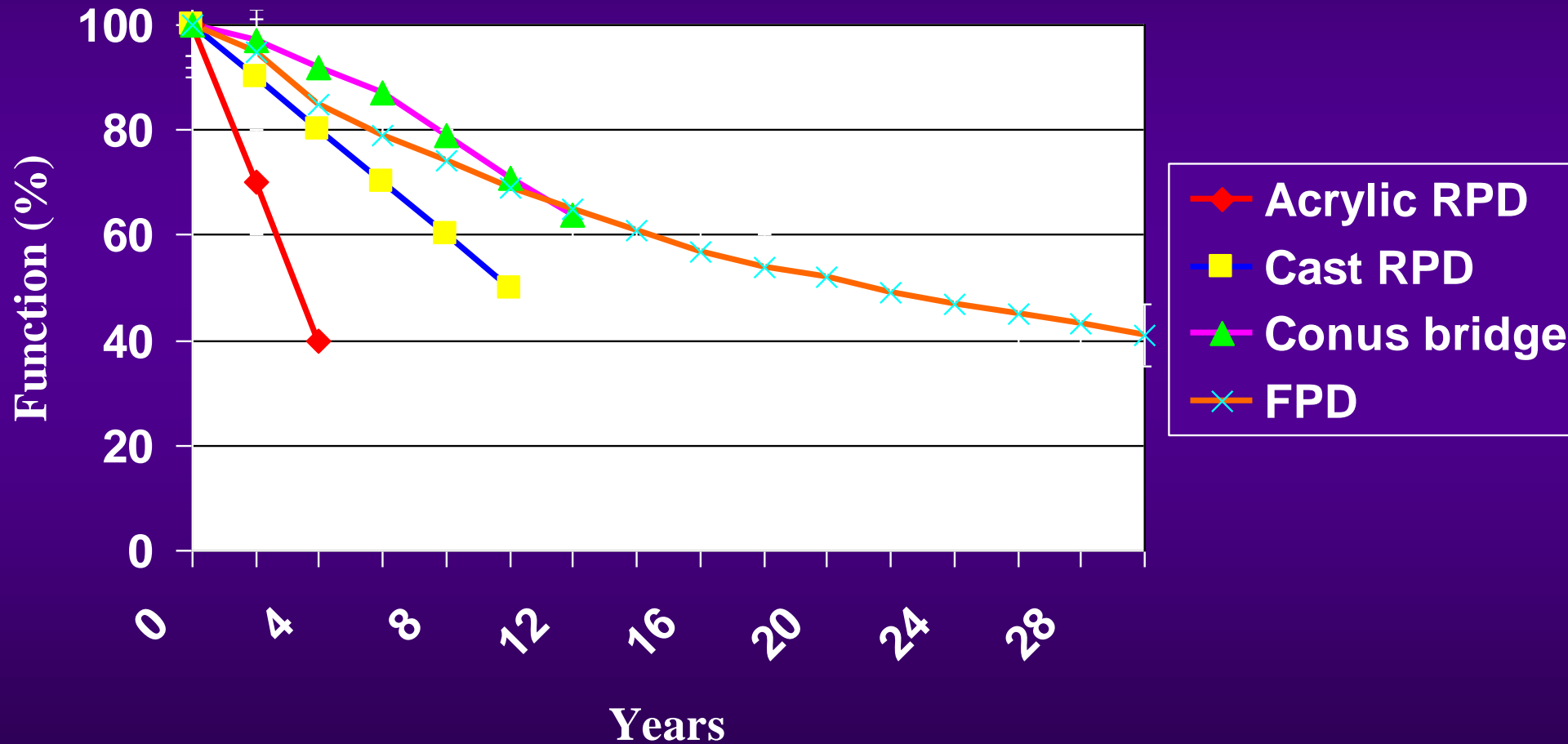
  - a. Average survival

  - b. Yearly maintenance in time = costs



$a \times b = \text{economic costs over time}$

# *Survival, published data*





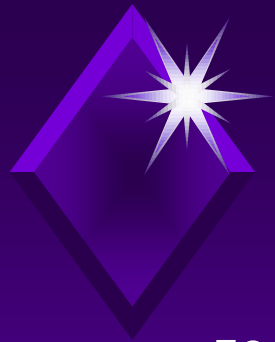
# Maintenance (minutes/year)

<u>Type:</u>	<u>Control</u>	<u>Adjustments</u>	<u>Repair</u>	<u>Sum</u>
Acrylic RPD	10	clasp 2.year-10 occlusion 6.year-60	rebase 3.year-60 tech.prob 10%/2y	50
Cast RPD	10	clasp 2.year-10 occlusion 6.year- 60	rebase 6.year-60 tech.prob 8%/2y	40
Conus bridge	10	retention 2.year-10 occlusion 6.year- 60	rebase 6.year-60 endodontic 20%/10y tech.prob 100%/5y	50
FPD	10		endodontic 8%/10y tech.prob. 20%/5y	20

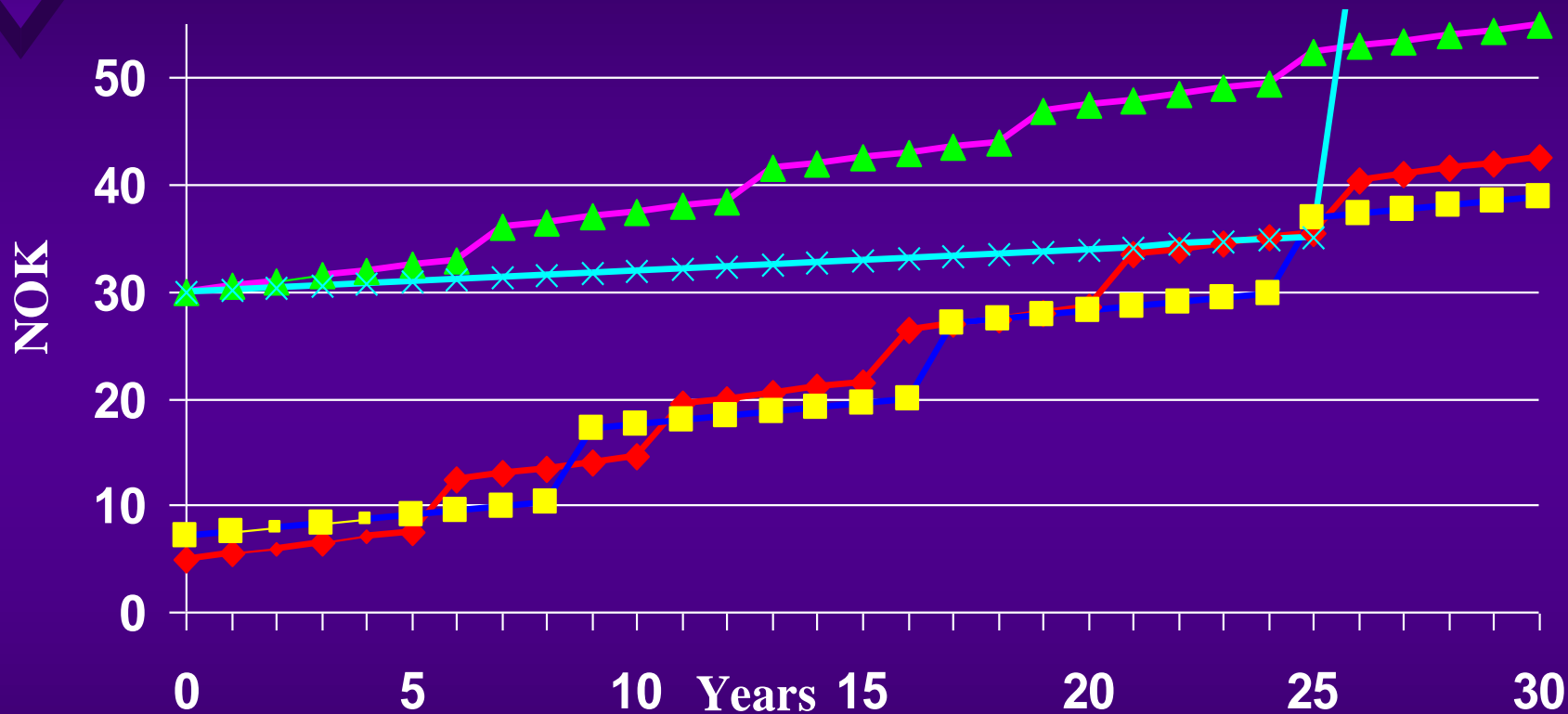


# *Summary, fee + maintenance*

1 clasp part.dent.	NOK 4 - 6.000	50 min
2 cast part.dent.	NOK 7- 17.000	40 min
2b " " " + crowns	NOK 16- 26.000	45 min
3 conus bridge	NOK 30- 35.000	50 min
4 bridge	NOK 30- 35.000	20 min



# *Economic costs over time - theoretical model*



## Inadequacies of model:

Costs are not adjusted for inflation

Replacement not always possible

Based on average data - not on individual practitioners'





# *Other potential costs*

1. What can happen if and when the prosthesis fail?
- 2 . How probable is it that the prosthesis which I have made will fail?



Potential costs  
economic - biologic - psychosocial



# "Worst case" situation

i.e. = failure of prosthesis within 1. year in spite of:

- ◆ *Correct indications and clinical procedures*
- ◆ *Esthetically acceptable and technically free of discrepancies at the time of delivery*
- ◆ Probability: *percentage of cases?*
- ◆ Consequence: *usually alternative / new prosthesis*



Economic costs: *remake free of charge common, to keep good patient relationship*

+

biologic & psychosocial costs



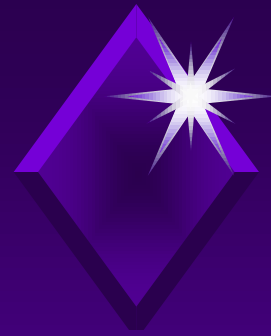
# Summary - "worst case"

<u>Type:</u>	<u>Problem:</u>	<u>%</u>	<u>Additional cost</u>
Acrylic RPD	maladaptation	<25	5.000 <i>Alt.prosthesis</i>
Cast RPD	maladaptation	<=8	7.500 <i>Alt.prosthesis</i>
Conus bridge	tight retention	0.5	1 hour <i>correction</i>
FPD	abutment fracture	0.5	15-30.000 <i>implant</i>



## *Economic analysis in prosthodontics - what is needed?*

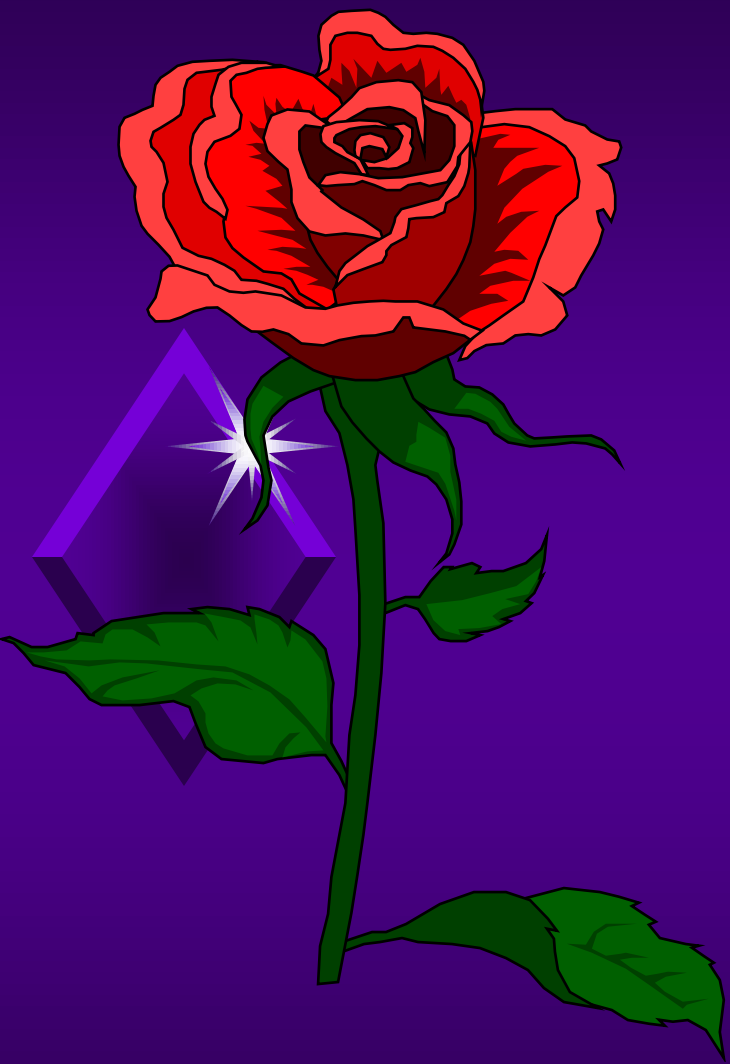
- ◆ More original efficacy clinical trials with appropriate study designs
- ◆ Trials with adequate length
- ◆ Trials using multiple criteria for measuring treatment outcomes
- ◆ Trials focussing on patient centered outcomes
- ◆ Surveys of patient values on oral health and prosthetic rehabilitation ("utility" values)



## *Everyday application of economic analysis in patient treatment*

Costs=Biological, Economical, Psychosocial

1. Possible technical solutions
2. Patient views and choice of values
  - ◆ Individually aimed treatment planning
3. Realistic aims with different technical solutions
4. Choice of technical solution integrating:
  - ◆ Fees
  - ◆ Survival
  - ◆ Yearly expenditures
  - ◆ "Worst-case"- scenario



*Thank you  
for your  
kind  
attention*